TEST REPORT

NB2685_CPR_137_2024_ENG

CUSTOMER[#]

TERRASTONE SH.P.K

PRODUCT NAME[#]

Calacatta Pearl, Ameba Beige and Imperador Beige

TYPE OF PRODUCT

Natural Stones (cladding slabs hEN 1469)

TYPE OF TEST

DETERMINATION OF FROST RESISTANCE (14 CYCLES) AND FLEXURAL STRENGTH UNDER CONCENTRATED LOAD (EN 12371 ; EN 12372)

Ordering TERRASTONE SH.P.K
Product placed on the market from [#]TERRASTONE SH.P.K - RR. BEDRI BERISHA, OBJEKTI B, LOKALI#1 - 10000 PRISHTINE - KOSOVO
Data related to the sample examined 21 samples of dimensions 300 mm x 50 mm x 50 mm
Sample origin sampled and provided by the Customer
Manufacturing plant[#] RR. ARDIANET - MILLOSHEVE - 15000 KASTRIOT - KOSOVO

Estimate 24037/CPR dated 30th Sep 2024
Order confirmation 24038/CPR of 1th Oct 2024
Receipt of the samples and DDT number 15th Oct 2024 - d.d.t. n. 24-10-01 of 4th Oct 2024
Test execution 11st November 2024 - 06st December 2024
Laboratory and location of test execution Certimac - via Ravegnana, 186 - Faenza (RA) - ITALY

Report issued 12/23/2024
Revision n° 00

Test executed by: I.E. Marco Chiari
Report drafted by: Eng. M. Morganti
Approval: Technical director Eng. L. Laghi

This test report is part of a file in PDF format digitally signed by Luca Laghi

Chief Technical Officer
(Eng. Luca Laghi)

1. Object of the test

This test report reports the results of the following tests:

- *Determination of frost resistance;*
- *Determination of flexural strength under concentrated load.*

Carried out on the following type of product:

- *Natural Stones (Cladding Slabs according to EN 1469) named "Calacatta Pearl, Ameba Beige and Imperador Beige."*

Which was received in the laboratory in the form of:

- *21 samples of 300 mm x 50 mm x 50 mm.*

The results obtained refer only to the sample under test, as taken by the Manufacturer and received, and are valid only under the conditions under which the test was carried out. It is the responsibility of the Manufacturer to adhere to the frequency of testing established by current regulations. If the Manufacturer requests testing of a sample while acknowledging a deviation from the conditions specified at the time of acceptance, Certimac disclaims any responsibility for results that may be affected by such deviation.

In the absence of more detailed information, the tested samples were considered **isotropic**.

2. Reference standards and documents

The tests have been executed according to the methods defined in the following documentation and reference standards:

a. EN 12371:2010 Natural stone test methods - Determination of frost resistance
b. EN 12372:2022 Natural stone test methods - Determination of flexural strength under concentrated load
c. hEN 1469:2015 Natural stone products - Slabs for cladding - Requirements

3. Test apparatus, environmental conditions and measurement uncertainty

Test apparatus and certificate of calibration	MTS single-axis testing machine, model 30/M, serial no. 273305/05, equipped with load cell with full scale of 20 kN. Calibration certificates No. LAT 052 2416560FSE (load), LAT 052 2416562FSE (stroke), LAT 052 2416563FSE (speed), issued by LAT Calibration Centre No. 52 dated 29/10/2024.
Environmental conditions	Temperature: 23±2°C Relative humidity : 50±10%.
Measurement uncertainty	Calculated (Ref. 2-a)

4. Results of the test

4.1 Determination of frost resistance (14 cycles)

The test was performed following the requirements of the standard in Ref. 2-a, according to the following steps

- Placement of the 21 test specimens inside the climate cell so that they were mutually spaced at least 10 mm apart and at least 20 mm from the sides of the frost;
- Performing 14 freeze/thaw cycles (Ref. 2-a): during the execution of the thermal cycles, the temperature reached inside the specimens was continuously recorded by means of 1 thermoresistance placed at a depth of about 25 mm inside a reference specimen. Other thermoresistances were placed inside the climate cell, outside the specimens.

At the end of the 14 freeze/thaw cycles, the appearance of each of the 21 test specimens was evaluated, noting the possible presence of thermal stress-induced deterioration.

A summary of the results is shown in Table 1:

Sample	Evaluation after visual inspection
1	No defects detected
2	No defects detected
3	No defects detected
4	No defects detected
5	No defects detected
6	No defects detected
7	No defects detected

Sample	Evaluation after visual inspection
8	No defects detected
9	No defects detected
10	No defects detected
11	No defects detected
12	No defects detected
13	No defects detected
14	No defects detected
15	No defects detected
16	No defects detected
17	No defects detected
18	No defects detected
19	No defects detected
20	No defects detected
21	No defects detected

Table 1. Results measurement of bending strength under concentrated load

4.2 Determination of bending strength under concentrated load after 14 freeze/thaw cycles

The test was performed in accordance with the requirements of Ref. 2-b, which sets out the methods for determining the flexural strength and the minimum characteristics of the testing machines.

As already specified, the test was carried out after drying the samples.

The application of the load requires the total absence of shocks and a constant load application speed of between 0.20 and 0.30 MPa/s until failure occurs. In order to guarantee compliance with these requirements, it was appropriate, operating under stroke control, to set a piston lowering speed of 0.5 mm/min.

Based on the parameters described and set in this way, the Flexural Strength Rtf (MPa) was determined as follows:

$$R_{tf} = \frac{3Fl}{2bh^2}$$

Where:

- F = Maximum applied load (N);

- l = Distance between the support rollers (150 mm, i.e. 5 times the thickness of the specimens as required by Ref. 2-b) (mm);

- b, h = Width and thickness of the specimen (cross-section), measured adjacent to the fracture plane.

Figure 1. Representation of a specimen after frost resistance and flexural strength test

Below is the table summarising the outcome of the test:

Sample	measures dimensions		Thickness h (mm)	Support roller distance L (mm)	tensile strength F (N)	Flexural strength Rtf (MPa) ± U (Rtf)
	L1 (mm)	L2 (mm)				
1	299.6	51.0	53.4	260.0	2831.1	7.6
2	300.2	50.1	52.8	260.0	2938.0	8.2
3	299.8	49.7	51.6	260.0	4458.5	13.1
4	299.9	51.0	53.8	260.0	3010.1	8.0
5	299.9	50.5	51.8	260.0	2330.5	6.7
6	299.8	49.5	49.7	260.0	1593.7	5.2
7	300.0	50.7	53.3	260.0	2629.1	7.1
8	300.1	50.0	53.4	260.0	2055.6	5.7
9	299.6	51.0	52.7	260.0	2545.5	7.0
10	299.6	50.9	53.7	260.0	2759.2	7.3
11	300.0	50.5	53.3	260.0	3861.8	10.5
12	299.8	50.1	52.3	260.0	2236.9	6.4
13	300.0	49.6	53.1	260.0	3092.6	8.6
14	299.6	49.9	53.7	260.0	3035.0	8.2
15	299.9	50.7	53.6	260.0	2603.6	7.0
16	300.1	50,9	52.8	260.0	4621.5	12.7
17	300.2	50.0	53.4	260.0	2421.2	6.7
18	300.1	51.2	53.2	260.0	3334.0	9.0
19	300.1	50.8	51.7	260.0	4843.6	13.9
20	300.2	50.2	53.4	260.0	4400.1	12.0
21	299.9	51.3	51.7	260.0	5276.6	15.0
Mean	**299.9**	**50.5**	**52.8**	**260.0**	**3184.7**	**8.9**

Sample	measures dimensions		Thickness h (mm)	Support roller distance L (mm)	tensile strengt h F (N)	Flexural strength Rtf (MPa) ± U (Rtf)
	L1 (mm)	L2 (mm)				
Standard deviation	0.2	0.5	1.0	0	1006.8	2.9
Lowest expected value	/	/	/	/	/	5.15

Table 2. Measurement results of bending strength under concentrated load after 14 freeze/thaw cycles

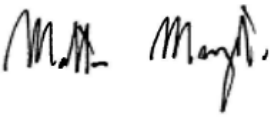
SUMMARY OF RESULTS

The tests previously described gave the following results:

Determination of frost resistance according to EN 12371:2010 and bending strength under concentrated load according to EN 12372:2022	
Determination of frost resistance (14 cycles)	No defects detected
Average value of bending strength under concentrated load after frost (14 cycles) / Mpa	8.9 ± 2.9 MPa

4. List of distribution

ENEA	Archive	1 copy
Certimac	Archive	1 copy
TERRASTONE SH.P.K	Archive	1 copy

In charge of technical test execution	In charge of technical report drafting	Technical director Approval
P. I. Marco Chiari	Eng. Mattia Morganti	Eng. Luca Laghi
		

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