

BS EN 12326-1:2014



BSI Standards Publication

# Slate and stone for discontinuous roofing and external cladding

Part 1: Specifications for slate and  
carbonate slate

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## National foreword

This British Standard is the UK implementation of EN 12326-1:2014. It supersedes BS EN 12326-1:2004 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee B/542, Roofing and cladding products for discontinuous laying.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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ISBN 978 0 580 84744 8

ICS 91.100.15

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This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 September 2014.

## Amendments issued since publication

| Date | Text affected |
|------|---------------|
|------|---------------|

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

# EN 12326-1

August 2014

ICS 91.100.15

Supersedes EN 12326-1:2004

English Version

## Slate and stone for discontinuous roofing and external cladding - Part 1: Specifications for slate and carbonate slate

Ardoises et pierres pour toiture et bardage extérieur pour  
pose en discontinu - Partie 1: Spécifications pour ardoises  
et ardoises carbonatées

Schiefer und Naturstein für überlappende Dachdeckungen  
und Außenwandbekleidungen - Teil 1: Spezifikationen für  
Schiefer und carbonathaltige Schiefer

This European Standard was approved by CEN on 10 July 2014.

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. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists 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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**CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels**

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## Foreword

This document (EN 12326-1:2014) 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 February 2015 and conflicting national standards shall be withdrawn at the latest by May 2016.

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 12326-1:2004.

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 the EU Construction Products Regulation.

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

In comparison to the previous edition, the following sections have been modified: 3.1, 3.2, 3.3, 3.13, 5.1, 5.2.3, 5.3, 5.5, 5.6, 5.8, 5.9, 5.12.1, 5.12.5, 5.13, 5.14, Clause 6, Annex B, Annex C, Annex D, Annex E and Annex ZA.

This European Standard EN 12326-1 is one of a series of product standards for building materials. EN 12326 consists of the following parts:

- *Part 1: Specifications for slate and carbonate slate;*
- *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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

## Introduction

The evaluation of the performance of the products has been defined, as far as possible, in terms of a number of type tests. A distinction has been made between product appraisal (type test) and routine factory production control requirements.

The performance of a roof or wall constructed with these products depends not only on the properties of the product as required by this document, but also on the design, construction and performance of the roof or wall as a whole in relation to the environment and conditions of use.

## 1 Scope

This European Standard specifies requirements for slate and carbonate slate for discontinuous roofing and external cladding, as defined in 3.1, and 3.2, used for assembly into discontinuous roofing and external cladding.

For the purposes of this European Standard, slates and carbonate slates have been classified.

This European Standard does not apply to products for roofing or external cladding made from the following:

- a) stone other than those defined in 3.1 and 3.2;
- b) concrete;
- c) polymeric materials;
- d) fibre reinforced cement;
- e) metal;
- f) clay.

This European Standard is not applicable to roofing and cladding slates used internally.

This European Standard is not applicable to bonded cladding (cladding fixed with adhesives) and cladding fixed with dowels and cramps.

NOTE 1 Requirements for internal wall lining slate are specified in EN 1469.

This document does not include requirements for appearance.

NOTE 2 Some general guidance for appearance is given in Annex A.

This European Standard does not include installation rules for slates.

NOTE 3 References to national recommendations on methods of construction for slate roofs are given in Annex C.

NOTE 4 Where the term "slate" is used in this document it means slate and carbonate slate unless otherwise indicated.

## 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 12326-2:2011, *Slate and stone for discontinuous roofing and external cladding — Part 2: Methods of test for slate and carbonate slate*

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

ISO 2859-1:1999, *Sampling procedures for inspection by attributes — Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection*



### 3 Terms and definitions

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

#### 3.1

##### **slate**

rock originating from clayey sedimentary rocks, including sediments of volcanoclastic origin and belonging petrographically to a range which begins at the boundary between sedimentary and metamorphic formation and ends at the epizonal-metamorphic phyllite formations

Note 1 to entry: The predominant and most important components are the phyllosilicates and the cleavage resulting from a schistosity flux, caused by low or very low grade of metamorphism.

Note 2 to entry: Slate is distinguished from sedimentary stones, which invariably splits along a bedding or sedimentation plane.

Note 3 to entry: The origin of the metamorphism can be due to tectonic or lithostatic compression or a combination of the two.

#### 3.2

##### **roofing slate**

slate used for roofing and external cladding, which easily splits into thin sheets along a plane of cleavage

#### 3.3

##### **carbonate slate**

rock used for roofing and external cladding, containing phyllosilicates and a minimum apparent calcium carbonate content of 20 % and exhibiting a prominent slaty cleavage

#### 3.4

##### **vein**

separately identifiable band of slate rock within the geological formation of a quarry or mine

#### 3.5

##### **slate vein**

localized occurrence (in a roofing or external cladding slate), usually passing through the thickness of a slate, of minerals that have intruded or infiltrated into a joint or fissure in the parent rock

#### 3.6

##### **grain**

orientation of the minerals in slate which results in an anisotropic bending strength

Note 1 to entry: In the bending strength test, grain is perpendicular to the load bar in the test that usually gives the highest failure result.

#### 3.7

##### **rectangular slate**

slate which is square or rectangular including such slates which have been shouldered

#### 3.8

##### **shouldering**

removal of the upper (when installed) corner(s) of a roofing or external cladding slate to facilitate laying

Note 1 to entry: This description does not apply to special designs of slates.

#### 3.9

##### **shouldered slate**

slate from which the upper corners have been removed

### 3.10 type test

product appraisal test concerned with one or more of the following, the effect of which cannot be anticipated on the basis of previous tests:

- the operation of a new quarry, mine or vein of slate for the first time;
- an unanticipated change in the geology of the rock

### 3.11 factory production control test

test performed on samples drawn from continuous production to establish whether a lot conforms to this document

### 3.12 nominal thickness

thickness of slates declared by the manufacturer

### 3.13 corrected packed thickness

thickness of 100 packed slates divided by 100 and reduced by a factor depending on the flatness characteristics of the slate declared by the manufacturer

Note 1 to entry: See Annex E.

### 3.14 basic individual thickness

thickness of slates determined from the modulus of rupture, as shown in Annex B, and/or from traditional construction methods

Note 1 to entry: See Annex B and Annex C.

### 3.15 minimum individual thickness

minimum thickness of slates determined by adjusting the basic individual thickness in accordance with 5.2.3

### 3.16 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 arrangement of the test is three point bending.

### 3.17 random slates

slates or sets of slates produced to undefined dimensions

## 4 Symbols and abbreviations

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

|                       |                                                                                               |
|-----------------------|-----------------------------------------------------------------------------------------------|
| <i>AQL</i>            | acceptable quality level                                                                      |
| <i>W1, W2</i>         | codes applied to the result of the water absorption test and if relevant the freeze–thaw test |
| <i>b</i>              | width of a slate, in mm                                                                       |
| <i>e<sub>bi</sub></i> | basic individual thickness of roofing slates determined from the modulus of                   |

|            |                                                                                                                                                     |
|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
|            | rupture and/or traditional construction methods, in mm                                                                                              |
| $e_i$      | individual thickness of roofing slates, in mm                                                                                                       |
| $e_l$      | thickness of a slate calculated as a function of its longitudinal modulus of rupture and the $X$ factor, in mm                                      |
| $e_{mi}$   | minimum thickness of individual slates, in mm                                                                                                       |
| $e_p$      | thickness of packed slates, in mm                                                                                                                   |
| $e_s$      | depth of softening in the sulfur dioxide exposure test for slates with an apparent calcium carbonate content more than 20 %, in mm                  |
| $e_t$      | basic thickness of a slate calculated as a function of its transverse modulus of rupture and the $X$ factor, in mm                                  |
| $l$        | length, in mm                                                                                                                                       |
| $R_{cl}$   | characteristic longitudinal modulus of rupture, in $N/mm^2$                                                                                         |
| $R_{ct}$   | characteristic transverse modulus of rupture, in $N/mm^2$                                                                                           |
| S1, S2, S3 | codes applied to the result of the sulfur dioxide exposure test for slates with an apparent calcium carbonate content of less than or equal to 20 % |
| S-3        | inspection level defined in ISO 2859-1                                                                                                              |
| T1, T2, T3 | codes applied to the result of the thermal cycle test                                                                                               |
| $X$        | nationally designated constant determined as a function of climate and/or construction techniques in $(N^{1/2} \cdot mm^{-1/2})$                    |

## 5 Requirements

### 5.1 Origin and petrography

A petrographic examination as specified in EN 12326-2:2011, Clause 16, shall be carried out for identification purposes and to decide whether the slate falls within the scope of this document and to establish the relationship between the bedding and the cleavage.

Every slate in a consignment shall be supplied from the declared source quarry, mine or vein of slate and shall be of the declared slate type as defined in 3.1 and 3.2.

### 5.2 Thickness

#### 5.2.1 General

A flow chart for the control of nominal and individual thickness of slates is given in Figure 1.

#### 5.2.2 Nominal thickness

The nominal thickness of each roofing slate product, in millimetres, and the amount by which the individual thickness varies, as a percentage of the nominal thickness, shall be declared.

NOTE Annex E gives a quick method for estimating the nominal thickness.

#### 5.2.3 Individual thickness

**5.2.3.1** The measurement of individual thickness shall be carried out in accordance with EN 12326-2:2011, Clause 8. The individual thickness of the slates shall not be less than 2,0 mm.

**5.2.3.2** The minimum individual thickness of slates ( $e_{mi}$ ) shall be determined as a function of their mechanical resistance — the bending strength and modulus of rupture (determined in accordance with EN 12326-2:2011, Clause 10) — and the climatic conditions or the traditional construction techniques in the country of use, increased by the appropriate value given in 5.2.3.3, 5.2.3.4 and/or 5.2.3.5. The minimum individual thickness shall be the largest value determined using any of the above factors.

NOTE 1 The mechanical resistance of a slate is a function of both the inherent strength of the rock from which it is made and its thickness. Annex B provides a method of calculating the basic individual thickness ( $e_{bi}$ ).

NOTE 2 The usual construction techniques can be given in national regulations or national standards for execution. A list of documents is given in Annex C.

NOTE 3 Member states can explain their national rules used to determine the minimum thickness of slates in an informative national document.

**5.2.3.3** The increase in the basic individual thickness of slates ( $e_{bi}$ ) with an apparent calcium carbonate content equal to or less than 20 % (determined in accordance with EN 12326-2:2011, Clause 13) shall not be less than the appropriate value shown in Table 1 for the relevant sulfur dioxide exposure code S1 or S2 in 5.9.1 (as determined in accordance with EN 12326-2:2011, 14.1).

**5.2.3.4** Slates with an apparent calcium carbonate content equal to or less than 20 %, (determined in accordance with EN 12326-2:2011, Clause 13) and achieving a sulfur dioxide exposure code S3 in 5.9.1 (determined in accordance with EN 12326-2:2011, 14.1) shall have a minimum individual thickness of not less than 8,0 mm or the thickness determined in accordance with EN 12326-2:2011, 15.2, and 5.2.3.5 of this document.

**5.2.3.5** The increase in basic individual thickness of slates ( $e_{bi}$ ) with an apparent calcium carbonate content more than 20 % (determined in accordance with EN 12326-2:2011, Clause 13) or of slates achieving a sulfur dioxide exposure code S3 (determined in accordance with EN 12326-2:2011, 14.1) shall not be less than the value obtained using the following formula:

$$e_{mi} = e_{bi} + 0,5 + (7e_s^2)$$

where

- $e_{mi}$  is the minimum individual thickness, in millimetres;
- $e_{bi}$  is the basic individual thickness, in millimetres (see Annex B);
- $e_s$  is the thickness of the softened layer, in millimetres.

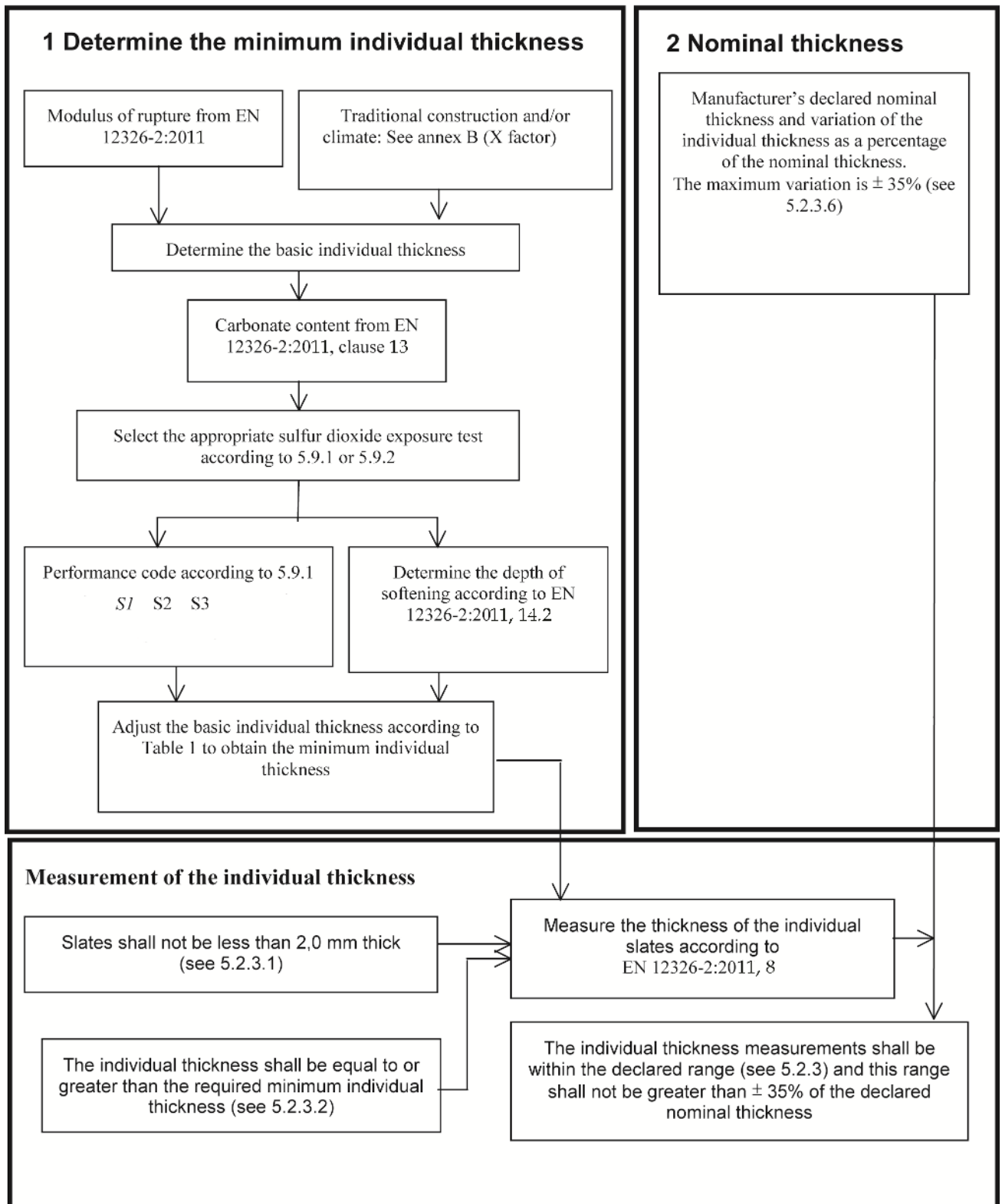


Figure 1 — Flow chart for the control of the nominal and individual thickness of slates

**Table 1 — Minimum individual thickness of slates in relation to the apparent calcium carbonate content and the sulfur dioxide exposure code**

| Apparent calcium carbonate content<br>% | Sulfur dioxide exposure code determined in accordance with EN 12326–2:2011, 14.1 | Depth of softened layer $e_s$ determined in accordance with EN 12326–2:2011, 14.2<br>mm | Formulas for thickness adjustment                                   |
|-----------------------------------------|----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|---------------------------------------------------------------------|
| $\leq 5,0$                              | S1                                                                               | NA <sup>a</sup>                                                                         | None                                                                |
|                                         | S2                                                                               | NA                                                                                      | $e_{bi} + 5 \%$                                                     |
|                                         | S3                                                                               | NA                                                                                      | $e_{bi} \geq 8,0$ mm or switch to the test in EN 12326–2:2011, 14.2 |
| $> 5,0$<br>$\leq 20,0$                  | S1                                                                               | NA                                                                                      | $e_{bi} + 5 \%$                                                     |
|                                         | S2                                                                               | NA                                                                                      | $e_{bi} + 10 \%$                                                    |
|                                         | S3                                                                               | NA                                                                                      | $e_{bi} \geq 8,0$ mm or switch to the test in EN 12326–2:2011, 14.2 |
| $> 20,0$                                | NA                                                                               | 0 to 0,70                                                                               | $e_{bi} + 0,50 + (7 \cdot e_s^2)$                                   |
|                                         |                                                                                  | $> 0,70$                                                                                | Not suitable for roofing or external cladding slates                |
| <sup>a</sup> Not applicable.            |                                                                                  |                                                                                         |                                                                     |

**5.2.3.6** The variation of individual thickness shall be within the declared range, which shall not be more than  $\pm 35 \%$  of the nominal thickness.

### 5.3 Characteristic modulus of rupture

The characteristic modulus of rupture, determined in accordance with EN 12326-2:2011, Clause 10, shall be declared.

### 5.4 Grain

If the characteristic modulus of rupture, determined in accordance with EN 12326-2:2011, Clause 10, indicates different bending strengths in the longitudinal and transverse orientations, the direction of the largest value shall be declared.

**NOTE** Grain is not always visible to the naked eye. In this case, petrographic analysis can be used to determine grain orientation.

### 5.5 Water absorption

When tested in accordance with EN 12326-2:2011, Clause 11, slates shall be classified and declared as code W1( $\leq 0,6$ ), W1( $> 0,6$ ) or W2 from Table 2.

**Table 2 — Water absorption requirements**

| Water absorption<br>(%)               | Code     |
|---------------------------------------|----------|
| ≤ 0,6                                 | W1(≤0,6) |
| > 0,6 and tested according to 5.6     | W1(>0,6) |
| > 0,6 and not tested according to 5.6 | W2       |

### 5.6 Freeze–thaw resistance (for slates with water absorption > 0,6)

When tested in accordance with EN 12326-2:2011, Clause 12,

- the mean modulus of rupture for each orientation before and after the freeze–thaw test are reported in addition to the code W1(>0,6) from Table 2.

### 5.7 Thermal cycle resistance

When tested in accordance with EN 12326-2:2011, Clause 15, slates shall be declared with a code according to Table 3.

**Table 3 — Thermal cycle requirements**

| Code                                                                                                                                                                                                                                                                                                      | Observation in test                                                                                                   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| T1                                                                                                                                                                                                                                                                                                        | No changes in appearance                                                                                              |
|                                                                                                                                                                                                                                                                                                           | Surface oxidation of metallic minerals                                                                                |
|                                                                                                                                                                                                                                                                                                           | Colour changes that neither affect the structure nor form runs of discolouration                                      |
| T2                                                                                                                                                                                                                                                                                                        | Oxidation or appearance changes of the metallic inclusions with runs of discolouration but without structural changes |
| T3                                                                                                                                                                                                                                                                                                        | Oxidation or appearance changes of metallic minerals that penetrate the slate and risk forming holes                  |
| It shall not be acceptable for slates to exhibit exfoliation, splitting or other major structural changes.<br>Slates within code T3, which potentially can result in water penetration, should only be used selectively with suitable methods of construction which avoid such penetration (see Annex C). |                                                                                                                       |

### 5.8 Apparent calcium carbonate content

The apparent calcium carbonate content, determined in accordance with EN 12326-2:2011, Clause 13, shall conform to the appropriate classification according to Table 1, as declared by the manufacturer.

### 5.9 Sulfur dioxide exposure test

**5.9.1** Slates with an apparent calcium carbonate content of ≤ 20 %, determined in accordance with EN 12326-2:2011, Clause 13, shall be tested according to EN 12326-2:2011, 14.1, and shall be allocated a code as shown in Figure 2 depending upon the assessment criteria reported in the test. Slates shall conform to the apparent calcium carbonate content as declared by the manufacturer. The minimum individual thickness of a slate shall be in accordance with the sulfur dioxide exposure code S or the depth of softened layer in  $e_s$ , determined in accordance with EN 12326-2:2011, 14.2, as defined in Table 1.

Any slates which achieve a code S3 may be tested according to EN 12326-2:2011, 14.2, to determine their minimum individual thickness according to 5.2.3.5.

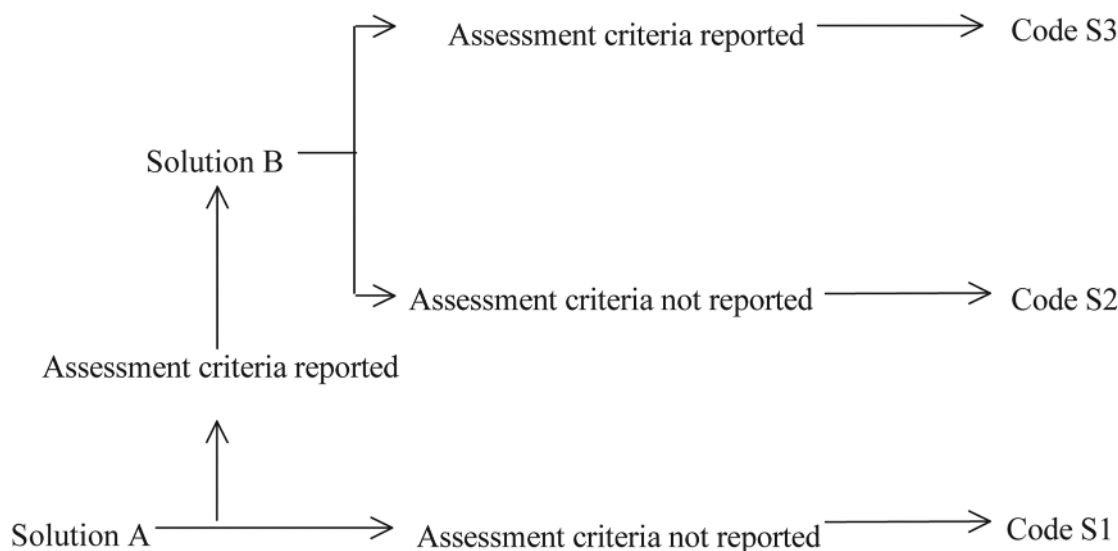


Figure 2 — Coding for sulfur dioxide exposure test

**5.9.2** Slates with an apparent calcium carbonate content of > 20 %, determined in accordance with EN 12326-2:2011, Clause 13, shall be tested according to EN 12326-2:2011, 14.2. The depth of softening measured ( $e_s$ ) shall be used to determine the minimum individual thickness according to 5.2.3.5.

## 5.10 Non-carbonate carbon content

When tested in accordance with EN 12326-2:2011, 13.5.2, the non-carbonate carbon content of slates shall be equal to or less than 2 %.

## 5.11 Defects

When subjected to a macroscopic examination according to EN 12326-2:2011, 16.6.1, slates shall be free of physical or petrographic features, as listed in EN 12326-2:2011, 16.6.1 b) and c), and damage which would be detrimental to their performance.

Small cracks and loosely attached flakes that are the result of the method of manufacture are permissible in so far as they do not prejudice the other requirements of this document.

## 5.12 Other dimensions

### 5.12.1 General

The requirements of 5.12.2, 5.12.3, 5.12.4 and 5.12.5 shall not apply to slates made to undefined dimensions or non-rectangular formats.

Requirements for rectangular slates, including shouldered rectangular roofing and external cladding slates, are specified in 5.12.2, 5.12.3, 5.12.4 and 5.12.5. Requirements for roofing and external cladding slates of other shapes or undefined dimensions are specified in 5.12.6.

### 5.12.2 Deviation of length and width

When tested in accordance with EN 12326-2:2011, Clause 5, rectangular slates shall not deviate from the manufacturer's declared length or width by more than  $\pm 5$  mm.



### 5.12.3 Deviation from edge straightness

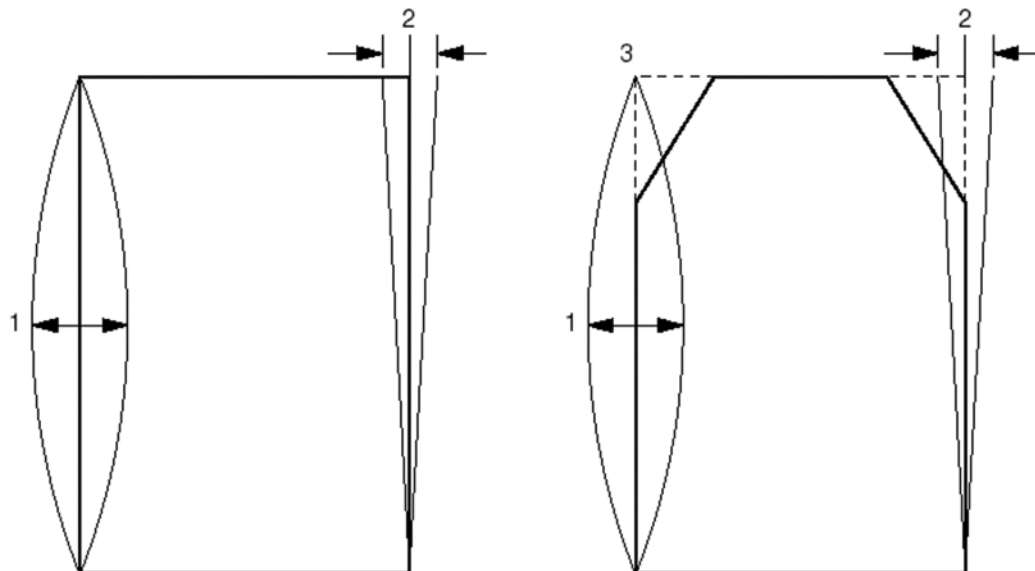
When tested in accordance with EN 12326-2:2011, Clause 6, the deviation from straightness of either of the long edges of rectangular slates shall not exceed the following limits (Figure 3):

- a) for slates less than or equal to 500 mm in length, the deviation shall not exceed 5 mm;
- b) for slates greater than 500 mm in length, the deviation shall not exceed 1 % of the length.

### 5.12.4 Deviation from rectangularity

When tested in accordance with EN 12326-2:2011, Clause 7, rectangular slates, which have not been shouldered, shall not deviate from rectangularity in any corner by more than  $\pm 1\%$  of their length (Figure 3).

Shouldering of slates is permitted provided it does not adversely affect the performance of the roof with respect to wind uplift resistance and driving rain. Further guidance on shouldering can be found in the reference documents listed in Annex C.



#### Key

- 1 maximum deviation of an edge (see 5.12.3)
- 2 maximum deviation from a rectangle (see 5.12.4)
- 3 for shouldered slates the deviation of the dimension is measured by extending the line of length and width

**Figure 3 — Deviations from straightness of edges and rectangularity**

The dimensions of the shoulders should be decided in relation to the traditional construction techniques of the country of use.

### 5.12.5 Deviation from flatness

When tested in accordance with EN 12326-2:2011, Clause 9, rectangular slates for normal use shall not deviate from flatness by more than the percentage shown in Table 4.

Other methods are acceptable provided that their correlations with the standardized test results are reported and accurate and satisfactory. It is the responsibility of the manufacturer to prove this correlation.

**Table 4 — Maximum deviation from flatness for rectangular slates**

| Slate flatness <sup>a</sup>                                                                                                                                                                                         | Maximum deviation as a percentage of the length |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|
| Very flat                                                                                                                                                                                                           | < 0,9                                           |
| Flat                                                                                                                                                                                                                | < 1,0                                           |
| Normal                                                                                                                                                                                                              | < 1,5                                           |
| Non-flat                                                                                                                                                                                                            | < 2,0                                           |
| Slates for special situations                                                                                                                                                                                       | No limit <sup>b</sup>                           |
| <p><sup>a</sup> As specified by the manufacturer.</p> <p><sup>b</sup> Slates for which there is no limit on the deviation from flatness are only suitable for use in special situations such as curved slating.</p> |                                                 |

Curved slates shall be manufactured so that the bevelled edges are applied to the convex face of the slate.

### 5.12.6 Format of random slates and special shaped slates

**5.12.6.1** The format of slates that are manufactured to shapes other than rectangular as defined in 3.7, shall be declared.

**5.12.6.2** Slates made to formats with undefined dimensions, except for the limitation on individual thickness in 5.2.3.1 (not less than 2,0 mm), shall be so designated in the accompanying commercial document which accompanies a consignment of slates (see Clause 6).

NOTE 1 Examples of such slates are random slates (UK) and schuppen slates (Germany).

NOTE 2 An example format for an accompanying commercial document is contained in Annex D.

## 5.13 Fire

### 5.13.1 External fire performance

Where subject to regulatory requirements, the external fire performance of slates shall be declared as Class B<sub>ROOF</sub><sup>1)</sup> as the slates are considered to satisfy this performance without the need for testing<sup>2)</sup>.

### 5.13.2 Reaction to fire performance

Where subject to regulatory requirements, the reaction to fire performance of slates shall be classified according to EN 13501-1 and declared as Class A1<sup>3)</sup> without the need for testing (CWT).

1) See Decision of the Commission 2001/671/EC of 2001-08-21 (see *OJEU L235 of 2001-09-04*).

2) See Decision of the Commission 2000/553/EC of 2000-09-06 (see *OJEU L235 of 2000-09-19*).

3) See Decision of the Commission 96/603/EC of 1996-10-04 (see *OJEU L267 of 1996-10-19*), as amended twice by 2000/605/EC of 2000-09-26 (see *OJEU L258 of 2000-10-12*) and by 2003/424/EC of 2003-06-06 (see *OJEU L144 of 2003-06-12*).

## 5.14 Release of dangerous substances

National regulations on dangerous substances may require verification and declaration on release, and sometimes content, when construction products covered by this standard are placed on those markets.

In the absence of European harmonized test methods, verification and declaration on release/content should be done taking into account national provisions in the place of use.

**NOTE** An informative database covering European and national provisions on dangerous substances is available at the Construction website on EUROPA accessed through: <http://ec.europa.eu/enterprise/sectors/construction/cp-ds>.

## 6 Assessment and verification of constancy of performance - AVCP

### 6.1 General

The compliance of the product i.e. slate and carbonate slate for discontinuous roofing and external cladding with the requirements of this standard and with the performances declared by the manufacturer in the DoP shall be demonstrated by:

- determination of the product type;
- factory production control by the manufacturer, including product assessment.

The manufacturer shall always retain the overall control and shall have the necessary means to take responsibility for the conformity of the product with its declared performance(s).

## 6.2 Number of slates required for type tests and factory production control

The testing requirements and the number of slates required for each test shall be as given in Table 5:

**Table 5 — Testing requirements and number of slates required for type testing and factory production control**

| Characteristics                                                                                     | Test according to EN 12326–2:2011 |                                                   | Number of slates for one test |
|-----------------------------------------------------------------------------------------------------|-----------------------------------|---------------------------------------------------|-------------------------------|
|                                                                                                     | Clause/Subclause                  | Name                                              |                               |
| Rock properties                                                                                     | EN 12326–2:2011, Clause 10        | Failure load in bending and grain                 | (20 or 40) <sup>a</sup>       |
| Thickness                                                                                           | EN 12326–2:2011, 8.2              | Individual thickness                              | 1                             |
| Rock properties                                                                                     | EN 12326–2:2011, Clause 11        | Water absorption                                  | 5                             |
|                                                                                                     | EN 12326–2:2011, Clause 12        | Freeze thaw                                       | (20 or 40) <sup>a</sup>       |
|                                                                                                     | EN 12326–2:2011, Clause 15        | Thermal cycle                                     | 6                             |
|                                                                                                     | EN 12326–2:2011, Clause 13        | Apparent calcium carbonate content                | 3                             |
|                                                                                                     | EN 12326–2:2011, 14.1             | SO <sub>2</sub> exposure ≤ 20 % CaCO <sub>3</sub> | 6                             |
|                                                                                                     | EN 12326–2:2011, 14.2             | SO <sub>2</sub> exposure > 20 % CaCO <sub>3</sub> | (6 or 12) <sup>a</sup>        |
|                                                                                                     | EN 12326–2:2011, Clause 13        | Non-carbonate carbon content                      | 3                             |
| Identification, scope and defects                                                                   | EN 12326–2:2011, Clause 16        | Petrography                                       | 1                             |
| Dimensions                                                                                          | EN 12326–2:2011, Clause 5         | Length and width                                  | 1                             |
|                                                                                                     | EN 12326–2:2011, Clause 6         | Edges                                             | 1                             |
|                                                                                                     | EN 12326–2:2011, Clause 7         | Rectangularity                                    | 1                             |
|                                                                                                     | EN 12326–2:2011, Clause 9         | Flatness                                          | 1                             |
| External fire performance <sup>b</sup>                                                              | —                                 | —                                                 | —                             |
| Reaction to fire <sup>b</sup>                                                                       | —                                 | —                                                 | —                             |
| <sup>a</sup> The number required depends on the size of the slates.<br><sup>b</sup> No test needed. |                                   |                                                   |                               |

## 6.3 Testing frequency

Determine, using Table 6, the frequency of testing and acceptance criteria for type testing, factory production control and testing in case of nonconformity and/or complaint procedures.

Table 6 — Characteristics, test frequencies and compliance criteria

| Characteristic                      | Clause/Sub clause in this document | Type testing                                                                                     | Factory production control <sup>e</sup>                                               |                  | Nonconformity and/or complaint procedures |                  |
|-------------------------------------|------------------------------------|--------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|------------------|-------------------------------------------|------------------|
|                                     |                                    |                                                                                                  | Minimum frequency                                                                     | Acceptance level | Tests per 50 000 slates                   | Acceptance level |
| Origin and petrographic assessment  | 5.1                                | When first applying this standard to any slate and for every new source of rock or vein of rock. | Every three years                                                                     | 100 %            | 1                                         | See 6.5.3.4      |
| Defects                             | 5.11                               |                                                                                                  | At inspection level S-3 <sup>b</sup>                                                  | AQL = 4 %        | 20 <sup>c</sup>                           |                  |
| Bending strength                    | 5.3                                |                                                                                                  | Once a year <sup>d</sup> (but see also 6.5.2.3) or every 25 000 t of finished slates. | See 6.5.2.3.3    | 1                                         |                  |
| Grain orientation                   | 5.4                                |                                                                                                  |                                                                                       |                  | 1                                         |                  |
| Water absorption                    | 5.5                                |                                                                                                  |                                                                                       |                  | 1                                         |                  |
| Freeze thaw resistance <sup>a</sup> | 5.6                                |                                                                                                  |                                                                                       |                  | 1                                         |                  |
| Thermal cycling                     | 5.7                                |                                                                                                  |                                                                                       |                  | 1                                         |                  |
| Apparent calcium carbonate content  | 5.8                                |                                                                                                  |                                                                                       |                  | 1                                         |                  |
| Sulfur dioxide exposure             | 5.9                                |                                                                                                  |                                                                                       |                  | 1                                         |                  |
| Non-carbonate carbon content        | 5.10                               |                                                                                                  |                                                                                       |                  | 1                                         |                  |
| Individual thickness                | 5.2.3                              |                                                                                                  | At inspection level S-3 <sup>b</sup>                                                  | AQL = 4 %        | 20 <sup>c</sup>                           |                  |
| Length and width deviation          | 5.12.2                             |                                                                                                  | At inspection level S-3 <sup>b</sup>                                                  | AQL = 4 %        | 20 <sup>c</sup>                           |                  |
| Deviation from edge straightness    | 5.12.3                             |                                                                                                  |                                                                                       |                  |                                           |                  |
| Deviation from rectangularity       | 5.12.4                             |                                                                                                  |                                                                                       |                  |                                           |                  |
| Deviation from flatness             | 5.12.5                             |                                                                                                  |                                                                                       |                  |                                           |                  |
| External fire performance           | 5.13.1                             | No test required                                                                                 |                                                                                       |                  |                                           |                  |
| Reaction to fire                    | 5.13.2                             | No test required                                                                                 |                                                                                       |                  |                                           |                  |

<sup>a</sup> If required (see 5.5).  
<sup>b</sup> As defined in ISO 2859-1.  
<sup>c</sup> As defined in ISO 2859-1.  
<sup>d</sup> For production of less than 5 000 t per year, test the indicated characteristics every 5 000 t or at least every 3 years.  
<sup>e</sup> Alternative test methods for the determination of the indicated characteristics are allowed provided that their correlation with the standardized test results are reported and proven accurate and satisfactory. It is the responsibility of the manufacturer to prove this correlation.

## 6.4 Type testing

### 6.4.1 General

Type testing shall be performed to show conformity of the product with this document. Tests previously performed in accordance with the provisions of this document (i.e. same product, characteristic, test method, sampling method, system of attestation of conformity, etc.), may be taken into account for the type testing purpose.

The tests given in Table 6 shall be carried out on the first application of this document to an existing source of rock or vein of rock and to each new source of rock or vein of rock.

Type testing shall be performed also whenever there is an unanticipated change in the geology of the rock.

### 6.4.2 Test Reports

The results of the determination of the product type shall be documented in test reports. All test reports shall be retained by the manufacturer for at least 10 years after the last date of production of the product, i.e. slate and carbonate slate for discontinuous roofing and external cladding to which they relate.

## 6.5 Factory production control (FPC)

### 6.5.1 General

The manufacturer shall establish, document and maintain a factory production control system to ensure that the products placed on the market comply with the declared performance of the essential characteristics. The FPC system shall consist of procedures, regular inspections and tests and/or assessments and the use of the results to control the rock properties, equipment, the production process and the product. Those tests specified in Table 6 as factory production control tests shall be performed as specified in 6.5.2.

All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures. The results of inspections, tests or assessments requiring action, and any action taken shall be recorded. The action taken when control values or criteria are not met shall also be recorded.

An FPC system conforming to the requirements of the relevant part(s) of EN ISO 9001, and made specific to the requirements of this European Standard, is considered to satisfy these requirements.

Alternative test methods for the determination of the indicated characteristics are allowed provided that their correlation with the standardized test results are reported and proven accurate and satisfactory. It is the responsibility of the manufacturer to prove this correlation.

### 6.5.2 Product related requirements

#### 6.5.2.1 Verification of origin and petrographic examination

Not less than once every three years, a petrographic examination as specified in EN 12326-2:2011, Clause 16, shall be carried out for identification purposes in order to check whether the product still falls within the scope of this document (see 3.1, 3.2 and 3.3).

#### 6.5.2.2 Verification of dimensions and measurement of dimensional variation

The following parameters shall be verified in accordance with an acceptable quality level of 4 % using the sampling schemes specified in ISO 2859-1:1999, Clause 10, and inspection level S-3:

- the deviation from the manufacturer's declared length and width;
- the individual thickness determined using the scheme in Figure 1;
- the deviation from rectangularity, flatness and edge straightness of slates.

Special precautions when measuring the thickness of individual slates shall be taken to ensure the sample is representative.

NOTE Under certain circumstances the inspection level might need to be increased to demonstrate an AQL of 4 % (see ISO 2859-1:1999, Clause 10).

### 6.5.2.3 Rock properties

**6.5.2.3.1** Verify the properties used to manufacture slates (bending strength, grain orientation, water absorption, freeze thaw resistance (if required), thermal cycle resistance, apparent calcium carbonate content, sulfur dioxide resistance, carbon content and petrography) at least once a year or every 25 000 t, whichever is the sooner (or for production of less than 5 000 t per year, test every 5 000 t or at least every 3 years).

When sampling material from a quarry face, care shall be taken to ensure that the samples reflect the range of variation present. Where there are obvious differences in the nature of the materials each material shall be sampled separately.

NOTE Rock can be subject to considerable horizontal and vertical variations in composition and properties.

**6.5.2.3.2** The frequency of testing shall be based on the variability of the rock, ensuring that the minimum frequency shall be at least once per year or, for the production of less than 5 000 t per year, every 5 000 t or at least every 3 years shall be tested. Where different geological horizons or veins are worked this frequency shall apply to each of them. Where the degree of variability is such that testing on an annual basis does not reflect it, it shall be ensured that more frequent testing intervals are adopted.

**6.5.2.3.3** Depending on the results of the tests, the thickness of the product shall be set (in function of bending strength, grain orientation, apparent calcium carbonate content, sulfur dioxide resistance. The appropriate code or results shall be applied (i.e. for thermal cycle resistance, sulfur dioxide resistance, water absorption, freeze thaw resistance (if executed)) or the rock for production rejected (i.e. function of petrography, water absorption, thermal cycle resistance, sulfur dioxide resistance, carbon content).

### 6.5.3 Procedures in case of nonconformity and/or complaint

#### 6.5.3.1 General

In the event of disputes about the non-conformity of the products, sampling shall be carried out in accordance with the procedure in 6.5.3.4.3 (see Figure 4).

#### 6.5.3.2 Sampling lots

For the purposes of these tests each consignment shall be divided into lots of 50 000 slates.

Any fraction over 50 000 shall be counted as an additional lot if it is larger than 20 000 slates.

Any fraction of 20 000 slates or less shall be grouped into the last lot of 50 000 slates.

A delivery of less than 50 000 slates shall be considered as one lot.

Sampling should be carried out by the recipient or their representative in the presence of the supplier.

### 6.5.3.3 Sampling

**6.5.3.3.1** Random sampling by selecting slates from each lot separately shall be carried out so that every slate has an equal chance of being selected. The selected slates shall be marked so as to identify which lot they came from.

**6.5.3.3.2** Where there is a possibility that the slates being tested contain localized harmful inclusions, such as calcite veins or oxidizable metallic minerals, the preparation of the test pieces shall be modified to ensure sufficient inclusions are contained the specimen in order a representative result is provided. For an indication of the number of slates required for each characteristic EN 12326-2:2011, Table 1 shall be referred to.

NOTE In the case of disputes, samples need only be taken for those properties that are in doubt.

### 6.5.3.4 Acceptance or re-designation of a lot

**6.5.3.4.1** It shall be ensured that every slate in a consignment is supplied from the declared source quarry, mine or vein of slate, and is of the declared slate type as defined in 3.1 or 3.2.

**6.5.3.4.2** Based on the results of the appropriate tests described in EN 12326-2, it shall be decided whether to accept, re-designate or reject the lot according to the value or code obtained (see Figure 4).

**6.5.3.4.3** Where one or more of the tests do not satisfy the requirements of this document, the unsatisfactory tests shall be repeated. If the results of the unsatisfactory test are confirmed, the lot shall be, depending on the results, rejected or re-designated.

If the repeated test is satisfactory, a second check shall be carried out. If that result is satisfactory, the lot may be accepted. If the repeated test is unsatisfactory, the lot shall be rejected or re-designated.

NOTE The result takes into account the whole of the statistically selected sample.



**Figure 4 — Decision tree for nonconformity and/or complaint procedures**



## 7 Marking, labelling and packaging

The following information shall be clearly indicated on the accompanying commercial document (i.e. delivery note, invoice or supplier's declaration) which shall be supplied with a consignment of slates:

- a) the number and date of this document;
- b) the name, trade mark or other means of identification of the manufacturer;
- c) the commercial name of the slate and its slate type description (see 3.1, 3.2 and 3.3, Table 5 and EN 12326-2:2011, Table 2) nominal thickness and its variation, size and shape;
- d) the name of the district, county or province in which the quarry or mine is situated;
- e) the year and month of manufacture (this may be in code);
- f) a report containing the following information:
  - 1) the latest test results for each test in Table 6;
  - 2) the date(s) of sampling;
  - 3) the date(s) of tests;
  - 4) the test methods applied;
  - 5) the requirements of this standard for each test.

**NOTE 1** An example format for the accompanying commercial document is given in Annex D, comprising the following two parts:

- the commercial information and the performance of the product against the requirements of this European Standard (see Clause 7, Points a) to f));
- an explanation of the requirements.

**NOTE 2** For CE marking and labelling see ZA.3.

**NOTE 3** Where ZA.3 covers the same information as Clause 7, the requirements of Clause 7 are met.

## Annex A (informative)

### Appearance of slates

#### A.1 Colour

Slates have various colours depending on their place of origin and, in any given quarry or mine, on different veins. The shades can range from dark to light. Slates can change colour after being fixed on the roof.

Slates should be supplied substantially similar in colour and texture to samples agreed between the supplier and the purchaser.

#### A.2 Marks

Colour, texture variation and other characteristic marks of slates are considered to be acceptable.

If there is any doubt about the durability of these marks, reference should be made to the relevant test method(s) (bending strength, water absorption, freeze–thaw, sulfur dioxide exposure and thermal cycling) in this document.

## Annex B (informative)

### Guidance for the calculation of the basic individual thickness of slates

#### B.1 Calculation of the basic individual thickness of slates

The basic individual thickness of slates ( $e_{bi}$ ) as a function of the mechanical resistance of the material should be determined in accordance with any or all of the following:

- a) local climate conditions;
- b) traditional construction techniques;
- c) the following formulae:

$$e_l = X \sqrt{\frac{l}{R_{cl}}}$$

and

$$e_T = X \sqrt{\frac{b}{R_T}}$$

where

- $e_l$  is the longitudinal thickness, (in mm);
- $e_t$  is the transverse thickness, (in mm);
- $l$  is the length of the slate, (in mm);
- $b$  is the width of the slate, (in mm);
- $R_{cl}$  is the characteristic longitudinal modulus of rupture, (in  $\text{N/mm}^2$ );
- $R_{ct}$  is the characteristic transverse modulus of rupture, (in  $\text{N/mm}^2$ );
- $X$  is a constant determined as a function of climate and the traditional construction techniques, (in  $\text{N}^{1/2} \cdot \text{mm}^{-1/2}$ );

NOTE It may be different for each formula (see Table B.1).

The thicknesses  $e_l$  and  $e_t$  are determined by using the length ( $l$ ) or the width ( $b$ ) of the slates. The maximum value determined is the basic individual thickness of the slate, ( $e_{bi}$ ).

## B.2 National X factors

**Table B.1 — National X factors**

| Member State   | Orientation factor                      |                                           |
|----------------|-----------------------------------------|-------------------------------------------|
|                | Transverse <sup>a</sup><br>( $R_{ct}$ ) | Longitudinal <sup>a</sup><br>( $R_{cl}$ ) |
| Belgium        | 1,0                                     | 1,0                                       |
| Czech Republic | 1,2                                     | 1,2                                       |
| France         | 1,0                                     | 1,0                                       |
| Germany        | 1,2                                     | 1,2                                       |
| Ireland        | 0,9                                     | 1,1                                       |
| Italy          | 1,2                                     | 1,2                                       |
| Spain          | 1,0                                     | 1,0                                       |
| UK             | 0,9                                     | 1,1                                       |

<sup>a</sup> Transverse and longitudinal refer to the orientation of the test pieces in the test to determine modulus of rupture in EN 12326–2.

Those countries that have not declared a national value should select a value, or a pair of values, in relation to their climate and traditional construction techniques. It should not be less than the minimum value or pair of values given above.

## B.3 Example calculations for minimum thickness of slates

### B.3.1 Nominal thickness

Manufacturers supply slates to a nominal thickness. The nominal thickness and the amount by which it will vary are stated in their product literature and in the accompanying commercial document.

The maximum variation of the nominal thickness is  $\pm 35\%$  but can be any value less than this. However, the nominal thickness and the actual variation of the thickness of individual slates around this value should be set so that no slate is less than the minimum individual thickness determined according to 5.2 and Annex B (B.1 and B.2).

### B.3.2 Examples for the calculation of nominal thickness

The examples for the calculation of nominal thickness are given below showing that the requirement for minimum individual thickness is satisfied.

#### EXAMPLE 1

- X factors: transverse 0,9, longitudinal 1,1;
- Slate size 600 mm × 300 mm;
- An apparent calcium carbonate content of < 5,0 %;
- Sulphur dioxide exposure code S1;
- Characteristic modulus of rupture longitudinal = 55 N/mm<sup>2</sup>;

- Characteristic modulus of rupture transverse = 29 N/mm<sup>2</sup>;
- Nominal thickness variation ± 35 %.

$$\text{Minimum basic longitudinal thickness: } e_t = X \sqrt{\frac{l}{R_{ct}}} = 1,1 \sqrt{\frac{600}{55}} = 3,6 \text{ mm}$$

$$\text{Minimum basic transverse thickness: } e_t = X \sqrt{\frac{b}{R_{ct}}} = 0,9 \sqrt{\frac{300}{29}} = 2,89 \text{ mm}$$

Therefore the minimum basic thickness is the larger value: 3,6 mm.

From Table 1 there is no thickness adjustment for slates with an apparent calcium carbonate content of < 5,0 % and sulphur dioxide code S1. Therefore the minimum individual thickness is 3,6 mm.

For a nominal thickness variation of ± 35 %, if the nominal thickness is 5,6 mm, the minimum thickness requirement is satisfied:

$$5,6 \times (1 - 0,35) = 3,64 \text{ mm}$$

#### EXAMPLE 2

- X factors: transverse 0,9, longitudinal 1,1;
- Slate size 500 mm × 250 mm;
- An apparent calcium carbonate content of < 13,0 %;
- Sulphur dioxide exposure code S2;
- Characteristic modulus of rupture longitudinal = 31 N/mm<sup>2</sup>;
- Characteristic modulus of rupture transverse = 27 N/mm<sup>2</sup>;
- Nominal thickness variation ± 20 %.

$$\text{Minimum basic longitudinal thickness: } e_t = X \sqrt{\frac{l}{R_{ct}}} = 1,1 \sqrt{\frac{500}{31}} = 4,4 \text{ mm}$$

$$\text{Minimum basic transverse thickness: } e_t = X \sqrt{\frac{b}{R_{ct}}} = 0,9 \sqrt{\frac{250}{27}} = 2,7 \text{ mm}$$

Therefore the minimum basic thickness is the larger value: 4,4 mm.

From Table 1 the thickness adjustment for slates with an apparent calcium carbonate content of < 13,0 % and sulphur dioxide code S2 is + 10 %. Therefore the minimum individual thickness is 4,84 mm.

For a nominal thickness variation of ± 20 %, if the nominal thickness is 6,1 mm the minimum thickness requirement is satisfied:

$$6,1 \times (1 - 0,20) = 4,88 \text{ mm}$$

#### EXAMPLE 3

- X factors: transverse 1,0, longitudinal 1,0;

- Slate size 600 mm × 300 mm;
- An apparent calcium carbonate content of < 5,0 %;
- Sulphur dioxide exposure code S1;
- Characteristic modulus of rupture longitudinal = 60 N/mm<sup>2</sup>;
- Characteristic modulus of rupture transverse = 30 N/mm<sup>2</sup>;
- Nominal thickness variation ± 35 %.

Minimum basic longitudinal thickness:  $e_l = 1,0 \sqrt{\frac{600}{60}} = 3,16 \text{ mm}$

Minimum basic transverse thickness:  $e_t = 1,0 \sqrt{\frac{300}{30}} = 3,16 \text{ mm}$

Therefore the minimum basic thickness is: 3,16 mm.

From Table 1 there is no thickness adjustment for slates with an apparent calcium carbonate content of < 5,0 % and sulphur dioxide code S1. Therefore the minimum individual thickness is 3,16 mm.

For a nominal thickness variation of ± 35 %, if the nominal thickness is 5,0 mm the minimum thickness requirement is satisfied:

$$5,0 \times (1 - 0,35) = 3,25 \text{ mm}$$

**EXAMPLE 4**

- X factors: transverse 1,2, longitudinal 1,2;
- Slate size 500 mm × 250 mm;
- An apparent calcium carbonate content of 19,0 %;
- Sulphur dioxide exposure code S3;
- Characteristic modulus of rupture longitudinal = 31 N/mm<sup>2</sup>;
- Characteristic modulus of rupture transverse = 27 N/mm<sup>2</sup>;
- Nominal thickness variation ± 20 %.

Minimum basic longitudinal thickness:  $e_l = X \sqrt{\frac{l}{R_{ct}}} = 1,2 \sqrt{\frac{500}{31}} = 4,82 \text{ mm}$

Minimum basic transverse thickness:  $e_t = X \sqrt{\frac{b}{R_{ct}}} = 1,2 \sqrt{\frac{250}{27}} = 3,65 \text{ mm}$

Therefore the minimum basic thickness is the larger value: 4,82 mm.

From Table 1 the thickness adjustment for slates with an apparent calcium carbonate content of 19,0 % and sulphur dioxide code S3 is thickness ≥ 8,0 mm (or switch to the alternative sulphur dioxide test – see EXAMPLE 4). Therefore the minimum individual thickness is 8,0 mm.

For a nominal thickness variation of  $\pm 20\%$ , if the nominal thickness is 10,0 mm the minimum thickness requirement is satisfied:

$$10,0 \times (1 - 0,20) = 8,0 \text{ mm}$$

EXAMPLE 5

- X factors: transverse 1,2, longitudinal 1,2;
- Slate size 500 mm  $\times$  250 mm;
- An apparent calcium carbonate content of 25,0 %;
- Sulphur dioxide exposure depth of softened layer  $e_s = 0,50$  mm;
- Characteristic modulus of rupture longitudinal = 31 N/mm<sup>2</sup>;
- Characteristic modulus of rupture transverse = 27 N/mm<sup>2</sup>;
- Nominal thickness variation  $\pm 20\%$

Minimum basic longitudinal thickness:  $e_t = X \sqrt{\frac{l}{R_{ct}}} = 1,2 \sqrt{\frac{500}{31}} = 4,82 \text{ mm}$

Minimum basic transverse thickness:  $e_t = X \sqrt{\frac{b}{R_{ct}}} = 1,2 \sqrt{\frac{250}{27}} = 3,65 \text{ mm}$

Therefore the minimum basic thickness is the larger value: 4,82 mm.

From Table 1 the thickness adjustment for slates with an apparent calcium carbonate content of 25,0 % and sulphur dioxide softened layer 0,5 mm thick is increased by

$$\begin{aligned} e_{bi} &+ 0,5 + (7 \times e_s^2) \\ &= 4,82 + 0,5 + (7 \times 0,5^2) \\ &= 4,82 + 0,5 + 1,75 \\ &= 7,07 \text{ mm} \end{aligned}$$

Therefore the minimum individual thickness is 7,07 mm.

For a nominal thickness variation of  $\pm 20\%$ , if the nominal thickness is 8,84 mm the minimum thickness requirement is satisfied:

$$8,84 \times (1 - 0,20) = 7,07 \text{ mm}$$

## Annex C (informative)

### General guidance on the installation of slates

Slates that conform to the requirements of this document should be fixed to roof and external cladding structures with nails, pins or hooks only. The durability of nails and hooks should be similar to the durability of the slates with which they are used.

**NOTE** Suitable nails, pins and hooks and the materials from which they are manufactured can be specified in European Standards or national Technical Specifications (see Table C.1).

**Table C.1 — National recommendations on methods of construction for slate roofs**

| Member State                                                                                                                          | Reference documents                                                                                                                                                                                                  |
|---------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Belgium                                                                                                                               | STS 34                                                                                                                                                                                                               |
|                                                                                                                                       | NIT 195 – TV 195                                                                                                                                                                                                     |
| Czech Republic                                                                                                                        | Základní pravidla pro pokrývání střech přírodní břidlicí, rákosem, slámou a pro osvětlení podkroví = ><br><br>(Code of practice for slate, sedge and straw laying and for lighting of a garret (ISBN 80–239–0248–2)) |
| France                                                                                                                                | NF P32–201–1                                                                                                                                                                                                         |
|                                                                                                                                       | NF P32–201–2                                                                                                                                                                                                         |
| Germany                                                                                                                               | Fachregel für Dachdeckungen mit Schiefer ZDD - Ausgabe September 1999)                                                                                                                                               |
|                                                                                                                                       | Fachregel für Außenwandbekleidungen mit Schiefer ZDD - Ausgabe September 1999                                                                                                                                        |
| Ireland                                                                                                                               | I.C.P. 2: 2002, Irish Code of Practice for Slating and Tiling (NSAI)                                                                                                                                                 |
| Spain                                                                                                                                 | UNE 22190–3 EX                                                                                                                                                                                                       |
| UK                                                                                                                                    | BS 5534–1                                                                                                                                                                                                            |
|                                                                                                                                       | BS 8000–6                                                                                                                                                                                                            |
| Before specifying a system of fixing, confirmation of the suitability of the proposal should be obtained from the slate manufacturer. |                                                                                                                                                                                                                      |



## Annex D (informative)

### Format for the accompanying commercial document

This annex gives an example format for the accompanying commercial document for products that conform to this European Standard, as described in Clause 7. The format for the accompanying commercial document is given in two parts:

- a blank form into which the test results or codes, etc. are to be entered (see Table D.1), and
- an explanation of how each entry can be made and the requirements of each test (see Table D.2).

**Table D.1 — Format for the first part of the accompanying commercial document**

|                                                                                                                                                                                                                                                                                        |                                   |                                                                                                                                   |                   |               |                   |         |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|-------------------|---------------|-------------------|---------|
| Manufacturer: <i>Name and address or identifying mark</i>                                                                                                                                                                                                                              |                                   |                                                                                                                                   |                   |               |                   |         |
| EN 12326–1:2014                                                                                                                                                                                                                                                                        |                                   |                                                                                                                                   |                   |               |                   |         |
| Number of this commercial document                                                                                                                                                                                                                                                     |                                   |                                                                                                                                   |                   | Date of issue |                   |         |
| Commercial document issued by: <i>Name and address</i>                                                                                                                                                                                                                                 |                                   |                                                                                                                                   |                   |               |                   |         |
| Location of the mine or quarry: <i>District, county or province</i>                                                                                                                                                                                                                    |                                   |                                                                                                                                   |                   |               |                   |         |
| This document records the conformity of the product described below and is incomplete without the explanation of the meaning of the test results and the requirements of EN 12326–1:2014. The tests referred to and the criteria are contained in EN 12326–1:2014 and EN 12326–2:2011. |                                   |                                                                                                                                   |                   |               |                   |         |
| Date of sampling                                                                                                                                                                                                                                                                       |                                   |                                                                                                                                   | Date of testing   |               |                   |         |
| Product description and commercial name                                                                                                                                                                                                                                                |                                   |                                                                                                                                   |                   | Conformity    |                   |         |
| Relation between bedding and cleavage                                                                                                                                                                                                                                                  |                                   |                                                                                                                                   |                   |               |                   |         |
| 1) Dimensional tolerances                                                                                                                                                                                                                                                              |                                   |                                                                                                                                   |                   |               |                   |         |
| Format                                                                                                                                                                                                                                                                                 |                                   |                                                                                                                                   |                   |               |                   |         |
| Deviation from declared length                                                                                                                                                                                                                                                         |                                   |                                                                                                                                   |                   | mm            |                   |         |
| Deviation from declared width                                                                                                                                                                                                                                                          |                                   |                                                                                                                                   |                   | mm            |                   |         |
| Deviation from squareness                                                                                                                                                                                                                                                              |                                   |                                                                                                                                   |                   | %             |                   |         |
| Deviation from straightness of edges                                                                                                                                                                                                                                                   |                                   |                                                                                                                                   |                   | mm or %       |                   |         |
| Slate type for deviation from flatness                                                                                                                                                                                                                                                 |                                   | Very flat                                                                                                                         | Flat              | Normal        | Non-flat          | Special |
| Deviation from flatness                                                                                                                                                                                                                                                                |                                   |                                                                                                                                   |                   |               |                   |         |
| 2) Thickness                                                                                                                                                                                                                                                                           |                                   |                                                                                                                                   |                   |               |                   |         |
| Nominal thickness and variation of individual thickness against nominal thickness                                                                                                                                                                                                      |                                   |                                                                                                                                   |                   |               |                   |         |
| 3) Strength                                                                                                                                                                                                                                                                            |                                   |                                                                                                                                   |                   |               |                   |         |
| Characteristic MoR                                                                                                                                                                                                                                                                     |                                   | Transverse                                                                                                                        | N/mm <sup>2</sup> | Longitudinal  | N/mm <sup>2</sup> |         |
| 4) Water absorption                                                                                                                                                                                                                                                                    |                                   | Code W1(≤0,6), W1(>0,6) or W2                                                                                                     |                   |               |                   |         |
| 5) Freeze thaw                                                                                                                                                                                                                                                                         |                                   | Mean modulus of rupture values, transverse and longitudinal, before and after the freeze/thaw test (if W1(>0,6)), or not required |                   |               |                   |         |
| 6) Thermal cycle test                                                                                                                                                                                                                                                                  |                                   | Code T1, T2 or T3                                                                                                                 |                   |               |                   |         |
| 7) Apparent calcium carbonate content                                                                                                                                                                                                                                                  |                                   | %                                                                                                                                 |                   |               |                   |         |
| 8) Sulfur dioxide exposure tests                                                                                                                                                                                                                                                       | ≤ 20 % apparent calcium carbonate | Code S1, S2 or S3                                                                                                                 |                   |               |                   |         |
|                                                                                                                                                                                                                                                                                        | > 20 % apparent calcium carbonate | Depth of softening                                                                                                                |                   |               |                   | mm      |
| 9) Non-carbonate carbon content                                                                                                                                                                                                                                                        |                                   | %                                                                                                                                 |                   |               |                   |         |
| 10) External fire exposure                                                                                                                                                                                                                                                             |                                   | Deemed to satisfy class B <sub>ROOF</sub>                                                                                         |                   |               |                   |         |
| 11) Reaction to fire                                                                                                                                                                                                                                                                   |                                   | Deemed to satisfy class A1                                                                                                        |                   |               |                   |         |
| 12) Release of dangerous substances                                                                                                                                                                                                                                                    |                                   | None in conditions of use as roofing or external cladding                                                                         |                   |               |                   |         |

**Table D.2 — Format for the accompanying commercial document**

|                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                            |            |                |              |            |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|------------|----------------|--------------|------------|
| Date of sampling and testing                                                                                                                                                                                                                                                                                                                                      | If more than one date is applicable to sampling or testing they should be indicated against the individual test results.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                            |            |                |              |            |
| Product description                                                                                                                                                                                                                                                                                                                                               | Slate for roofing and external cladding or carbonate slate for roofing and external cladding<br>Slate type and origin                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                            |            |                |              |            |
| 1) Dimensional tolerances                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                            |            |                |              |            |
| Length and width                                                                                                                                                                                                                                                                                                                                                  | Maximum deviation ± 5 mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                            |            |                |              |            |
| Deviation from squareness                                                                                                                                                                                                                                                                                                                                         | Maximum deviation ± 1 % of the length                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                            |            |                |              |            |
| Deviation from straightness of edges                                                                                                                                                                                                                                                                                                                              | Slate length ≤ 500 mm Permitted deviation ≤ 5 mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                            |            |                |              |            |
|                                                                                                                                                                                                                                                                                                                                                                   | Slate length > 500 mm Permitted deviation ≤ 1 % of the length                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                            |            |                |              |            |
| Flatness: The limits of deviation from flatness are defined for four types of slate. The bevelled edges should be applied to the convex face. Slates with deviation from flatness in excess of the limit may be used for special applications.                                                                                                                    | Slate type                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Maximum deviation from flatness as a % of the slate length |            |                |              |            |
|                                                                                                                                                                                                                                                                                                                                                                   | Very flat                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | < 0,9                                                      |            |                |              |            |
|                                                                                                                                                                                                                                                                                                                                                                   | Flat                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | < 1,0                                                      |            |                |              |            |
|                                                                                                                                                                                                                                                                                                                                                                   | Normal                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | < 1,5                                                      |            |                |              |            |
|                                                                                                                                                                                                                                                                                                                                                                   | Non-flat                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | < 2,0                                                      |            |                |              |            |
| 2) Thickness: The basic nominal thickness is determined as a function of the bending strength using the formulae given in 3), local climate conditions and traditional construction techniques. The basic nominal thickness is increased in relation to the slate's performance in the appropriate sulfur dioxide test (if required) as shown in 7) and 8) below. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                            |            |                |              |            |
| 3) Strength: Longitudinal and transverse characteristic modulus of rupture; there is no limit for characteristic modulus. However the basic nominal thickness is determined as a function of the bend strength using the formulae given below, local climate conditions and traditional construction techniques.                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                            |            |                |              |            |
| $e_l = X \sqrt{\frac{l}{R_{cl}}}$ <p>and</p> $e_t = X \sqrt{\frac{b}{R_{ct}}}$                                                                                                                                                                                                                                                                                    | <p>where</p> <p><math>e_l</math> is the longitudinal thickness, (in mm);</p> <p><math>e_t</math> is the transverse thickness, (in mm);</p> <p><math>l</math> is the length of the slate, (in mm);</p> <p><math>b</math> is the width of the slate, (in mm);</p> <p><math>R_{cl}</math> is the characteristic longitudinal modulus of rupture, (in N/mm<sup>2</sup>);</p> <p><math>R_{ct}</math> is the characteristic transverse modulus of rupture, (in N/mm<sup>2</sup>);</p> <p><math>X</math> is a constant determined as a function of climate and the traditional construction techniques, (in N<sup>1/2</sup>·mm<sup>-1/2</sup>).</p> <p>NOTE It may be different for each formula and is selected for the member state of use according to the table below.</p> |                                                            |            |                |              |            |
|                                                                                                                                                                                                                                                                                                                                                                   | National $X$ factors:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Member state                                               | Transverse | Longitudinal   | Member state | Transverse |
|                                                                                                                                                                                                                                                                                                                                                                   | Belgium                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 1,0                                                        | 1,0        | Czech Republic | 1,2          | 1,2        |
|                                                                                                                                                                                                                                                                                                                                                                   | Ireland                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 0,9                                                        | 1,1        | Italy          | 1,2          | 1,2        |
|                                                                                                                                                                                                                                                                                                                                                                   | France                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 1,0                                                        | 1,0        | Spain          | 1,0          | 1,0        |
|                                                                                                                                                                                                                                                                                                                                                                   | Germany                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 1,2                                                        | 1,2        | UK             | 0,9          | 1,1        |
| Those Member States that have not declared a national value should select a value or a pair of values in relation to their countries climate and traditional construction techniques. It should not be less than the minimum value or pair of values given above.                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                            |            |                |              |            |
| $e_l$ and $e_t$ are determined by using the length $l$ and the width $b$ of the slates. The maximum value determined is the basic individual thickness of the slate, $e_{bi}$ . The basic individual thickness is increased in relation to the slates performance in the appropriate sulfur dioxide test as shown in 7) and 8) below.                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                            |            |                |              |            |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                     |                                                    |                                                                     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|---------------------------------------------------------------------|
| 4) Water absorption: Code W1( $\leq 0,6$ ), W1( $> 0,6$ ) or W2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                     |                                                    |                                                                     |
| 5) Freeze–thaw test: tested slates indicate the mean value of modulus of rupture after 50 cycles in transverse and longitudinal directions before and after the freeze/thaw test, if relevant, (test (if W1( $> 0,6$ )), or not required.)                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                     |                                                    |                                                                     |
| 6) Thermal cycle test: The following table explains the meaning of the test codes:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                     |                                                    |                                                                     |
| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Observation in the test                                                                                                                             |                                                    | Conformity to the standard                                          |
| T1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | No changes in appearance. Surface oxidation of metallic minerals. Colour changes that neither affect the structure nor form runs of discolouration. |                                                    | Acceptable                                                          |
| T2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Oxidation or appearance changes of the metallic inclusions with runs of discolouration but without structural changes.                              |                                                    | Acceptable                                                          |
| T3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Oxidation or appearance changes of metallic minerals which penetrate the slate and risk the formation of holes.                                     |                                                    | Acceptable subject to the note below                                |
| NOTE It is best only to use slates within Code T3, which potentially may result in water penetration selectively with suitable methods of construction that avoid such penetration. Slates showing exfoliation splitting or other structural changes in this test are not acceptable.                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                     |                                                    |                                                                     |
| 7) Apparent calcium carbonate content: There is no limit on apparent calcium carbonate content. However, the apparent calcium carbonate content determines which sulfur dioxide exposure test procedure should be carried out and, together with the strength, the minimum nominal thickness of the product.<br><br>If the carbonate content is less than or equal to 20 % then the sulfur dioxide exposure test procedure in EN 12326–2:2011, 14.1, applies. If the carbonate content is more than 20 %, the sulfur dioxide exposure test procedure in EN 12326–2:2011, 14.2 applies. The minimum thickness is calculated using the table below. |                                                                                                                                                     |                                                    |                                                                     |
| 8) Minimal nominal thickness in relation to apparent calcium carbonate content and sulfur dioxide exposure code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                     |                                                    |                                                                     |
| Carbonate content (%)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | SO <sub>2</sub> exposure test code from EN 12326–2:2011, 14.1                                                                                       | Depth of softened layer from EN 12326–2:2011, 14.2 | Thickness adjustment                                                |
| $\leq 5,0$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | S1                                                                                                                                                  |                                                    | None                                                                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | S2                                                                                                                                                  |                                                    | $e_{bi} + 5 \%$                                                     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | S3                                                                                                                                                  |                                                    | $e_{bi} \geq 8,0$ mm or switch to the test in EN 12326–2:2011, 14.2 |
| $> 5,0$<br>$\leq 20,0$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | S1                                                                                                                                                  |                                                    | $e_{bi} + 5 \%$                                                     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | S2                                                                                                                                                  |                                                    | $e_{bi} + 10 \%$                                                    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | S3                                                                                                                                                  |                                                    | $e_{bi} \geq 8,0$ mm or switch to the test in EN 12326–2:2011, 15.2 |
| $> 20,0$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                     | 0 mm to 0,70 mm                                    | $e_{bi} + 0,50$ mm + $7t^2$                                         |
| $e_{bi}$ is the basic individual thickness obtained from 3 above (in mm).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                     |                                                    |                                                                     |
| $t$ is the thickness of the softened layer obtained from EN 12326–2:2011, 14.2 (in mm).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                     |                                                    |                                                                     |
| 9) Non-carbonate carbon content: The non-carbonate carbon content should be less than 2 %.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                     |                                                    |                                                                     |

## Annex E (informative)

### Method to estimate the nominal thickness of packed slates $e_{pc}$ <sup>4)</sup>

#### E.1 Principle

The thickness of 100 closely packed slates in a pallet is measured in millimetres with a steel rule. The measured packed thickness  $e_{pm}$  obtained is divided by 100 and adjusted by an amount dependent on the flatness characteristics of the slate type declared by the manufacturer. This corrected packed thickness  $e_{pc}$  corresponds with the mean thickness of the packed slates and should be comparable with the nominal thickness of the slates.

#### E.2 Apparatus

**E.2.1 Metal rule, or similar equipment**, capable of measurements to 1 mm.

#### E.3 Preparation of test pieces

Slates should be measured close packed in a pallet but do not need any preparation.

#### E.4 Procedure

Count 100 slates and measure their total thickness using the metal rule.

#### E.5 Expression of results

The measured thickness should be divided by 100. The packed thickness should be determined by applying the appropriate reduction declared by the manufacturer.

#### E.6 Test report

The corrected packed slate thickness should be reported to the nearest 0,1 mm.

The test report should also include the identification of the product, reference to this method and the identifier of this European Standard, i.e. EN 12326-1:2014.

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4) This method is intended to be used for quickly checking the nominal thickness and should not be used as a basis for rejection. To confirm the nominal thickness the method given in 5.2 is used.

## Annex ZA (informative)

### Clauses of this European Standard addressing the provisions of the EU Construction Products Regulation

#### ZA.1 Scope and relevant characteristics

This European Standard has been prepared under Mandate M/122 “Roof coverings, rooflights, roof windows and ancillary products” and Mandate M/121 “Internal and external wall and ceiling finishes” given to CEN by the European Commission and the European Free Trade Association.

If this European Standard is cited in the Official Journal of the European Union (OJEU), the clauses of this standard, shown in this annex, are considered to meet the provisions of the relevant mandate, under the Regulation (EU) No. 305/2011.

This annex deals with the CE marking of the slate and carbonate slate for discontinuous roofing and external cladding intended for the uses indicated in Tables ZA.1.1 and ZA.1.2 and shows the relevant clauses applicable.

This annex has the same scope as in Clause 1 of this standard related to the aspects covered by the mandate and is defined by Tables ZA.1.1 and ZA.1.2.

**Table ZA.1.1 — Relevant clauses for slate and carbonate slate and intended use —  
Discontinuous roofing**

| <b>Product:</b> slate and carbonate slate    |                                                                                     |                                                                |                                            |
|----------------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------|--------------------------------------------|
| <b>Intended use:</b> discontinuously roofing |                                                                                     |                                                                |                                            |
| Essential Characteristics                    | Clauses in this and other European Standard(s) related to essential characteristics | Regulatory classes                                             | Notes                                      |
| Mechanical resistance                        | 5.3, 5.4                                                                            |                                                                | Units                                      |
| External fire performance                    | 5.13.1                                                                              | Deemed to satisfy (EC Decision 2000/553/EC)                    | Declared classes                           |
| Reaction to fire                             | 5.13.2                                                                              | Deemed to satisfy Class A1 (EC Decision 96/603/EC, as amended) | Declared classes                           |
| Water permeability                           | 5.5                                                                                 |                                                                | Class W1( $\leq 0,6$ ), W1( $>0,6$ ) or W2 |
| Dimensional variation                        | 5.2.2 Nominal thickness                                                             |                                                                | Declared value                             |
|                                              | 5.2.3 Individual thickness                                                          |                                                                | Declared value                             |
|                                              | 5.12.1 and 5.12.2 Deviation of length and width                                     |                                                                | Pass/Fail                                  |

|                                 |                                                    |  |                                                                                                                       |
|---------------------------------|----------------------------------------------------|--|-----------------------------------------------------------------------------------------------------------------------|
|                                 | 5.12.1 and 5.12.3 Deviation from edge straightness |  | Pass/Fail                                                                                                             |
|                                 | 5.12.1 and 5.12.4 Deviation from rectangularity    |  | Pass/Fail                                                                                                             |
| Release of dangerous substances | 5.14                                               |  | Declaration on release/content taking into account national provisions in the place of use                            |
| Durability                      | 5.5 Water absorption                               |  | Declared Class<br>W1( $\leq 0,6$ )<br>or<br>W1( $> 0,6$ )<br>or<br>W2                                                 |
|                                 | 5.6 Freeze–thaw resistance                         |  | Not required<br>or<br>W1( $> 0,6$ ) in combination with the Mean modulus of rupture before and after freeze–thaw test |
|                                 | 5.7 Thermal cycle resistance                       |  | Declared Class T1, T2 or T3                                                                                           |
|                                 | 5.8 Apparent calcium carbonate content             |  | Technical classes                                                                                                     |
|                                 | 5.9 Sulfure dioxide                                |  | Declared Class S1, S2 or S3                                                                                           |
|                                 | 5.10 Non-carbonate carbon content                  |  | Technical class                                                                                                       |
|                                 | 5.11 Defects                                       |  | Pass/Fail                                                                                                             |

**Table ZA.1.2 — Relevant clauses for slate and carbonate slate and intended use – external cladding**

| <b>Product:</b> Slate and carbonate slate |                                                                                            |                                                                |                                                                                                                      |
|-------------------------------------------|--------------------------------------------------------------------------------------------|----------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| <b>Intended use:</b> External cladding    |                                                                                            |                                                                |                                                                                                                      |
| <b>Essential Characteristics</b>          | <b>Clauses in this and other European Standard(s) related to essential characteristics</b> | <b>Regulatory classes</b>                                      | <b>Notes</b>                                                                                                         |
| External fire performance                 | 5.13.1                                                                                     | Deemed to satisfy (EC Decision 2000/553/EC)                    | Deemed to satisfy (EC Decision 2000/553/EC)                                                                          |
| Reaction to fire                          | 5.13.2                                                                                     | Deemed to satisfy Class A1 (EC Decision 96/603/EC, as amended) | Deemed to satisfy Class A1 (EC Decision 96/603/EC, as amended)                                                       |
| Water permeability                        | 5.5                                                                                        |                                                                | Class W1( $\leq 0,6$ ), W1( $> 0,6$ ) or W2                                                                          |
| Release of dangerous substances           | 5.14                                                                                       |                                                                | Declaration on release/content taking into account national provisions in the place of use                           |
| Durability                                | 5.5 Water absorption                                                                       |                                                                | Declared Class W1( $\leq 0,6$ )<br>or<br>W1( $> 0,6$ )<br>or<br>W2                                                   |
|                                           | 5.6 Freeze–thaw resistance                                                                 |                                                                | Not required<br>or<br>W1( $>0,6$ ) in combination with the Mean modulus of rupture before and after freeze–thaw test |
|                                           | 5.7 Thermal cycle resistance                                                               |                                                                | Declared Class T1, T2 or T3                                                                                          |
|                                           | 5.8 Apparent calcium carbonate content                                                     |                                                                | Technical classes                                                                                                    |
|                                           | 5.9 Sulfur dioxide                                                                         |                                                                | Declared Class S1, S2 or S3                                                                                          |
|                                           | 5.10 Non-carbonate carbon content                                                          |                                                                | Technical class                                                                                                      |
|                                           | 5.11 Defects                                                                               |                                                                | Pass/Fail                                                                                                            |



The declaration of the product performance related to certain essential characteristics is not required in those Member States (MS) where there are no regulatory requirements on these essential characteristics for the intended use of the product. In this case, manufacturers placing their products on the market of these MS are not obliged to determine nor declare the performance of their products with regard to these essential characteristics and the option “No performance determined” (NPD) in the information accompanying the CE marking and in the declaration of performance (see ZA.3) may be used for those essential characteristics.

## **ZA.2 Procedure for AVCP of the slate and carbonate slate for discontinuous roofing and external cladding**

### **ZA.2.1 Systems of AVCP**

The AVCP systems of attestation of conformity of the slate and carbonate slate for discontinuous roofing and external cladding indicated in Tables ZA.1.1 and ZA.1.2, respectively in accordance with:

- the Decision of the Commission 98/436/EC of 1998-06-22 (published the 10.07.98 under L194) amended by the Decision 01/596/EC (published the 2.08.01 under L209) as given in Annex III of the mandate for “Roof coverings, roof lights, roof windows and ancillary products”,
- the Decision of the Commission 98/437/EC of 1998-06-30 (published the 10.07.98 under L194) as corrected (see OJ L 278, 15.10.1998, p.51 (98/437/EC)) and amended by the Decision 01/596/EC (published the 2.08.01 under L209) as given in Annex III of the mandate for “Internal and external wall and ceiling finishes”,

are shown in Table ZA.2 for the indicated intended uses and relevant levels or classes.

Table ZA.2 — Systems of AVCP

| Products                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Intended uses                                                                                                      | Level(s) or class(es) of performance         | AVCP systems |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|----------------------------------------------|--------------|
| Roofing slates                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | For uses subject to resistance to fire regulations (e.g. fire compartmentation)                                    | Any                                          | 3            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | For uses subject to reaction to fire regulations                                                                   | A1*, A2*, B* and C*                          | 1            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                    | A1**, A2**, B**, C**, D and E                | 3            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                    | (A1 to E)***,F                               | 4            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | For uses subject to external fire performance regulations                                                          | Products requiring testing                   | 3            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                    | Products 'deemed to satisfy' without testing | 4            |
| As roof coverings subject to regulations on dangerous substances                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | –                                                                                                                  | 4                                            |              |
| As roof coverings for all other uses                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | –                                                                                                                  | 4                                            |              |
| Tiles                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | As internal or external finishes in walls or ceilings subject to reaction to fire regulations                      | A1*, A2*, B* and C*                          | 1            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                    | A1**, A2**, B**, C**, D and E                | 3            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                    | (A1 to E)***,F                               | 4            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | As internal or external finishes in walls or ceilings, as relevant, subject to regulations on dangerous substances | –                                            | 3            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | As internal or external finishes in walls or ceilings for other uses mentioned in the mandate                      | –                                            | 4            |
| <p>* Products/materials for which a clearly identifiable stage in the production process results in an improvement of the reaction to fire classification (e.g. an addition of fire retardants or a limiting of organic material). Fire retardant products are under conformity system 1.</p> <p>** Products not covered by footnote (*).</p> <p>*** Products/materials that do not require to be tested for reaction to fire (e.g. products/materials of Class A1 according to Commission Decision 96/603/EC).</p> <p>System 1: See Regulation (EU) No. 305/2011 (CPR) Annex V, 1.2</p> <p>System 3: See Regulation (EU) No. 305/2011 (CPR) Annex V, 1.4</p> <p>System 4: See Regulation (EU) No. 305/2011 (CPR) Annex V, 1.5</p> |                                                                                                                    |                                              |              |

The AVCP of the slate and carbonate slates in Tables ZA.1.1 to ZA.1.2 shall be according to the AVCP procedures indicated in Table(s) ZA.3.1 to ZA.3.2 resulting from application of the clauses of this or other European Standard indicated therein. The content of tasks of the notified body shall be limited to those essential characteristics as provided for, if any, in Annex III of the relevant mandate and to those that the manufacturer intends to declare.

**Table ZA.3.1— Assignment of AVCP tasks for the slate and carbonate slate for discontinuous roofing and external cladding under System 3**

| Tasks                                   |                                                                                                                                                                                                    | Content of the task                                                                                              | AVCP clauses to apply |
|-----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|-----------------------|
| Tasks for the manufacturer              | Factory production control (FPC)                                                                                                                                                                   | Parameters related to essential characteristics of Table ZA.1.1 relevant for the intended use which are declared | 6.2,6.3 and 6.5       |
| Tasks for a notified testing laboratory | Determination of the product-type on the basis of type testing (based on sampling carried out by the manufacturer), type calculation, tabulated values or descriptive documentation of the product | Dangerous substances                                                                                             | 6.2, 6.3 and 6.4      |

**Table ZA.3.2 — Assignment of AVCP tasks for the slate and carbonate slate for discontinuous roofing and external cladding under System 4**

| Tasks                      |                                                                                                                                                | Content of the task                                                                           | AVCP clauses to apply |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-----------------------|
| Tasks for the manufacturer | Factory production control (FPC)                                                                                                               | Parameters related to essential characteristics of Table ZA.1.1 relevant for the intended use | 6.2, 6.3 and 6.5      |
|                            | Determination of the product-type on the basis of type testing, type calculation, tabulated values or descriptive documentation of the product | Essential characteristics of Table ZA.1.2 relevant for the intended use which are declared    | 6.2, 6.3 and 6.4      |

## ZA.2.2 Declaration of performance (DoP)

### ZA.2.2.1 General

The manufacturer draws up the DoP and affixes the CE marking on the basis of the different AVCP systems set out in Annex V of the Regulation (EU) No 305/2011:

*In case of products under system 3:*

- the factory production control carried out by the manufacturer; and
- the determination of the product-type on the basis of type testing (based on sampling carried out by the manufacturer), type calculation, tabulated values or descriptive documentation of the product, carried out by the notified testing laboratory.

*In case of products under system 4:*

- the factory production control carried out by the manufacturer;

- the determination by the manufacturer of the product-type on the basis of type testing, type calculation, tabulated values or descriptive documentation of the product.

#### **ZA.2.2.2 Content**

The model of the DoP is provided in Annex III of the Regulation (EU) No 305/2011.

According to this Regulation, the DoP shall contain, in particular, the following information:

- a) the reference of the product-type for which the declaration of performance has been drawn up;
- b) the AVCP system or systems of the construction product, as set out in Annex V of the CPR;
- c) the reference number and date of issue of the harmonized standard which has been used for the assessment of each essential characteristic;
- d) where applicable, the reference number of the Specific Technical Documentation used and the requirements with which the manufacturer claims the product complies.

The DoP shall in addition contain:

- e) the intended use or uses for the construction product, in accordance with the applicable harmonized Technical Specification;
- f) the list of essential characteristics, as determined in the harmonized Technical Specification for the declared intended use or uses;
- g) the performance of at least one of the essential characteristics of the construction product, relevant for the declared intended use or uses;
- h) where applicable, the performance of the construction product, by levels or classes, or in a description, if necessary based on a calculation in relation to its essential characteristics determined in accordance with the Commission determination regarding those essential characteristics for which the manufacturer shall declare the performance of the product when it is placed on the market or the Commission determination regarding threshold levels for the performance in relation to the essential characteristics to be declared;
- i) the performance of those essential characteristics of the construction product which are related to the intended use or uses, taking into consideration the provisions in relation to the intended use or uses where the manufacturer intends the product to be made available on the market;
- j) for the listed essential characteristics for which no performance is declared, the letters "NPD" (No Performance Determined).

Regarding the supply of the DoP, Article 7 of the Regulation (EU) No 305/2011 applies.

The information referred to in Article 31 or, as the case may be, in Article 33 of Regulation (EC) No 1907/2006, (REACH) shall be provided together with the DoP.

### ZA.2.2.3 Example of DoP

The following gives an example of a filled-in DoP for slate/carbonate slate:

#### DECLARATION OF PERFORMANCE

**No. 001DoP2013-07-14**

1. Unique identification code of the product-type:

**Slate and carbonate slate for discontinuous roofing and cladding**

**MT38- ML85-WPC CCC20-T2-S2**

2. Type, batch or serial number or any other element allowing identification of the construction product as required under Article 11(4):

**Slate and carbonate slate for discontinuous roofing and cladding**

**MT38- ML85-WPC CCC20-T2-S2**

3. Intended use or uses of the construction product, in accordance with the applicable harmonized Technical Specification, as foreseen by the manufacturer:

**Slate and carbonate slate for discontinuous roofing and cladding**

4. Name, registered trade name or registered trade mark and contact address of the manufacturer as required under Article 11(5):

**AnyCo SA,**

**PO Box 21**

**B-1050 Brussels, Belgium**

**Tel. +32987654321**

**Fax: +32123456789**

**Email: <mailto:anyco.sa@provider.be>**

5. Where applicable, name and contact address of the authorized representative whose mandate covers the tasks specified in Article 12(2):

**Anyone Ltd**

**Flower Str. 24**

**West Hamfordshire**

**UK-589645 United Kingdom**

**Tel. +44987654321**

**Fax: +44123456789**

**e-mail: [anyone.ltd@provider.uk](mailto:anyone.ltd@provider.uk)**

6. System or systems of assessment and verification of constancy of performance of the construction product as set out in CPR, Annex V:

**System 4**

7. Declared performance:

| Essential characteristics                                                                                                                                                                 | Performance                                                                  | Harmonized technical specification |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|------------------------------------|
| <b>Dimensional variation</b><br>- Nominal thickness<br>- Individual thickness<br>- Deviation of length and width<br>- Deviation from edge straightness<br>- Deviation from rectangularity | 4 mm<br>4 mm<br>Complies<br>Complies<br>Complies                             | EN 12326-1:2014                    |
| <b>Mechanical resistance<br/>(Characteristic modulus of rupture)</b>                                                                                                                      | Transverse: 38 N/mm <sup>2</sup><br>Longitudinal: 85 N/mm <sup>2</sup>       |                                    |
| <b>Water absorption</b>                                                                                                                                                                   | W1 (> 0,6)                                                                   |                                    |
| <b>Apparent calcium carbonate</b>                                                                                                                                                         | ≤ 20 %                                                                       |                                    |
| <b>Durability:</b><br>- Water absorption<br>- Freeze-thaw cycling<br>- Thermal cycling<br>- Sulfure dioxide exposure<br>- Non-carbonate carbon content                                    | W1(> 0,6)<br>Change in mean modulus of rupture<br>T2<br>S2<br>Complies ≤ 2 % |                                    |
| <b>Release of dangerous substances</b>                                                                                                                                                    | None in conditions of use as roofing or external cladding                    |                                    |
| <b>External fire performance</b>                                                                                                                                                          | Deemed to satisfy                                                            |                                    |
| <b>Reaction to fire</b>                                                                                                                                                                   | Deemed to satisfy class A1                                                   |                                    |

8. The performance of the product identified in Points 1) and 2) is in conformity with the declared performance in point 7).

This declaration of performance is issued under the sole responsibility of the manufacturer identified in point 4).

Signed for and on behalf of the manufacturer by:

.....

(name and function)

.....

(place and date of issue) (signature)

### ZA.3 CE marking marking and labelling

The CE marking symbol shall be in accordance with the general principles set out in Article 30 of Regulation (EC) No 765/2008 and shall be affixed visibly, legibly and indelibly:

- to the slate and carbonate slate for discontinuous roofing and external cladding,
- or
- to a label attached to it.

Where this is not possible or not warranted on account of the nature of the product, it shall be affixed:


- to the packaging,
- or
- to the accompanying documents.

The CE marking shall be followed by:

- the last two digits of the year in which it was first affixed,
- the name and the registered address of the manufacturer, or the identifying mark allowing identification of the name and address of the manufacturer easily and without any ambiguity,
- the unique identification code of the product-type,
- the reference number of the declaration of performance,
- the level or class of the performance declared,
- the dated reference to the harmonized Technical Specification applied,
- the identification number of the notified body, the intended use as laid down in the harmonized Technical Specification applied.

The CE marking shall be affixed before the construction product is placed on the market. It may be followed by a pictogram or any other mark notably indicating a special risk or use.

Figure ZA.1 gives an example of the information related to products subject to AVCP under each of the different systems to be given on the packaging or to the accompanying documents.

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <p><b>AnyCo Ltd, PO Box 21, B-1050, Brussels, Belgium</b></p> <p><b>14</b></p> <p>001-DoP2013-07-14</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <p>EN 12326–1:2014</p> <p>MT38- ML85-WPC CCC20-T2-S2</p> <p>intended to be used as discontinuous roofing and external cladding.</p> <p>Dimensional variation:</p> <ul style="list-style-type: none"> <li>- Nominal thickness: 4mm</li> <li>- Individual thickness: 4 mm</li> <li>- Deviation of length and width: complies</li> <li>- Deviation from edge straightness: complies</li> <li>- Deviation from rectangularity: complies</li> </ul> <p>Mechanical resistance (Characteristic modulus of rupture):</p> <ul style="list-style-type: none"> <li>- Transverse: 38 N/mm<sup>2</sup>;</li> <li>- Longitudinal: 85 N/mm<sup>2</sup></li> </ul> <p>Water permeability – water absorption: W1 (≤ 0,6 %)</p> <p>Apparent calcium carbonate content: ≤ 20 %</p> <p>Durability:</p> <ul style="list-style-type: none"> <li>- Water absorption: W1 (≤ 0,6 %)</li> <li>- Freeze–thaw cycling: not required</li> <li>- Thermal cycling: T2</li> <li>- Sulfure dioxide exposure: S2</li> <li>- Non-carbonate carbon content: Complies ≤ 2 %</li> </ul> <p>Release of dangerous substances: None in conditions of use as roofing or external cladding</p> <p>External fire performance: Deemed to satisfy</p> |

*CE marking, consisting of the “CE”-symbol*

*name and the registered address of the manufacturer, or identifying mark*

*Last two digits of the year in which the marking was first affixed*

*Reference number of the DoP*

*No. of European Standard applied, as referenced in OJEU*

*Unique identification code of the product-type  
 Intended use of the product as laid down in the European standard applied*

*Level or class of the performance declared*

**Figure ZA.1 — Example CE marking information of products under AVCP System 4**



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