



SLOVENSKI STANDARD

SIST EN 1341:2001

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Plošče iz naravnega kamna za zunanje tlakovanje - Zahteve in preskusne metode

Slabs of natural stone for external paving - Requirements and test methods

Platten aus Naturstein für Außenbereiche - Anforderungen und Prüfverfahren

Dalles de pierre naturelle pour le pavage extérieur - Exigences et méthodes d'essai

Ta slovenski standard je istoveten z: **EN 1341:2000**

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ICS:

91.100.15	Mineralni materiali in izdelki	Mineral materials and products
93.080.20	Materiali za gradnjo cest	Road construction materials

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 1341

January 2000

ICS 93.080.20

English version

Slabs of natural stone for external paving - Requirements and test methods

Dalles de pierre naturelle pour le pavage extérieur -
Exigences et méthodes d'essai

Platten aus Naturstein für Außenbereiche - Anforderungen
und Prüfverfahren

This European Standard was approved by CEN on 22 August 1999.

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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 178 "Paving units and kerbs", the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by July 2000, and conflicting national standards shall be withdrawn at the latest by July 2000.

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

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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1 Scope

This European Standard specifies the performance requirements and the corresponding test methods for all natural stone slabs, for external paving use.

It provides for product marking and for the evaluation of conformity of the product to this European Standard.

This European Standard covers also characteristics that are of importance to the trade.

It does not cover internal flooring tiles or slabs nor does it cover the effect of de-icing salts.

2 Normative references

This European Standard incorporates by dated or undated reference provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

EN 10025, *Specification for hot rolled products of non-alloy non-structural sheets and their technical delivery conditions*

ISO 48, *Rubber, vulcanised or thermoplastic - Determination of hardness (hardness between 10 IRHD and 100 IRHD)*

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ISO 2632, *Roughness comparison specimens*

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ISO 4662, *Rubber - Determination of rebound resilience of vulcanizates*

ISO 7619, *Rubber - Determination of indentation hardness by means of pocket hardness meters*

3 Definitions

For the purposes of this standard the following definitions apply:

3.1 slab

Any unit of natural stone used as a paving material, in which the working width exceeds 150 mm and also generally exceeds two times the thickness.

3.1.1 riven slab

Slab with split face.

3.1.2**textured slab**

Slab with a modified appearance resulting from one or several surface treatments (for example mechanical or thermal).

3.2**upper face**

Surface of a slab intended to be seen when in use.

3.3**side face**

Surfaces of a slab intended to be vertical in use.

3.4**work dimension**

Any dimension of a slab specified for its manufacture to which the actual dimension should conform within specified permissible deviations.

3.5**actual dimension**

Any dimension of a slab as measured.

3.6**thickness**

Distance between the upper face and the bedface of the slab.

3.7**overall length**

The longer side of the rectangle with the smallest length able to enclose the slab.

3.8**overall width**

The shorter side of the rectangle with the smallest area able to enclose the slab.

3.9**fine textured**

Surface treatment with a maximum difference of 0,5 mm between peaks and depressions (for example polished, honed or sawn with a diamond disc or blade).

3.10**honed**

Dull polish or matt surface.

3.11**coarse textured**

Surface treatment with more than 2 mm difference between peaks and depressions (for example dolly pointed, tooled, shot blasted or flame textured).

3.12**dolly pointed**

Finish consisting of peaks and depressions achieved by using a four pointed dolly bit.

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3.13

tooled

Finish resulting from mechanical surface treatment and showing tool marks.

3.14

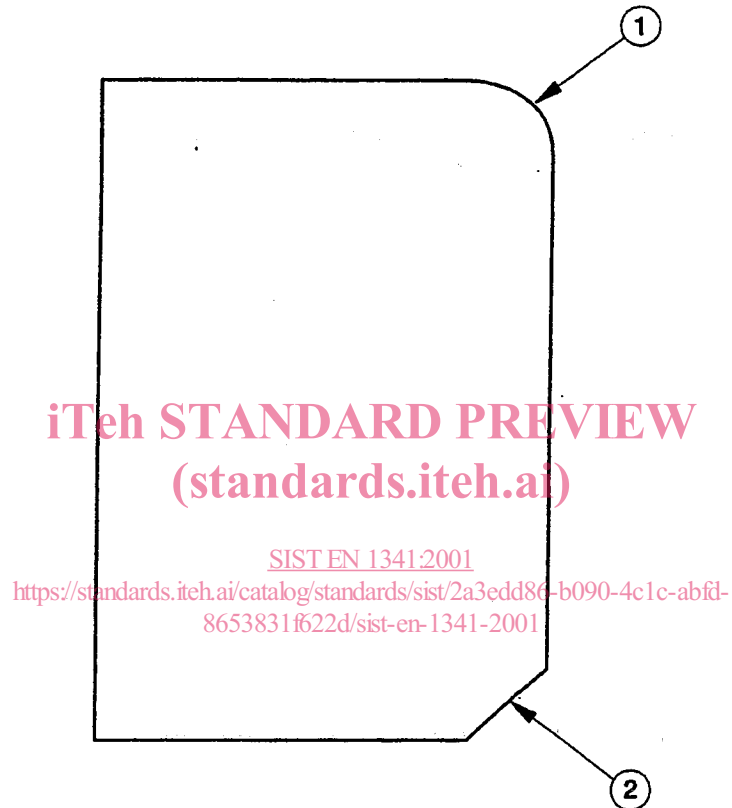
arris

Sharp edge produced by the meeting of two surfaces.

3.15

chamfer

Bevelled arris as shown in Figure 1.



1 Rounded
2 Bevelled

Figure 1.: Chamfer

4 Requirements

4.1 Dimensions

The supplier shall state the work dimensions of each slab that is tested, unless supplied in random sizes. Where supplied in running lengths, only the widths and thickness shall be stated.

Dimensions shall be measured in accordance with normative annex A.

4.1.1 Permissible deviations

4.1.1.1 Plan dimensions (excluding slabs with irregular plan form)

When measured in accordance with normative annex A.2 or A.3, the deviation from the work plan dimensions shall conform with Table 1.

Table 1: Deviations on plan dimension

	Class 1	Class 2
Marking Designation	P1	P2
Sawn edges \leq 700 mm	\pm 4 mm	\pm 2 mm
Sawn edges $>$ 700 mm	\pm 5 mm	\pm 3 mm
Riven edges	\pm 10 mm	\pm 10 mm

When measured in accordance with normative annex A.2 or A.3, the maximum difference between the measurement of the two diagonals of a rectangular slab shall not exceed the values given in Table 2.

Table 2: Deviations on diagonals

Class	Diagonal	Difference
Marking Designation	D1	D2
1	$<$ 700	6 mm
	\geq 700	8 mm
2	$<$ 700	3 mm
	\geq 700	6 mm

4.1.1.2 Thickness

When measured in accordance with normative annex A.4, the deviation from the work thickness of textured slabs shall conform to Table 3.

Table 3: Deviation on thickness

Textured slabs	Class 0	Class 1	Class 2
Marking Designation	T0	T1	T2
≤ 30 mm thick	No requirement for thickness measurement	± 3 mm	± 10 %
> 30 mm ≤ 60 mm thick		± 4 mm	± 3 mm
> 60 mm thick		± 5 mm	± 4 mm

For riven slabs there is no requirement but a producer may declare appropriate permissible deviations measured in accordance with normative annex A.4.

4.1.1.3 Face irregularities

When measured in accordance with normative annex A.5 the face irregularities on riven slabs shall be a maximum of 20 mm above work thickness and not below work thickness.

4.1.1.4 Flatness and straightness

4.1.1.4.1 Arrises

When measured in accordance with normative annex A.6 the flatness deviation along the arrises of textured slabs shall conform to Table 4.

Table 4: Deviation on flatness along arrises

Longest test straight edge	0,5 m	1 m	1.5 m
Fine textured face	± 2 mm	± 3 mm	± 4 mm
Coarse textured face	± 3 mm	± 4 mm	± 6 mm
> 30 mm ≤ 60 mm	for thickness measurement	± 4 mm	± 3 mm
> 60 mm thick		± 5 mm	± 4 mm

4.1.1.4.2 Faces

When measured in accordance with normative annex A.6 the deviations from flatness and bow shall conform to Table 5 unless the surface is riven in which case the supplier/manufacturer shall supply information on deviations.

Table 5: Deviation on flatness for faces

Fine texture		
Gauge length ¹⁾	Max. convex deviation	Max. concave deviation
(mm)	(mm)	(mm)
300	2,0	1,0
500	3,0	2,0
800	4,0	3,0
1000	5,0	4,0
Coarse texture		
Gauge length ¹⁾	Max. convex deviation	Max. concave deviation
(mm)	(mm)	(mm)
300	3,0	2,0
500	4,0	3,0
800	5,0	4,0
1000	8,0	6,0

¹⁾ See Figure A.1.

4.1.1.5 Arrises

Arrises described as square or sharp may have a bevel with horizontal or vertical dimensions not exceeding 2 mm at the manufacturer's discretion.

When slabs are supplied with a chamfered or rounded arris, the dimensions shall be declared by the producer and the vertical and horizontal dimension shall be within ± 2 mm of the declared dimensions.

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4.2 Freeze/thaw resistance

The producer shall declare the freeze/thaw resistance of the stone in accordance with Table 6. If possible the stone shall be tested in accordance with normative annex B and reported as the minimum value (number of cycles before failure occurs) expected for individual specimens. If there is no requirement for freeze/thaw resistance or no performance has been determined, then this shall be stated.

NOTE Reasons that would make it impossible to carry out the test in annex B include time constraints and non-availability of suitable equipment.

Table 6: Freeze/thaw resistance

Class	Class 0	Class 1
Marking Designation	F0	F1
Requirement	No requirements for freeze/thaw resistance	Resistant

4.3 Flexural strength

The producer shall declare a flexural strength (in MPa) as the minimum value expected for individual test specimens when tested in accordance with normative annex C. If no performance has been determined this shall be stated.

NOTE Guidance on the appropriate breaking load for different classes of use is given in informative annex K.

4.4 Abrasion resistance

The producer shall declare the abrasion resistance (length of chord in mm) as the maximum value expected for individual test specimens when tested in accordance with normative annex D. If no performance has been determined this shall be stated.

4.5 Slip resistance

The producer shall declare the minimum Unpolished Slip Resistance Value (USRV) expected for individual test specimens of fine textured slabs when tested in accordance with normative annex E. If no performance has been determined this shall be stated.

NOTE 1 Coarse textured and riven slabs are assumed to give satisfactory slip resistance. They cannot be reliably tested.

NOTE 2 The unpolished slip resistance value relates to slabs as manufactured and helps to ensure adequate slip/skid resistance on installation.

4.6 Aspects

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4.6.1 Appearance

Stone is naturally occurring material giving rise to variations in colour, veining and texture, therefore, general characteristics of the appearance may be given by one or more specimens (see 4.6.2).

4.6.2 Reference sample

A reference sample shall be a number of pieces of natural stone of sufficient size to indicate the appearance of the finished work. The dimensions shall be between 0,01 m² and 0,25 m² in face area and shall indicate the approximate appearance regarding the colouring, the vein pattern, the physical structure and face finish.

It shall show the general tonality and finish of the natural stone, but does not imply any total uniformity in colour and veins between the sample and supply.

The reference sample shall be provided and delivered to the customer as an indication to show specific characteristics such as holes for travertine, worm holes for marble, glass seams, spots, crystalline veins and rusty spots of the offered materials:

NOTE These characteristics should not be considered as flaws and should not be used as a reason for rejection.

The name and address of the producer or the supplier shall be indicated on the sample as well as identification of the material including trade name, petrographic name, country of origin and extraction area.

Reference samples shall also show the surface finish proposed.

Any comparison between test and reference samples shall be carried out in accordance with normative annex F.

4.7 Water absorption

Where required the producer shall declare the water absorption (% by mass) as the maximum value expected for individual specimens when tested in accordance with normative annex G.

4.8 Petrographical description

The producer shall provide a petrographical description, including a petrographic name, of the stone type, in accordance with normative annex H.

4.9 Chemical surface treatment

The producer/supplier shall declare if the product has been subjected to a chemical surface treatment and what the treatment was.

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5 Evaluation of conformity

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5.1 General

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The producer or supplier shall demonstrate compliance of his product, either new or existing, with the requirements of this standard and with the declared values or classes for the current properties by carrying out initial testing and factory production control.

The value declared by the producer or supplier shall be representative of the current production, for example the lowest expected value or the minimum test value in normal production.

5.2 Initial type tests

When a product shall first demonstrate conformity with this standard, for example when a new product type is developed, and before offering it for sale, appropriate tests shall be carried out to confirm that the properties of the product meet the requirements of this standard and the values to be declared for it by the producer. Whenever a significant change occurs in the raw material or the production process which could change the properties of the finished product, this shall be considered as constituting a new product type.

The type tests shall be the reference tests called up in this standard for the properties selected from the following list consistent with the product type's intended use:

- Dimensions;
- Flatness of surface;

- Freeze/thaw resistance;
- Flexural strength;
- Abrasion resistance;
- Slip resistance;
- Aspects (for example visual appearance);
- Water absorption;
- Petrographic description;
- Surface treatment.

The results of the initial tests shall be recorded.

5.3 Factory production control

A factory production control system shall be established and documented prior to commencing production. The factory production control system shall consist of procedures for the internal control of production to ensure that products placed on the market conform with this standard and the manufacturer's declared values.

The internal control shall consist of regular inspection checks and tests and the utilisation of the results to control incoming materials, equipment, the production process and the finished product.

5.3.1 Raw materials

Specifications of all incoming materials and the procedures to be operated to ensure that they comply shall be documented.

5.3.2 Production process

The relevant features of the plant and production process shall be defined, giving the frequency of the inspection checks and tests, together with the criteria required both on equipment and on work in progress. The action to be taken when control values or criteria are not met shall be given. Weighing and measuring equipment shall be calibrated and the procedure, frequency and criteria stated.

5.3.3 Finished product testing

A sampling plan for the testing of finished products shall be defined and the results shall be recorded and available for inspection. When alternative tests to the reference tests are used for the test procedure their correlation to the reference test shall be available for inspection. All test equipment shall be calibrated and the procedure, frequency and criteria stated.

5.3.4 Stock control

The stock control of finished products, together with procedures for dealing with non-conforming products, shall be detailed.

6 Acceptance criteria

6.1 Sampling

The sampling procedure from a batch to establish its conformity to this standard and the manufacturer's declared range of values shall be in accordance with normative annex J.

6.2 Conformity criteria

6.2.1 Dimensions

When tested in accordance with normative annex A, the mean value of the measurements taken of any one dimension on a single slab shall not vary from the manufacturer's declared work dimension by more than the permissible deviations given in 4.1.1.1 and 4.1.1.2 for the declared class. The maximum difference between the measurements of the two diagonals of any one slab shall not exceed the value given in 4.1.1.1 for the declared class.

6.2.2 Flatness

When tested in accordance with normative annex A, no individual measurement of the deviation from a plane shall exceed the value given in 4.1.1.4.

6.2.3 Freeze/thaw resistance

When tested in accordance with normative annex B the results for any of the test specimens shall be not less than the declared value.

6.2.4 Flexural strength

When tested in accordance with normative annex C the results for all of the test specimens shall be not less than the declared value.

6.2.5 Abrasion resistance

When tested in accordance with normative annex D the results for all of the test specimens shall be not greater than the declared value.

6.2.6 Slip resistance

When tested in accordance with normative annex E the results for all of the test specimens shall be not less than the declared value.

7 Marking, labelling and packaging

Slabs shall be packed in a manner to avoid damage in transit, and any metal banding used shall be corrosion resistant.

The following information shall be supplied either on the packaging, or on the delivery note:

- a) the petrographical name of the stone;
- b) the commercial name of the stone;