



Geoceramic Researches S.r.l.

Via Bacchello, 9
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IAR N° 1505

Laboratory for Experimental and Technological Ceramics and Brick Industries

TEST REPORT

N° 198/17eng

Place and Date of Issue : Monte San Pietro, 07/08/2017

Customer : CERAMICHE ASCOT S.p.A.

Address : Via Croce, 80
41050 SOLIGNANO MO

Type material examined : Industrial Tiles

30x60 cm GN310R GEMSTONE WHITE RET

Standards applied :

UNI EN ISO 10545/3 : 2000 (*)
UNI EN ISO 10545/4 : 2014
UNI EN ISO 10545/7 : 2000 (*)
UNI EN ISO 10545/12 : 2000 (*)
UNI EN ISO 10545/13 : 2000 (*)
UNI EN ISO 10545/14 : 2015 (*)
DIN 51130 : 2014 (*)
DIN 51097 : 2006 (*)
B.C.R.A. : 1981 (*)
BOT 3000 (*)
EN/101 : 1982 (*)

(*) test not accredited

Sampling date : 26/07/2017

Sampling by :

Client



Geoceramic R.



Storage time of samples : 3 months from the end of tests.

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The data reported in the test report refer only to the sample tested as received in the Laboratory

The validity of digital signature is verifiable through the analysis of the field file original signature.

Laboratory with Quality Management System ISO 9001: 2008



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UNI EN ISO 10545-3 : 2000

CERAMIC TILES DETERMINATION OF WATER ABSORPTION

Principle: dry tiles are impregnated with water and then suspended in water. The relationships of the dry, saturated, and suspended weights allow the calculation of the listed properties.

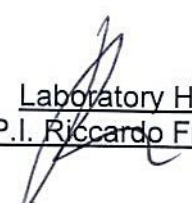
Samples arrived 27/07/2017 (sampling executed by Costumer)

DESCRIPTION TILES : 30x60 cm
TYPE : GN310R GEMSTONE WHITE RET

Test start 27/07/2017
Test finished 27/07/2017

Instrumentation used : Boiling tank– Cod. GR AS/021
±0,2 grams balance – Cod. GR B/001

Sample n°	Water absorption %
1	0,05%
2	0,06%
3	0,06%
4	0,06%
5	0,04%
Average water absorption	0,05%


Laboratory Head
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UNI EN ISO 10545-4 : 2014

CERAMIC TILES DETERMINATION OF MODULUS OF RUPTURE AND BREAKING STRENGTH

The present norm establishes a test method in order to determine the modulus of rupture (R) and the breaking strength (S) of all the floor tiles of ceramics for means of a cargo applied on three points, with the point centers them of cargo in contact with the surface of exercise of the floor tile.

The modulus of rupture, expressed in Newton to the square millimetre, is given gives:
The breaking strength, expressed in Newton, is given gives:

$$R = 3 \cdot F \cdot L / 2 \cdot b \cdot h^2$$
$$S = F \cdot L / b$$

where: F is the necessary cargo to the breach (in Newton); L is the distance between the seams of support (in millimeters); b it is the width of the floor tile (in millimetres); h it is the minimal thickness of the champion of test (in millimeters) measured after the long test the edge of the breach.

Samples arrived 27/07/2017 (sampling executed by Costumer)

DESCRIPTION TILES : 30x60 cm
TYPE : GN310R GEMSTONE WHITE RET

Test start 28/07/2017
Test finished 28/07/2017

Description equipment

- Crometro - Cod. GR AS/004
- vernier caliper up to 500 mm - Cod. GR AC/012
- feeler 0÷20 mm - Cod. AC/011
- diameter of the seam (d) : mm 20
- thickness of the rubber (t): 5
- distance between support and extremity camp. (l₁): 10

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CERAMIC TILES
DETERMINATION OF MODULUS OF RUPTURE AND BREAKING STRENGTH

Samples arrived 27/07/2017 (sampling executed by Costumer)

DESCRIPTION TILES : 30x60 cm
TYPE : GN310R GEMSTONE WHITE RET

Test start 28/07/2017
Test finished 28/07/2017

- number of tile for the test..... 7
- distance between support and extremity sample (l₁): mm..... 10
- distance between the seams of support (l₂) mm..... 480

Tile n°	l ₂	b	h	F	S	R
	mm	mm	mm	N	N	N/mm ²
1	480	296,1	9,7	1854	3005	47,9
2	480	297,4	9,7	1799	2904	46,3
3	480	296,8	9,7	1787	2890	46,1
4	480	296,5	9,8	1851	2997	46,8
5	480	297,1	9,8	1815	2932	45,8
6	480	296,4	9,7	1738	2815	44,9
7	480	297	9,7	1796	2903	46,3
media	480	296,8	9,7	1806	2921	46,3

"TILES CUT IN 30x50 cm"

Average breaking load F..... 1806N
Breaking strength S 2921N

Average modulus of rupture R..... 46,3 N/mm²

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UNI EN ISO 10545-7 : 2000

CERAMIC TILES
DETERMINATION OF RESISTANCE TO SURFACE ABRASION
GLAZED TILES

Principle: determination of the abrasion resistance of the glaze of tiles by rotation of an abrasive load on the surface and the assessment of the wear by means of visual comparison of abraded test specimens and non-abraded tiles.

Samples arrived 27/07/2017 (sampling executed by Costumer)

DESCRIPTION TILES : 30x60 cm
TYPE : GN310R GEMSTONE WHITE RET

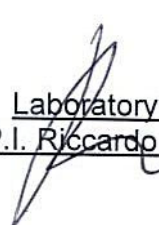
Test start 01/08/2017
Test finished 03/08/2017

Instrumentation used : Surface abrasion apparatus – Cod. GR AS/005.

DETERMINATION OF RESISTANCE TO SURFACE ABRASION

Classification : **IV**

Note : (visual not failure at 12.000 revolutions - stains not removed)


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UNI EN ISO 10545-12 : 2000

DETERMINATION OF FROST RESISTANCE

After impregnation with water the tiles are cycled between +5°C and -5°C. All sides of the tiles are exposed to freezing during a minimum of 100 freeze-thaw cycle.

Samples arrived 27/07/2017 (sampling executed by Costumer)

DESCRIPTION TILES : 30x60 cm
TYPE : GN310R GEMSTONE WHITE RET

Test start 27/07/2017
Test finished 04/08/2017

Instrumentation used: Apparatus for frost resistance – Cod. GR AS/016
Apparatus for determining porosity vacuum – Cod. GR AS/009
Scales ± 0.2 grams – Cod. GR B/006
Forced air dryer – Cod. GR E/002

Number of tiles tested:10
Used method of immersion:water absorption with vacuum
Number of tiles damaged after 100 cycles:.....nobody
Description of the defects damaged before the test:...nobody
Type of damage:.....nobody
Water absorption before test:0,06%
Water absorption after test:.....0,14%


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UNI EN ISO 10545-13 : 2000

DETERMINATION OF CHEMICAL RESISTANCE

This norm defines a method of test for determining the chemical resistance of ceramic tiles at room temperature. The method is applicable to all types of ceramic tiles.

Samples arrived 27/07/2017 (sampling executed by Costumer)

DESCRIPTION TILES : 30x60 cm
TYPE : GN310R GEMSTONE WHITE RET

Test start 28/07/2017
Test finished 01/08/2017

Test solutions for chemical resistance: hydrochloric acid solution 3% (v/v) for 4 days.; citric acid solution (100 g/l) for one day; potassium hydroxide 30 g/l for 4 days; sodium hypochlorite solution (20 mg/l) for one day; ammonium chloride solution (100 g/l) for one day.

TEST SAMPLES : Every solution has been tried on n° 5 fragments of floor tile .

Classification

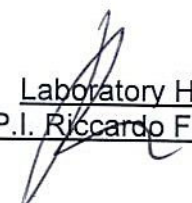
Household chemicals : ammonium chloride
Swimming pool salts : sodium hypochlorite

GA class
GA class

Acids and alkalies

citric acid
hydrochloric acid
potassium hydroxide

GLA class
GLA class
GLA class


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UNI EN ISO 10545-14 : 2015

DETERMINATION OF RESISTANCE TO STAINS

Definition: the resistance to stains is determined maintaining to contact solutions blotting with the surface of exercise of the champions heads, for a sure period of time; the surface comes then cleaned up with systems of severity progressive, finally analyzed visually.

Samples arrived 27/07/2017 (sampling executed by Costumer)

DESCRIPTION TILES : 30x60 cm
TYPE : GN310R GEMSTONE WHITE RET

Test start 28/07/2017
Test finished 29/07/2017

Staining agents	Class
-----------------	-------

Stains having tracing action (pastes)

Green staining agent in light oil	5
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Stains having chemical/oxidizing action

Iodine/alcohol solution, 13 g/l	5
---------------------------------	---

Stains having filming action

Olive oil	5
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Classification:

Class 5 : stain removed with hot water;
Class 4 : stain removed with hand cleaning with abrasive sponge;
Class 3 : stain removed with mechanical cleaning with the strong cleaning agent;
Class 2 : stain removed with suitable solvent;
Class 1 : stain not removed.

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NORM DIN 51130 : 2014

Determination of anti-slippery characteristic

Work's zone with high risk of slippery

Procedure of test walking – inclined platform.

The test regard work's zone with high risk of slippery; the procedure it previews a slanted plan that it comes covered from the subject participants to the test, whose surface is paved with the material in object, preventively greased with having oil 10 viscosity SAE W 30. During the execution one determines if the material in examination can be suitable for puts down it in specific atmospheres of job. The medium degree of inclination correspondent to the feeling of insecurity of the operator who walks on the plan, defines the classification of the material in one of the five groups that serve like parameter in order to establish the effectiveness degree anti-slippery.

Samples arrived 27/07/2017 (sampling executed by Costumer)

DESCRIPTION TILES : 30x60 cm
TYPE : GN310R GEMSTONE WHITE RET

Test start 02/08/2017
Test finished 02/08/2017

Slide angle : 10,8°

Classification : R10

LEGEND:

Total of the medium values

from 6° to 10°
over 10° until 19°
over 19° until 27°
over 27° until 35°
over 35°

Group classification

R 9
R 10
R 11
R 12
R 13

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NORM DIN 51097 : 1992

Determination of the property antislip of bathed zones on which it walks knots on foot

A person is left over and on foot withdraws knots on the covering to try whose inclination is increased of approximately 1° to the second; the rake in correspondence of which the person is not more in conditions than emergency, comes defined like sliding angle. The surface is bathed in continuous with one solution (1 g/l of bathing agent + water).

Samples arrived 27/07/2017 (sampling executed by Costumer)

DESCRIPTION TILES : 30x60 cm
TYPE : GN310R GEMSTONE WHITE RET

Test start 02/08/2017
Test finished 02/08/2017

Slide angle : 22,8°

Classification : B

LEGEND:

Total of the medium values

<12°
from 12° until 17,9°
from 18° until 23,9°
over 23,9°

Group classification

0
A
B
C

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B.C.R.A. METHOD SLIPPERY

The test has been carried out using measuring instrument TORTUS® of the coefficient of dynamic friction between a sliding element and the surface of test.

Operating conditions:

- Speed of advance (mm/s): 17 - Loaded junior clerk to sliding element (g): 200

Samples arrived 27/07/2017 (sampling executed by Customer)

DESCRIPTION TILES : 30x60 cm
TYPE : GN310R GEMSTONE WHITE RET

Test start 02/08/2017
Test finished 02/08/2017

Covering material of sliding element	Superficial test of condition			Coefficient of friction (μ)	
Leather	Dry			0,49	
Hard rubber standard	Wet (water + bathing agent)			0,53	
Singles test of coefficient of friction					
with leather:	0,45	0,53	0,55	0,42	0,52
with hard rubber standard	0,54	0,52	0,51	0,55	0,53

REFERENCE VALUE

(B.C.R.A. REP. CEC. 6/81)

$\mu < 0.20$
 $0.20 < \mu > 0.40$
 $0.40 < \mu > 0.74$
 $\mu > 0.74$

Danger slippery
Excessive slippery
Satisfaction friction
Excellent friction

Requirement ("Regulations of performance dell' art.1 of the law 9 January 1989, n.13" - Decree Ministerial 14/06/89, n° 236 Art. 8.2.2)

μ (coefficient of friction) :

- for leather sliding element to dry paving : > 0.40
- for hard rubber sliding element to wet paving : > 0.40

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BOT 3000

CERAMIC TILES
DETERMINATION OF DINAMIC COEFFICIENT OF FRICTION (DCOF)

All samples to be tested should be thoroughly cleaned prior to testing. Three samples should be placed in a row on an area not subject to fluctuations. Necessary to wet the path of the sensor with an aqueous solution of 0.05% SLS (Sodium-Lauryl Sulfate). Necessary to make a total of 4 dynamic measurements on the tiles. After scoring the first measurement rotate the BOT 3000 180 ° and run the second measurement. Subsequently rotate tiles of 90 ° and perform the following two measures according to the same methodology. Record all four measures and calculate the average. Repeat the procedure on two other pieces. For structured tiles, the three pieces tested shall be representative of the different structures. If there are more than three different structures, test each structure.

Samples arrived 27/07/2017 (sampling executed by Costumer)

DESCRIPTION TILES : 30x60 cm
TYPE : GN310R GEMSTONE WHITE RET

Test start 07/08/2017
Test finished 07/08/2017

DCOF - Test conditions	value 1	value 2	value 3	value 4	Average Value
Wet - sample n° 1	0,48	0,49	0,50	0,49	0,49
Wet - sample n° 2	0,50	0,48	0,48	0,49	0,49
Wet - sample n° 3	0,49	0,51	0,48	0,47	0,49

REFERENCE VALUES

The ANSI A137.1: 2012.Version 1 indicates as a limit value of 0.42 for indoor environments where conceivably there is the possibility of wear in wet conditions.

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EN 101 : 1982

DETERMINATION OF SCRATCH HARDNESS MOHS SCALE

This norm defines a method of test for determining the scratch hardness with Mohs scale.

Mineral's test

Mineral	Scratch Hardness Mohs	Mineral	Scratch Hardness Mohs
Talc	1	Feldspar	6
Gypsum	2	Quartz	7
Calcite	3	Topaz	8
Fluorite	4	Corundum	9
Apatite	5	Diamond	10

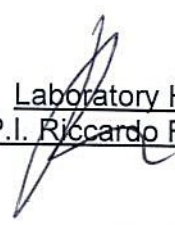
Samples arrived 27/07/2017 (sampling executed by Costumer)

DESCRIPTION TILES : 30x60 cm
TYPE : GN310R GEMSTONE WHITE RET

Test start 27/07/2017
Test finished 27/07/2017

Scratch Hardness Mohs

Test tile n°: 1 5
 2 5
 3 5


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