



Verde Spluga

> 02 Catalogue

> 06 Technical sheets

Verde Spluga

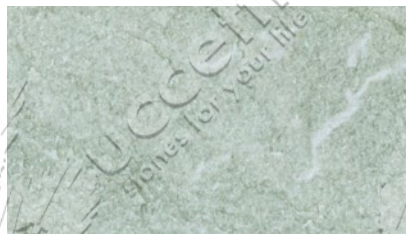
POLISHED



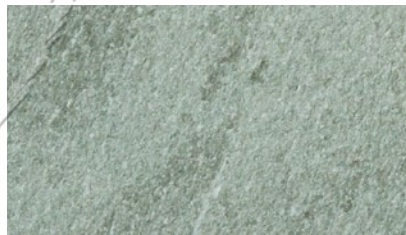
HONED



FLAMED + BRUSHED



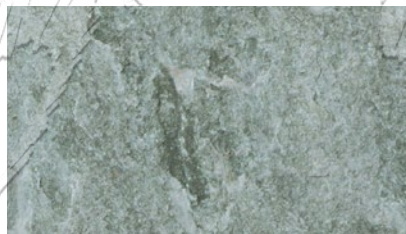
FLAMED



SANDED



NATURAL SPLIT



TECHNICAL TESTS - AVERAGE VALUES SURFACE: DIAMOND DISK CUT

Apparent Density UNI EN 1936:2007

2630 kg/m³

Open Porosity UNI EN 1936:2007

0,7 %

Water Absorption at atmospheric pressure
UNI EN 13755:2008

0,3 %

Abrasion Resistance UNI EN 14157:2017

15,5 mm

Flexural Strength UNI EN 12372:2007

20,3 MPa

Frost Resistance:

flexural strength after 14 freeze/thaw cycles
UNI EN 12371:2010 - UNI EN 12372:2007

20,4 MPa

Frost Resistance:

flexural strength after 56 freeze/thaw cycles
UNI EN 12371:2010 - UNI EN 12372:2007

19,7 MPa

Breaking Load at dowel hole UNI EN 13364:2003

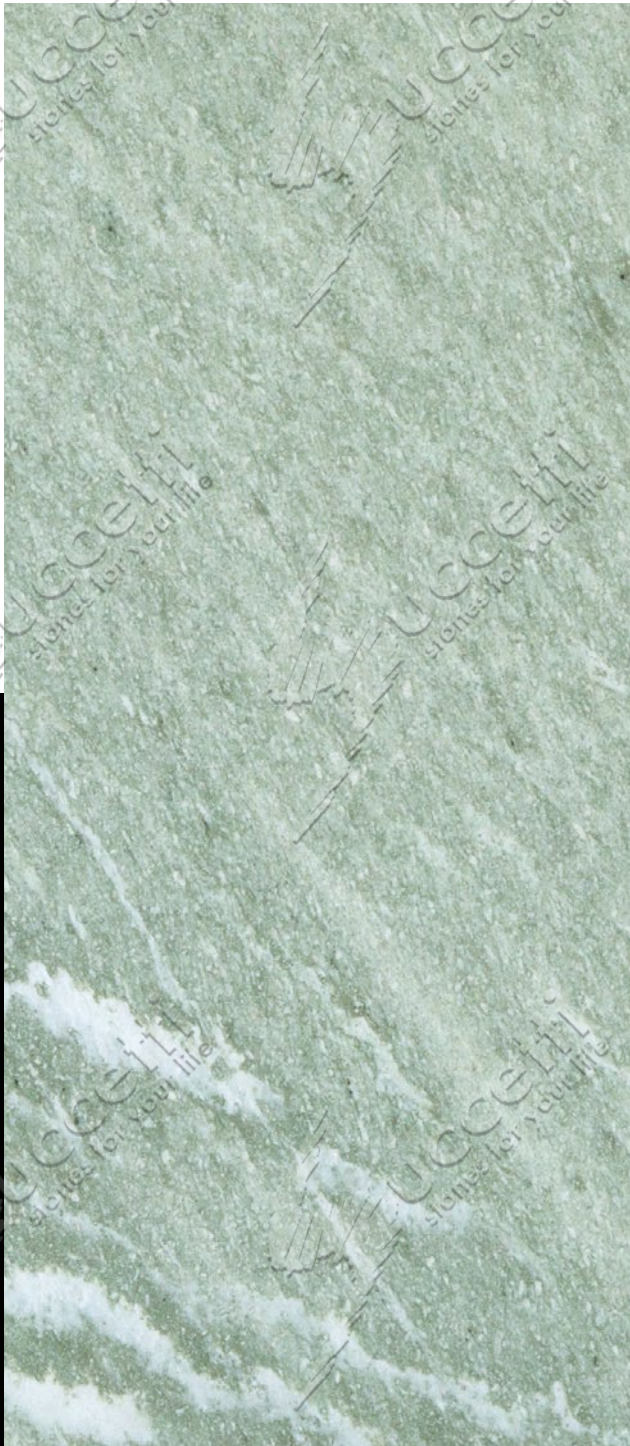
1450 N

Resistance to Ageing: flexural strength
after thermal shock cycles

UNI EN 14066:2013 - UNI EN 12372:2007

19,7 Mpa

POLISHED



HONED



Slab
78,7x31,5"

Detail
13,8x31,5"

FLAMED + BRUSHED



FLAMED



Slab
78,7x31,5"

Detail
13,8x31,5"



SANDED



NATURAL SPLIT

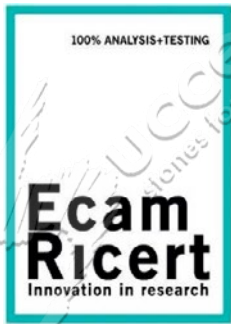


Slab
78,7x31,5"

Detail
13,8x31,5"

Technical sheets

uccetti
stones for your life



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 Viale del Lavoro, 6
 36030 Monte di Malo
 Vicenza, Italy
 T +39 0445 605838
 F +39 0445 581430
 info@ecamricert.com
 C.F./P.I. 01650050246
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 Laboratorio di Ricerca altamente qualificato art. 14 DM 593/2000-G.U. n° 29/2003
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LAB N° 0699

Test Report n° 18-4260-005/E

Issue Date, 07/31/2018

Client	SUC CETTI LUCIANO S.R.L. VIA REZIA N.30 23022 - CHIAVENNA, SO ITALIA
Sample description	VERDE SPLUGA #
Origin	CUSTOMER PLANT
Kind of sample	SLABS OF NATURAL STONE FOR CUTTING
Sampling by	CLIENT
Sampling date	NOT DECLARED
Taken from	COURIER
Delivery date	05/17/2018
Acceptance number	18-4260
Acceptance date	05/17/2018
Test start date	05/21/2018
Test end date	07/30/2018
Object	ITT TESTS FOR CE MARKING ACCORDING TO: UNI EN 1341 UNI EN 1469 UNI EN 12057 UNI EN 12058

DISPOSITION OF ANISOTROPY PLANS COMPARED TO THE DIMENSIONS OF THE SPECIMENS:

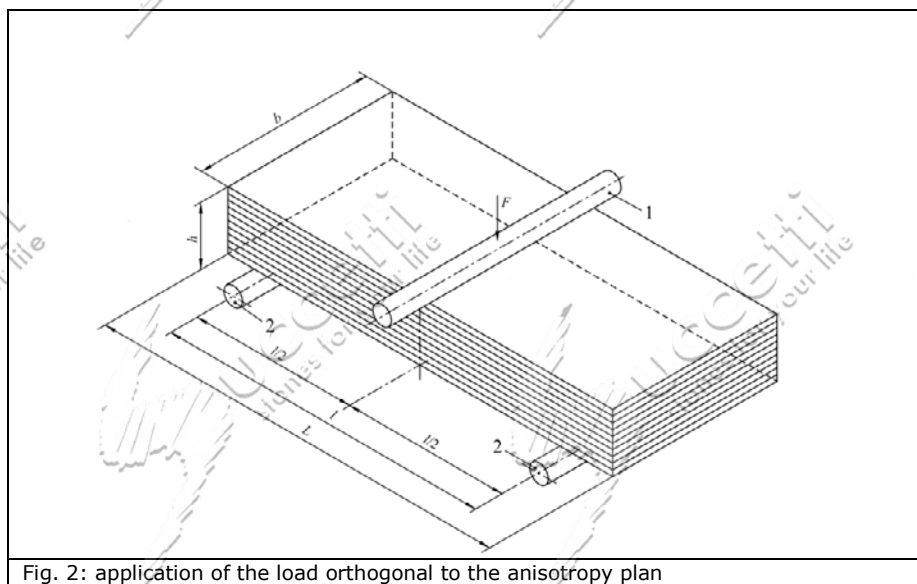
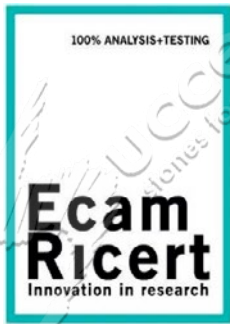


Fig. 2: application of the load orthogonal to the anisotropy plan



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36030 Monte di Malo
Vicenza, Italy
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F +39 0445 581430
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PETROGRAPHIC EXAMINATION **

Test according to: UNI EN 12407: 2007

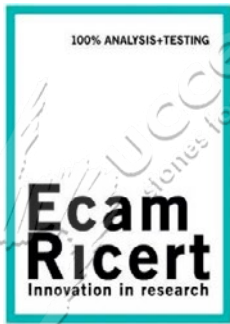
Macroscopic description by lens (10X), diluted hydrochloric acid at 10%

Metamorphic rock of quartz-muscovite-feldspar composition, non-reactive to cold hydrochloric acid. The rock presents alternating quartz (white) and granoblastic levels of muscovite (green) and feldspar (white) porphyroblasts bordered with quartz and muscovite

Petrographic microscopic analysis in thin section by polarizing microscope (thin section at 30 microns) - Microchemical test with Alizarina S coloring solution (red Alizarina)

Components		%	Grain
Mains	Quartz	45	Medium grain granoblasts
	Feldspar	20	Coarse-grained porphyroblasts
	Muscovite	35	Lepidoblasts with fine grains sometimes deformed
Lessers	-	-	-
	-	-	-
	-	-	-

Equipment: Cropper Micromet Remet
Microscope Olympus BX 41
Digital Camera Canon EOS 450D
Remote control and image management Eos Utility
Magnifying glass 10x



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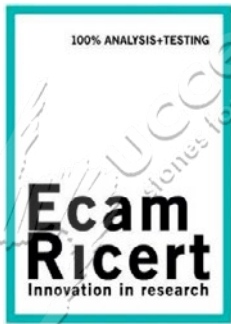
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PETROGRAPHIC EXAMINATION **

Test according to: UNI EN 12407: 2007

**Petrographic microscopic analysis in thin section by polarizing microscope (thin section at 30 microns) -
 Microchemical test with Alizarina S coloring solution (red Alizarina)**

Intergranular texture	Granoblastic-lepidoblastic texture (granoblastic quartz levels alternating with lepidoblastic muscovite levels). Porfiroblastic texture (feldspar porfiroblasts bordered with quartz and muscovite)
Intergranular texture	No internal schistosity
Porosity observable under the microscope	No porosity observable
Residual	Absent
Grain	Medium-coarse
Metamorphic level	High
Classification	Gneiss
Commercial name	Verde Spluga



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PHOTOGRAPHIC DOCUMENTATION

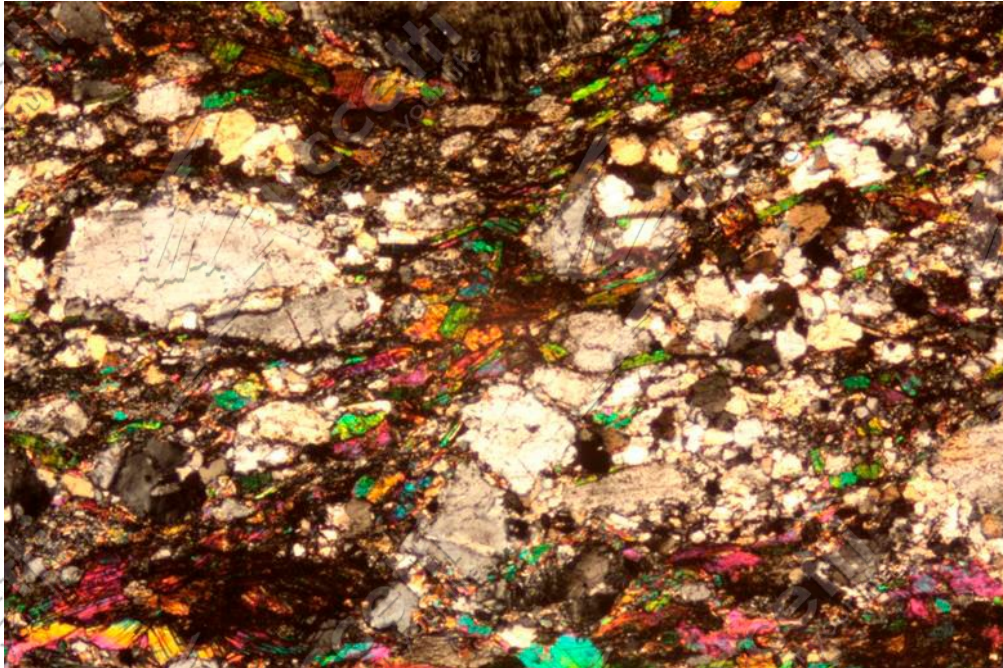


Photo 1: Photo under an optical microscope, thin section, trasmitted light, 20 magnifications, cross nicols

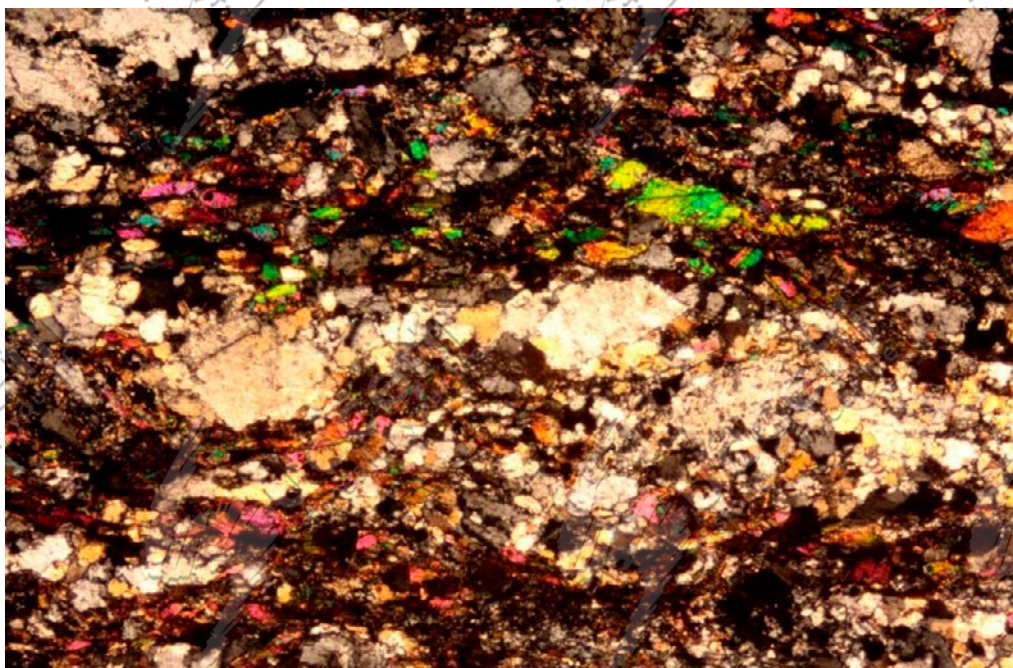


Photo 2: Photo under an optical microscope, thin section, trasmitted light, 20 magnifications, cross nicols

DETERMINATION OF WATER ABSORPTION AT ATMOSPHERIC PRESSURE (UNI EN 13755:2008)

SPECIMEN	specimen dimension (mm)			Mass of the dry specimen (g)	Mass of the saturated specimen (g)	Absorption (%)	
	n.	L	I				h
ASS - 1		100,1	99,8	26,0	688,07	689,88	0,3
ASS - 2		100,0	100,4	25,9	689,75	691,58	0,3
ASS - 3		100,8	100,8	25,8	690,15	691,81	0,2
ASS - 4		9,9	100,3	25,7	683,85	685,68	0,3
ASS - 5		100,3	100,3	25,8	690,99	692,56	0,2
ASS - 6		100,5	100,1	25,4	686,22	687,82	0,2
average absorption (%)							0,3±0,1

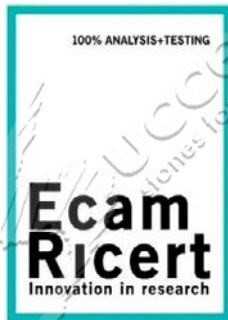
Note: measurement uncertainty reported in extended form with k = 2.57 corresponding to a confidence level of 95%

DETERMINATION OF APPARENT DENSITY (UNI EN 1936:2007)*

SPECIMEN	Mass of the dry specimen (g)	Mass of the saturated specimen (g)	Mass of the specimen in water (g)	Apparent density (kg/m ³)
ASS - 1	688,07	689,88	413,17	2481,6
ASS - 2	689,75	691,58	432,92	2661,3
ASS - 3	690,15	691,81	432,85	2659,8
ASS - 4	683,85	685,68	428,10	2649,6
ASS - 5	690,99	692,56	433,20	2658,9
ASS - 6	686,22	687,82	431,39	2670,7
Apparent density (kg/m³)				2630,0

DETERMINATION OF OPEN POROSITY (1936:2007)*

SPECIMEN	Mass of the dry specimen (g)	Mass of the saturated specimen (g)	Mass of the specimen in water (g)	Open porosity (%)
ASS - 1	688,07	689,88	413,17	0,7
ASS - 2	689,75	691,58	432,92	0,7
ASS - 3	690,15	691,81	432,85	0,6
ASS - 4	683,85	685,68	428,10	0,7
ASS - 5	690,99	692,56	433,20	0,6
ASS - 6	686,22	687,82	431,39	0,6
Average open porosity (%)				0,7



ECAMRICERT SRL
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Vicenza, Italy
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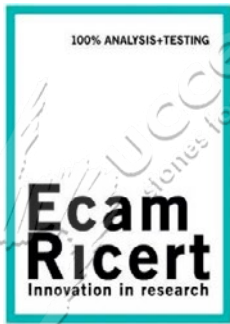
Issue Date, 07/31/2018

**DETERMINATION OF THE ABRASION RESISTANCE (UNI EN 14157:2017)
Method A with abrasive disk**

Surface finish:	disk cut #
Abrasion surface:	ORTHOGONAL TO THE PLAN OF USE
¹ Correction value :	- 0,5 mm

specimen number	groove width (mm)	correct groove width (mm) ¹	average correct value (mm)
1	15,9	15,5	15,5 ± 0,5
2	16,3	16,0	
3	16,3	16,0	
4	16,1	15,5	
5	15,8	15,5	
6	16,2	15,5	

Note: measurement uncertainty on the average value reported in extended form with $k = 2,57$ corresponding to a confidence level of 95%



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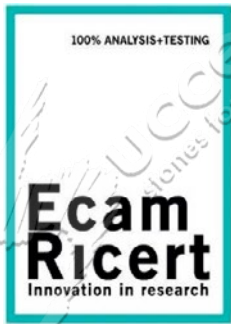
DETERMINATION OF FLEXURAL STRENGTH UNDER CONCENTRATED LOAD (UNI EN 12372-2007)

- Speed of load's application:	0,23 MPa/s
- Surface finish:	disk cut #
- Direction of load's application:	orthogonal to the plan of use (vein cut, fig. 2)

SPECIMEN	Dimensions (mm)				Breaking load (N)	Type of breaking	Flexural strength (Mpa)
	n.	Total Length L	Distance supports I	b			
1-VS-TQ	180,6	153,0	89,6	30,5	7147	-	19,6
2-VS-TQ	180,6	153,0	90,0	30,7	7883	-	21,3
3-VS-TQ	180,2	153,0	90,2	30,9	7869	-	21,0
4-VS-TQ	180,1	153,0	89,5	30,6	7170	-	19,6
5-VS-TQ	179,6	153,0	90,3	30,6	7057	-	19,1
6-VS-TQ	180,6	153,0	89,7	30,9	7607	-	20,4
7-VS-TQ	180,4	153,0	90,5	30,6	7736	-	20,9
8-VS-TQ	180,9	153,0	90,6	30,6	7743	-	20,9
9-VS-TQ	180,7	153,0	90,0	30,8	7254	-	19,5
10-VS-TQ	180,4	153,0	90,1	30,7	7488	-	20,2
Average flexural strength (MPa):							20,3 ± 0,5

number of specimens	10
Average flexural strength (MPa)	20,3 ± 0,5
Standard deviation (MPa)	0,8
Coefficient of variation	0,0
Logarithmic mean	3,01
logarithmic standard deviation (MPa)	0,04
Minimun value (MPa)	19,1
Maximun value (MPa)	21,3
Lower expected value (MPa)	18,7
Quantile factor K _s	2,10

Note: measurement uncertainty on the average value reported in extended form with k = 2,36 corresponding to a confidence level of 95%



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F +39 0445 581430
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**DETERMINATION OF FROST RESISTANCE (UNI EN 12371:2010)*
by changing of the flexural strength (UNI EN 12372:2007)**

- Number of cycles: 14
- Visible deterioration^x: 0
- Surface finish: disk cut #
- Direction of load's application: perpendicular to the plan of use (vein cut, fig. 2)

^x Note (see par. 7.3.2.1 UNI EN 12371:2010):

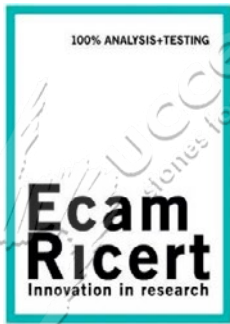
- | | |
|---|--|
| 0 | specimen intact. |
| 1 | very minor damage (minor rounding of corners and edges) which does not compromise the integrity of the specimen. |
| 2 | one or several minor cracks ($\leq 0,1$ mm width) or detachment of small fragments (≤ 30 mm ² per fragment). |
| 3 | one or several cracks, holes or detachment of fragments larger than those defined for the '2' rating, or alteration of material in veins, or the specimen shows important signs of crumble or dissolution. |
| 4 | specimen with major cracks or broken in two or more or disintegrated. |

Average value of flexural strength (R_{TF}) of specimens not subjected to freezing and thawing cycles:

R_{TF} (MPa)	20,3
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Average value of flexural strength (R_{TF}) of specimens subjected to freezing and thawing cycles (14 cycles):

R_{TF} (MPa)	20,4
----------------------------------	-------------



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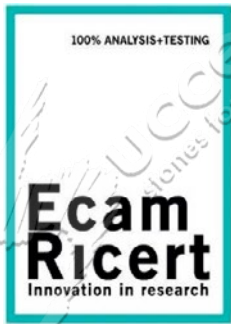
DETERMINATION OF FLEXURAL STRENGTH UNDER CONCENTRATED LOAD (UNI EN 12372:2007)

- Speed of load's application:	0,24 MPa/s
- Surface finish:	disk cut #
- Direction of load's application:	orthogonal to the plan of use (vein cut, fig. 2)

SPECIMEN	Dimensions (mm)				Breaking load (N)	Type of breaking	Flexural strength (Mpa)
	n.	Total Length L	Distance supports I	b			
VS-11	181,1	153,0	89,4	30,8	7677		20,8
VS-12	181,2	153,0	90,1	30,8	7440		20,0
VS-13	180,5	153,0	89,5	29,7	7024		20,4
VS-14	180,3	153,0	89,7	30,5	7455		20,5
VS-15	180,7	153,0	90,4	30,6	7463		20,2
VS-16	181,3	153,0	90,2	30,4	7267		20,0
VS-17	181,8	153,0	89,3	30,7	7711		21,0
VS-18	181,7	153,0	90,6	30,6	7417		20,1
VS-19	180,9	153,0	90,3	30,5	7349		20,1
VS-20	181,4	153,0	90,0	30,4	7413		20,5
Average flexural strength (MPa):							20,4 ± 0,5

number of specimens	10
Average flexural strength (MPa)	20,4 ± 0,5
Standard deviation (MPa)	0,3
Coefficient of variation	0,0
logarithmic mean	3,01
logarithmic standard deviation (MPa)	0,02
Minimun value (MPa)	20,0
Maximun value (MPa)	21,0
Lower expected value (MPa)	19,7
Quantile factor K _s	2,10

Note: measurement uncertainty on the average value reported in extended form with k = 2,23 corresponding to a confidence level of 95%



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**DETERMINATION OF FROST RESISTANCE (UNI EN 12371:2010)*
 by changing of the flexural strength (UNI EN 12372:2007)**

- Number of cycles: 56
- Visible deterioration^x: 0
- Surface finish: disk cut #
- Direction of load's application: orthogonal to the plan of use (vein cut, fig. 2)

^x Note (see par. 7.3.2.1 UNI EN 12371:2010):

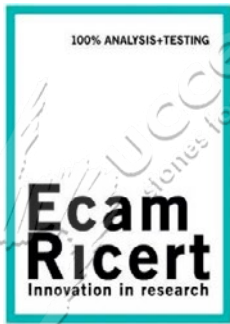
0	specimen intact.
1	very minor damage (minor rounding of corners and edges) which does not compromise the integrity of the specimen.
2	one or several minor cracks ($\leq 0,1$ mm width) or detachment of small fragments (≤ 30 mm ² per fragment).
3	one or several cracks, holes or detachment of fragments larger than those defined for the '2' rating, or alteration of material in veins, or the specimen shows important signs of crumble or dissolution.
4	specimen with major cracks or broken in two or more or disintegrated.

Average value of flexural strength (R_{TF}) of specimens not subjected to freezing and thawing cycles:

R_{TF} (MPa)	20,3
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Average value of flexural strength (R_{TF}) of specimens subjected to freezing and thawing cycles (56 cycles):

R_{TF} (MPa)	19,7
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ECAMRICERT SRL
 Viale del Lavoro, 6
 36030 Monte di Malo
 Vicenza, Italy
 T +39 0445 605838
 F +39 0445 581430
 info@ecamricert.com
 C.F./P.I. 01650050246
 ecamricert.com

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LAB N° 0699

Test Report n° 18-4260-005/E

Issue Date, 07/31/2018

DETERMINATION OF FLEXURAL STRENGTH UNDER CONCENTRATED LOAD (UNI EN 12372:2007)

- Speed of load's application:	0,27 MPa/s
- Surface finish:	disk cut #
- Direction of load's application:	orthogonal to the plan of use (vein cut, fig. 2)

SPECIMEN	Dimensions (mm)				Breaking load (N)	Type of breaking	Flexural strength (Mpa)
	n.	Total Length L	Distance supports I	b			
21-VS	180,7	152,0	90,2	30,7	6760	-	18,1
22-VS	179,9	152,0	88,0	30,0	6398	-	18,4
23-VS	180,1	152,0	89,8	30,0	8135	-	23,0
24-VS	180,6	152,0	90,4	30,7	7114	-	19,0
25-VS	180,6	152,0	90,2	30,9	7359	-	19,6
26-VS	180,4	152,0	90,1	30,8	7526	-	20,0
27-VS	180,0	152,0	90,6	30,7	7156	-	19,1
28-VS	180,4	152,0	89,7	30,7	7128	-	19,3
29-VS	179,7	152,0	90,1	29,9	8204	-	23,2
30-VS	180,1	152,0	89,7	30,6	6584	-	17,8
Average flexural strength (MPa):							19,7 ± 0,9

number of specimens	10
Average flexural strength (MPa)	19,7 ± 0,9
Standard deviation (MPa)	1,9
Coefficient of variation	0,1
Logarithmic mean	2,98
logarithmic standard deviation (MPa)	0,09
Minimun value (MPa)	17,8
Maximun value (MPa)	23,2
Lower expected value (MPa)	16,2
Quantile factor K _s	2,10

Note: measurement uncertainty on the average value reported in extended form with k = 2,26 corresponding to a confidence level of 95%

**DETERMINATION OF BREAKING LOAD
AT DOWEL HOLE (UNI EN 13364:2003)***

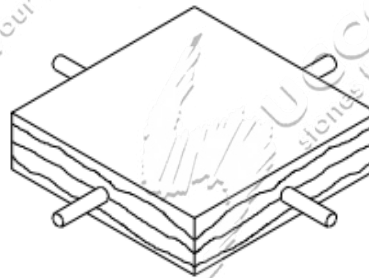


Fig. 4 Test system for a specimen with the direction of application of the load perpendicular to the anisotropy planes (type I)

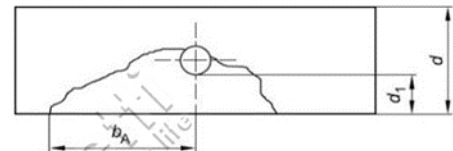
TEST DATA:

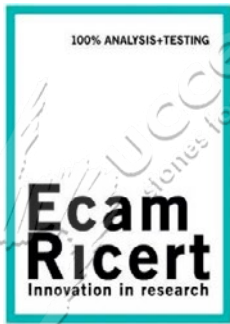
Type of test:	i
Number of specimens:	3
Conditioning specimens:	In ventilated oven at $70 \pm 5^\circ \text{C}$ to constant mass
Type of cement used:	Cement Mortar CEM I 52,5 R
Surface finish:	disk cut #
Hole's diameter [mm]	10
Pin's diameter [mm]	6,1

TEST RESULTS:

Definitions

- d: specimen's thickness
- d_1 : distance from the hole to the face in the direction of the force
- b_A : maximum distance of the center of the hole to the edge of the fracture





ECAMRICERT SRL
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 36030 Monte di Malo
 Vicenza, Italy
 T +39 0445 605838
 F +39 0445 581430
 info@ecamricert.com
 C.F./P.I. 01650050246
 ecamricert.com

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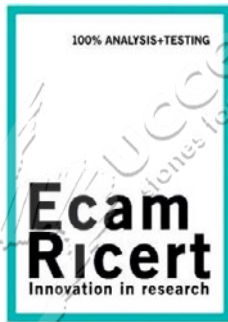
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Test Report n° 18-4260-005/E

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DIRECTION OF APPLICATION OF THE LOAD: perpendicular to the anisotropy planes (type I)							
Specimen n°	Specimen's dimension [mm]			Test n°	d ₁ [mm]	b _A [mm]	Breaking load F [N]
	L ₁	L ₂	d				
1	200,3	201,7	29,9	1	10	37	1200
				2	11	50	1450
				3	10	61	1300
				4	10	42	1800
2	200,4	201,5	29,8	5	10	36	1700
				6	10	67	1250
				7	11	40	1600
				8	10	41	1400
3	199,8	200,3	31,00	9	10	48	1250
				10	11	32	1250
				11	11	79	1950
				12	10	32	1350

Average value of d ₁ [mm]:	10
Average value of b _A [mm]:	47
Average breaking load F [N]:	1450
Standard Deviation [N]:	248
Coefficient of variation:	0,17
Logarithmic average grade:	7,28
Standard logarithmic deviation:	0,16
Minimum value [N]:	1200
Maximum Value [N]:	1950
Lower expected value [N]:	1050
Quantile factor K _S :	2,06



ECAMRICERT SRL
Viale del Lavoro, 6
36030 Monte di Malo
Vicenza, Italy
T +39 0445 605838
F +39 0445 581430
info@ecamricert.com
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DETERMINATION OF ACCELERATED AGEING BY THERMAL SHOCK (UNI EN 14066:2013)*

Specimen's conditioning

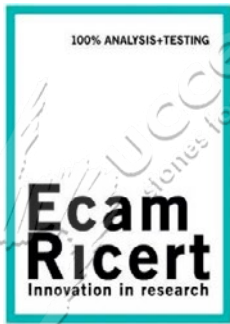
Specimens previously dried with constant mass are subject to temperature variations according to the following procedure: 18 h in a ventilated stove at 70°C immediately followed by 6 h completely immersed in tap water at a temperature of 20 ° C. The total number of the cycles are 20.

At the end of the cycles, specimens are dried with constant mass at 70°C and they are tested for the determination of open porosity (according to UNI EN 1936:2007) and flexural strength under concentrated load (according to UNI EN 12372:2007).

Following the thermal shock cycles, the specimens do not show appreciable surface changes.

OPEN POROSITY BEFORE THERMAL SHOCK CYCLES:	0,7 %
OPEN POROSITY AFTER THERMAL SHOCK CYCLES (average value of the tested specimens):	0,6 %
VARIATION OF THE OPEN POROSITY AFTER THERMAL SHOCK CYCLES (%):	-14,3 %

FLEXURAL STRENGTH BEFORE THERMAL SHOCK CYCLES:	20,3 MPa
FLEXURAL STRENGTH AFTER THERMAL SHOCK CYCLES:	19,7 MPa
VARIATION OF THE FLEXURAL STRENGTH AFTER THERMAL SHOCK CYCLES (%):	- 3,0 %



ECAMRICERT SRL
 Viale del Lavoro, 6
 36030 Monte di Malo
 Vicenza, Italy
 T +39 0445 605838
 F +39 0445 581430
 info@ecamricert.com
 C.F./P.I. 01650050246
 ecamricert.com

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DETERMINATION OF FLEXURAL STRENGTH UNDER CONCENTRATED LOAD (UNI EN 12372:2007)

- Speed of load's application:	0,20 MPa/s
- Surface finish:	disk cut #
- Direction of load's application:	orthogonal to the plan of use (vein cut, fig. 2)

SPECIMEN	Dimensions (mm)				Breaking load (N)	Type of breaking	Flexural strength (Mpa)
	n.	Total Length L	Distance supports I	b			
31 - VS	181,0	152,0	89,6	30,8	7105	-	19,0
32 - VS	181,4	152,0	90,0	29,8	6815	-	19,4
33 - VS	182,1	152,0	89,0	29,8	6090	-	17,6
34 - VS	180,6	152,0	90,0	30,9	6584	-	17,5
35 - VS	180,3	152,0	90,1	31,0	7066	-	18,6
36 - VS	179,3	152,0	90,3	29,9	8346	-	23,6
37 - VS	179,4	152,0	90,1	29,8	7922	-	22,5
38 - VS	180,1	152,0	90,5	30,8	7658	-	20,3
39 - VS	180,6	152,0	90,5	30,8	7358	-	19,5
40 - VS	180,4	152,0	90,6	30,7	7209	-	19,2
Average flexural strength (MPa):							19,7 ± 0,9

number of specimens	10
Average flexural strength (MPa)	19,7,0 ± 0,9
Standard deviation (MPa)	2,0
Coefficient of variation	0,1
Logarithmic mean	2,98
logarithmic standard deviation (MPa)	0,10
Minimun value (MPa)	17,5
Maximun value (MPa)	23,6
Lower expected value (MPa)	16,0
Quantile factor K _s	2,10

Note: measurement uncertainty on the average value reported in extended form with k = 2,23 corresponding to a confidence level of 95%



SUCCETTI LUCIANO S.R.L.
Via Rezia, 30
23022 Chiavenna (SO) - Italy

info@succettigraniti.com
+39 0343 33278
www.succettigraniti.com