



DPC: 24/30483339 DC

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Date: 15 February 2024

Origin: European

Latest date for receipt of comments: 09 April 2024

Project No. 2023/02799

Responsible committee: B/542/7 Slate and stone products

Interested committees:

Title: Draft BS EN 12326-2 Slate and stone for discontinuous roofing and external cladding. Part 2: Test methods.

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Full document details: 24/30483339 DC

Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

For national standards, comments will be reviewed by the relevant UK national committee and the resulting standards published as a British Standard.

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Please indicate whether you consider the UK should submit a negative (with supporting technical reasons) or positive vote on this draft. Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

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- **Annotated drafts are not acceptable and will be rejected.**
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Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/ Figure/Table/Note	Type of comment	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	

English Version

Slate and stone for discontinuous roofing and external cladding - Part 2: Test methods

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

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

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.

This draft European Standard was established by CEN 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 CEN-CENELEC Management Centre has the same status as the official versions.

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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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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (prEN 12326-2:2024) 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 12326-2:2011.

This document is one of a series of product standards for building materials, which consists of the following parts:

- *Part 1: Specifications for slate and carbonate slate*
- *Part 2: Test methods*

1 Scope

This document specifies test methods for slate, carbonate slate, schist and schistose stone for discontinuous roofing and external cladding, as defined in 3.1, 3.2, and 3.3 of EN 12326-1:2014 and 3.1 of prEN 12326-3:2021, used for assembly into discontinuous roofs and external wall cladding. In this sense, when the test describes a slate, it could also be considered as carbonate slate.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 12326-1:2014, *Slate and stone for discontinuous roofing and external cladding - Part 1: Specifications for slate and carbonate slate*

3 Terms, definitions and symbols

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

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

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

3.1 Terms and definitions

3.1.1

constant mass

mass achieved when two successive weightings taken 24 h apart do not differ by more than 0,005 g or 0,05 % of the mass of the test piece, whichever is greater

3.1.2

modulus of rupture

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

Note 1 to entry: In this document, 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 modulus of rupture test	(N/mm ²)/s
B	width	mm
C'_a	apparent mass percentage calcium carbonate in slate	%
C_c	carbonate carbon content of slate	%
$\bar{C}_c$	mean carbonate carbon content of a slate	%
C_d	carbon dioxide content of a test piece or standard preparation	%

C_{nc}	non-carbonate carbon in a slate	%
C_T	total carbon in a slate	%
e_{1A} to e_{4A}	individual thickness measurements in the SO ₂ exposure test	mm
e_i	Individual thickness measurement of slates or test pieces	mm
E_i	thickness of a individual slate or a test piece	mm
$\bar{e}_{i8}$	mean of 8 individual thickness measurements in the modulus of rupture test	mm
E_d	maximum deviation of the thickness of a slate from the mean thickness	%
e_{mi}	mean of three thickness measurements used to determine the rate of application of load in the modulus of rupture test	mm
e_{max}	the individual thickness measurement from the four individual thickness measurements with the maximum difference with the mean individual thickness carried out on one slate or a test piece	mm
e_s	thickness of the softened layer in the SO ₂ exposure test	mm
F_d	deviation from flatness of a slate	mm
$\lambda K\alpha$	wavelength of the α radiation used in the x-ray diffraction analysis	nm
l	length	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_w	wet mass of a test piece in the water absorption test	g
n	number of slates subject to a test	-
P_i	failure load of individual slates in the modulus of rupture 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_i	modulus of rupture of individual 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 _l	rate of application of the load in the modulus of rupture test	N/s
α	deviation of a slate from rectangle	°
θ	angle of incidence of the beam in the X-ray diffraction analysis	°

4 Number of slates required for testing

Table 1 indicates the number of slates required for each test.

In addition, specimens for testing shall be representative of the product and any processes that the stone is subjected to.

Table 1 — Number of slates required to carry out each test

Test	Number of slates required for each test
Length and width	1
Straight edges	1
Rectangularity	1
Individual thickness	1
Curvature	1
Modulus of Rupture	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
Where there is a possibility that the slates being tested may contain localized harmful inclusions, such as calcite veins or oxidizable 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. Sampling should preferably be carried out by the recipient or his representative in the presence of the supplier. For the tests marked * the number of slates required depends on their size. The individual tests indicate the size and number of test pieces or powdered test pieces required.	
NOTE 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.	

5 Determination of the length (l) and width (b) 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 oversize corner(s) at an angle of approximately 45° from a point 50 mm from the corner, using a suitable cutting tool.

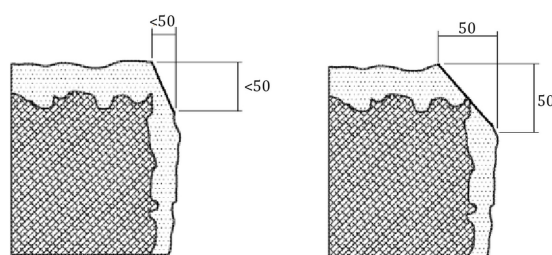


Figure 1 — Corner oversized within 50 mm of the corner.

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.

5.6 Test report

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 document, i.e. prEN 12326-2:2024.

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.

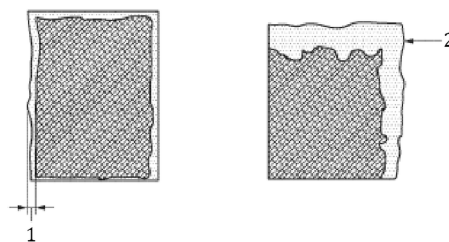
6.2.2 A steel bar longer and thicker than the slates under test with one edge which shall not deviate from a straight edge by more than $\pm 0,1$ mm.

6.3 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, the oversize corner(s) shall be removed at an angle of approximately 45° from a point 50 mm from the corner, using a suitable cutting tool.

6.4 Procedure

Place the slate with the chamfered edge facing down and position the straight edge of the steel bar alongside one edge of the slate. Using the steel rule measure the maximum deviation (S_{d1}) of the edge of the slate from the steel bar to the nearest 0,5 mm. Ignore small deviations and flaking resulting from the dressing of the edges (Figure 1). Repeat and record the deviation for the other edge (S_{d2}).



Key

- 1 deviation from a straight edge
- 2 acceptable minor deviations and flaking

Figure 2 — Illustration of acceptable small variations and flaking resulting from the dressing of the edges of slates. The chamfer is shown facing upwards

Measure the length of the slate (l_s) by the method given in Clause 5.

6.5 Expression of the results

For slates of 500 mm or longer and for each edge calculate the percentage deviation from a straight edge (S_d) using the formula:

$$S_d = \frac{S_{dx} \cdot 100}{l}$$

where

- S_{dx} is the deviation for each edge, S_{d1} and S_{d2} in millimetres,
- l is the length of the slate, in millimetres.

6.6 Test report

For slates less than 500 mm long, report for each edge the deviation in mm from a straight edge.

For slates 500 mm long or longer, report for each edge the deviation in mm from a straight edge and the percentage deviation.

The test report shall also include the identification of the product, reference to this method and the identifier of this document, i.e. prEN 12326-2:2024.

7 Determination of the rectangularity of slates

7.1 Principle

The deviation from a right angle of the angles enclosing any two sides is measured using a goniometer or an engineering set square. The deviation is calculated as a percentage of the length.

7.2 Apparatus

7.2.1 A set square with blades longer and thicker than the slates under test calibrated to an angular deviation of 0,1°.

7.2.2 Alternatively, a goniometer (calibrated adjustable square) with blades longer and thicker than the slates under test capable of being read to 0,1°.

7.3 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 oversize corner(s) at an angle of approximately 45° from a point 50 mm from the corner using a suitable cutting tool.

7.4 Procedure

Place the slate in the set square with one end tightly against the blade so that the long edge of the slate touches the opposite blade. Using the steel rule measure the maximum deviation (r_{d1}) of the long edge from the opposing blade of the set square to the nearest 0,5 mm.

Repeat for all four corners to obtain the values (R_{d2}), (R_{d3}) and (R_{d4}).

Alternatively, if a goniometer is used read the deviation in degrees to the nearest 0,1°.

Measure the length of the slate (l_s) by the method given in Clause 5.

7.5 Expression of the results

For each edge calculate the percentage deviation (R_d) from a rectangle using the formula:

$$R_d = \frac{r_{d\max} \cdot 100}{l_s}$$

where

$r_{d\max}$ is the maximum value of (r_{d1}) to (r_{d4}), in millimetres

l_s is the slate length, in millimetres

Alternatively, if a goniometer has been used calculate the percentage deviation using the formula:

$$R_d = \tan \alpha \cdot 100$$

where

α is the maximum angle measured in 7.4.

7.6 Test report

Report the maximum percent deviation.

The test report shall also include the identification of the product, reference to this method and the identifier of this document, i.e. prEN 12326-2:2024.

8 Determination of the thickness of individual slates

8.1 Principle

The thickness of a slate is measured at four points using a micrometer, or similar equipment.

Four individual readings (e_i) shall be taken.

The mean of the four individual readings corresponds with the thickness of that individual slate (E_i).

8.2 Apparatus

Dial gauge, micrometer or similar equipment capable of measuring thickness to 0,05 mm with a contact area of 5 mm to 10 mm diameter.

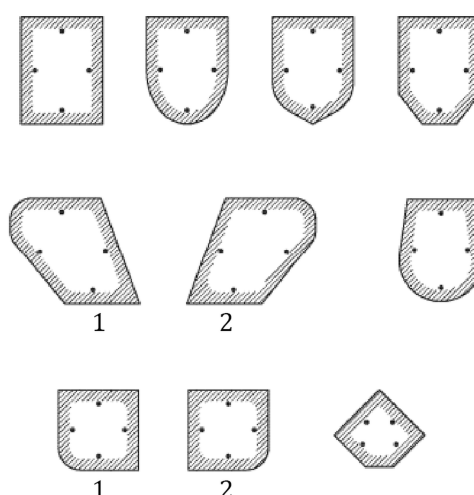
8.3 Preparation of test pieces

Whole slates are used. They do not require any preparation.

8.4 Procedure

Measure the thickness of the slate to 0,1 mm at four points (approximately at the middle of the sides of the slates, see Figure 2) avoiding all dressed edges and any localized thick or thin areas.

NOTE Figure 3 indicates the approximate points of measurement for various slate shapes.



Key

-  perimeter zone of the slate (width 25 mm) excluded from thickness measurements.
-  point of measurement recommended (25 mm to 30 mm from edge)

Figure 3 — Approximate positions for measurements of individual thickness