NATIONAL CERA LAB
CERAMIC LABORATORY

Shop No. 16, 17, Ground Floor, Dariyalal Plaza,
Nr. Argil Ceramic, 8-A, N/H, Morbi - 363 642 (Guj.) INDIA.

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As per all Countries Export report of Wall, Floor, Vitrified Tiles & Sanitary Wares

Ref. No. NCL/Glazed Vitrified Tile / EN/03/638/2020-21

Date : March. 20. 2021

Receive date of test sample :- 09. 03. 2021

Issued To

Tile Merchant,
Dockrells Complex, Ballymount Rd Upper, Ballymount, Dublin 24
Rep. of Ireland

SAMPLE DECRIPTION & NAME: Porcelain Tile (Ceramic Glazed Vitrified Tile) " First Grade " , Nominal size 900x600x20.0 mm (Rectified) as submited by the party. Sample not drawn by National Cera Lab

TEST DESIRED: EN : 14411 : 2016 (Group B I a) ANNEX - G

A Dimensions and surface quality
I Deviation in Length & Width
II Thickness
III Straightness Of Sides
IV Rectangularity
V Surface Flatness
VI Surface quality
B *Physical Property*
I Water Absorption %
II Breaking Strength in N
III Modulus of Rupture (MOR) N/mm²
IV Resistance to surface abrasion
V Coefficient of Liner Thermal Expansion
VI Thermal Shock Resistance
VII Crazing Resistance
VIII Moisture Expansion (in mm/mm)
IX Impact resistance
X Scrach hardness of Srface (mohs scale)
XI Bulk density , Iin (g/cc)
XII Small colour differences
XIII Reaction to fire
C *Chemical Property*
I Resistance Stain
II Resistance To Low Concentration of Acid & Alkali
III Resistance To High Concentration of Acid & Alkali
IV Resistance to house chemical
V Resistance to swimming pool salt
VI Lead and Cadmium Releas

TEST REPORT

			Require	Test Method		Result
A Dimensions and surface quality						
I Deviation in Length & Width			≥ 15 cm			
1 Length	The diveation in mm of average size of each tile (2 sides) from the average of 10 test specimens (20 Sides)		± 1 mm	EN ISO 10545 - 2	Avg+ Avg -	0.47 mm 0.00 mm Pass
2 Width	The deviation in mm of the average size of each tile (2 sides) from the average of 10 test specimens (20 Sides)		± 1 mm	EN ISO 10545 - 2	Avg+ Avg -	0.22 mm 0.00 mm Pass
II Thickness		Party givan Thickness 20.00 mm	10 Pices Average 19.93 mm	± 0.5 mm	EN ISO 10545 - 2	Avg+ Avg -	0.00 mm 0.07 mm Pass
The deviation in mm of average thickness of 10 tile from the work size thickness						
III Straightness of Sides				±0.8 mm	EN ISO 10545 - 2	Max+ Max -	0.17 mm 0.19 mm Pass
Maxmum deviation from straightness in mm related to the corresponding work size						
IV Rectangularity				±1.5 mm	EN ISO 10545 - 2	Max+ Max -	0.21 mm 0.22 mm Pass
Maximum deviation from rectangularity in mm related to the corresponding work size						

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Ref. No. **Date :**

TEST REPORT

March. 20. 2021

	Test Method	Require		Result
V Surface Flatness				
(a) Centre Curvature Centre curvature related to diagonal calculated from the work size.	EN ISO 10545 - 2	± 1.8 mm	Max+ Max -	0.15 mm 0.00 mm
(b) Edge curvature Edge curvature related to the corresponding work size.	EN ISO 10545 - 2	± 1.8 mm	Max+ Max -	0.16 mm 0.00 mm
(c) Warpage Warpage related to diagonal calculated from the work size.	EN ISO 10545 - 2	± 1.8 mm	Max+ Max -	0.14 mm 0.00 mm Pass
VI Surface quality Tested by the visually Minimum 95 percent of tile shall be free from visible defect that would impair the appearance of the major area of tiles. No any defect found in the tiles surface area and lot pass the test.	EN ISO 10545 - 2	95%		100% Free from defects

B PHYSICAL PROPERTIES :-

I Water Absorption % **%**

1	0.042 %				
2	0.012 %				
3	0.034 %				
4	0.038 %				
5	0.015 %				
Average	0.028 %				

EN ISO 10545 - 3 — Avg. 0.028%, Max. 0.042%

Ev ≤ 0.5 %
Individual maximum 0.6%

II Breaking Strength in N **N**

1	8284.47 N	6	8799.41 N	
2	8672.84 N	7	10038.75 N	
3	11526.44 N	8	10789.39 N	
4	10252.88 N			
5	11264.59 N	Average	9953.60 N	

EN ISO 10545 - 4 — Avg. 9953.60 N, Min. 8284.47 N

Not lass than 1300
Thickness ≥ 7.5 mm

III Modulus of Rupture (MOR) **N/mm²**

1	36.23 N/mm²	6	38.07 N/mm²	
2	36.57 N/mm²	7	43.15 N/mm²	
3	46.61 N/mm²	8	46.18 N/mm²	
4	44.45 N/mm²			
5	48.42 N/mm²			
		Average	42.46 N/mm²	

EN ISO 10545 - 4 — Avg.42.46 N/mm², Min.36.23 N/mm²

Minimum 35
Individual minimum 32

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Ref. No. **Date :**

TEST REPORT **March. 20. 2021**

		Test Method	Require	Result
IV	**Resistance to surface abrasion** Visual failure was observed at 12000 revolution when the tiles ware subjected to abrasion stage of 150,600,750,1500 , 2100,6000, up to 12000 revolution, 6000 revolution pass.	EN ISO 10545 - 7	Abrasion class and cycle passed	PEI Class - IV 6000 Revolution pass
V	**Coefficient of Liner Thermal Expansion** Expantion from ambient temperature to 100°c (K - 1)	EN ISO 10545 - 8	Declared value	5.31x10¯6
VI	**Thermal Shock Resistance** 15/145°c 10cycle	EN ISO 10545 - 9	Pass according to ISO 10545-1	Confirm
VII	**Crazing Resistance** NO CRAZING IN TWO CYCLE ONE HOUR DURATION At a steam pressure of 750±20kpa 6 Nos of tiles ware subjected to autoclaving at a steam pressure of 750±20 Kpa of saturated steam for Two hour consisting of Two cycle. None of the tiles show any sign of the crazing on the glaze surface and the lot pass the test.	EN ISO 10545 - 11	Pass according to ISO 10545-1	Confirm
VIII	**Moisture Expansion (in mm/mm)**	EN ISO 10545 - 10	Declared value	0.01 mm/m max
IX	**Impact resistance** Coefficient of restitution (COR)	EN ISO 10545 - 5	Declared value	0.82
X	**Scrach hardness of Srface (mohs scale)**	IS 13630 - 13	5 moh's scal	7 Moh's
XI	**Bulk density , lin (g/cc)**	EN ISO 10545 - 3	2.2 min	2.2949 g/cc
XII	**SMALL COLOUR DIFFERENCES**	EN ISO 10545 -16	ΔE cmc < 0.75	No Difference
XIII	**Reaction to fire**			Class A1

C CHEMICAL PROPERTIES:

I	**Resistance Stain**	Stain put on tiles up to 24 hrs.		
	Red Past in Light Oil (Fe2O3)	Stain removed by weak cleaning agent	EN ISO 10545 - 14	Min Class - 3 / Class - 4
	Iodine in Alcohol 13g/l	Stain removed by weak cleaning agent		Min Class - 3 / Class - 4
	Olive Oil	Stain removed by hot water		Min Class - 3 / Class - 5
II	**Resistance To Low Concentration OF Acid & Alkali**			
a	Hydrochloric Acid solution 3% (V/V)	No visual changes obsorved after immersion for 4 days, pencil line removed with soft wet cloth.	EN ISO 10545 - 13	Declared value / Class GLA
b	Citric Acid Soln. 100gm/l	No visual changes obsorved after immersion for 4 days, pencil line removed with soft wet cloth.	EN ISO 10545 - 13	Declared value / Class GLA
c	Potassium Hydroxide Soln 30gm/l	No visual changes obsorved after immersion for 4 days, pencil line removed with soft wet cloth.	EN ISO 10545 - 13	Declared value / Class GLA

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Ref. No. **Date :**

TEST REPORT

March. 20. 2021

		Test Method	Require	Result
III **Resistance To High Concentration OF Acid & Alkali**				
a Hydrochloric Acid solution 18% (V/V)	No visual changes obsorved after immersion for 4 days, pencil line removed with soft wet cloth.	EN ISO 10545 - 13	Declared value	Class GHA
b Lactic Acid Soln. 5% (v/v)	No visual changes obsorved after immersion for 4 days, pencil line removed with soft wet cloth.	EN ISO 10545 - 13	Declared value	Class GHA
c Potassuim Hydroxide Soln. 100gm/l	No visual changes obsorved after immersion for 4 days, pencil line removed with soft wet cloth.	EN ISO 10545 - 13	Declared value	Class GHB
IV **House hold chemical resistance** Ammonium chloride solution 100gm/l	No visual changes obsorved after immersion for 24 hrs, pencil line removed with soft wet cloth.	EN ISO 10545 - 13	Min CLASS - GB	Class GA
V **Swimming poll salt** Sodium Hypochorite solution 20mg/l	No visual changes obsorved after immersion for 24 hrs, pencil line removed with soft wet cloth.	EN ISO 10545 - 13	Min CLASS - GB	Class GA
VI **Lead And Cadmium Releas**		EN ISO 10545 - 15	**Limit**	**Result**
a Lead Release Test Solution Acietic Acid Solution 4% (v/v), (in 960ml distilled water)	Digestion time- 24 hrs (20±2°) Detected by ED XRF		Declared value	0.004 mg/dm²
b Cadmium Release Test Solution Acietic Acid Solution 4% (v/v), (in 960ml distilled water)	Digestion time- 24 hrs (20±2°) Detected by ED XRF		Declared value	0.004 mg/dm²

CONCLUSION:
The sanple drawn by party fron the above lot complies with standard EN 14411 :2016 Group BI a
Test Procedure as per EN ISO 10545

Verify by
Testing Engineer

Nimesh J. Kavar
(Nimesh J. Kavar)

For
National Cera Lab

Name of Authorised signatory : J.M. Kavar
Designation of signatory : Technical Manager

20/3/2021

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As per all Countries Export report of Wall, Floor, Vitrified Tiles & Sanitary Wares

Ref. No. NCL/Glazed Vitrified Tile / EN/03/638/2020-21 **Date :**

Receive date of test sample :- **09. 03. 2021** **March. 20. 2021**

Issued To
M/s GRANOLAND TILES LLP
Sartanpar - Matel Road , N.H. 27, Village-Matel
Tal - Wankaner, Dist - Morbi ; Gujarat ; India

SAMPLE DECRIPTION & NAME: Porcelain Tile (Ceramic Glazed Vitrified Tile) " First Grade " , Nominal size 900x600x20.0 mm (Rectified) as submited by the party. Sample not drawn by National Cera Lab

TEST DESIRED: **EN : 14411 : 2016 (Group B I a) ANNEX - G**
Frost Resistance

Test Method EN ISO 10545 - 12 : 2007
The initial water absorptior 0.039%
The final water absorption 0.047%
Water absorption coefficient of tile ≤ 0.5%
The type of test performed
(with or without immersion) With immersion

Size of test specimen or m² Minimum area 0.25² , 300x200 mm
Number of test specimen 10 no specimen 0.60m²
with visible defect after 100 cycle Not a single tile visible defects

Result **Pass the test**

Specimen no	Visual defect before commencing the test			
	Cracks	Crazing	Dry spots	After methy
1	√	√	√	√
2	√	√	√	√
3	√	√	√	√
4	√	√	√	√
5	√	√	√	√
6	√	√	√	√
7	√	√	√	√
8	√	√	√	√
9	√	√	√	√
10	√	√	√	√

X - Not conform √ - Conform

Specime no	Visual defect after commencing the test			
	Cracks	Crazing	Dry spots	After methy
1	√	√	√	√
2	√	√	√	√
3	√	√	√	√
4	√	√	√	√
5	√	√	√	√
6	√	√	√	√
7	√	√	√	√
8	√	√	√	√
9	√	√	√	√
10	√	√	√	√

X - Not conform √ - Conform

Initial water absorption

Specimen no	Mass of each dry tile	Mass of each wet tile	Percent of W.A.
1	2630.50	2631.60	0.042
2	2603.00	2603.30	0.012
3	2657.00	2657.80	0.030
4	2615.60	2616.60	0.038
5	2592.00	2592.60	0.023
6	2635.20	2636.10	0.034
7	2632.10	2633.40	0.049
8	2634.60	2635.90	0.049
9	2642.20	2643.80	0.061
10	2644.40	2645.90	0.057
Average of ten specimen			0.039 %

Final water absorption

Specimen no	Mass of each wet tiles after test	Mass of each dry tile after the test	Percent of W.A.
1	2631.80	2630.50	0.049
2	2603.50	2603.00	0.019
3	2657.90	2657.00	0.034
4	2616.90	2615.70	0.046
5	2592.70	2592.00	0.027
6	2636.30	2635.20	0.042
7	2633.70	2632.10	0.061
8	2636.10	2634.60	0.057
9	2644.00	2642.20	0.068
10	2646.10	2644.40	0.064
Average of ten specimen			0.047 %

Verify by Nimesh J. Kavar
Testing Engineer (Nimesh J. Kavar)

Name of Authorised signatory : J.M. Kavar For National Cera Lab

Designation of signatory : Technical Manager

NATIONAL CERA LAB MORBI

20/3/2021

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Ref. No. **Date :**

NCL/Glazed Vitrified Tile / EN/03/638/2020-21

Issue Date **March. 20. 2021**

Receive date of test sample 09.03. 2021

Issued To
M/s GRANOLAND TILES LLP
Sartanpar - Matel Road , N.H. 27, Village-Matel
Tal - Wankaner, Dist - Morbi ; Gujarat ; India

SAMPLE DESRIPTION & NAME Porcelain Tile (Ceramic Glazed Vitrified Tile) " First Grade " , Nominal size 900x600x20.0 mm (Rectified) as submited by the party. Sample not drawn by National Cera Lab

TEST DESIRED: **EN : 14411 : 2016 (Group B I a) ANNEX - G**

1 CO-EFFICENT OF FRICTION (ANTI SLIP TEST) "RAMP TEST"

Note Party submitted sample size 900x500 mm one sample Tiles.

CO-EFFICENT OF FRICTION (ANTI SLIP TEST) "RAMP TEST"

TEST METHOD **As per Standard DIN 51130 : 2014 - 2 & ISO 10545 - 17**

STANDARD LIMIT		CORRECTED MEAN OVERALL ACCEPTANCE ANGLE	SLIP RESISTACE CLASS
S - I	5.7° - 11.7°	6° UP TO 10°	R 9
S - II	14.3° - 20.3°	OVER 10° UP TO 19°	R 10
		OVER 19° UP TO 27°	R 11
S - III	24.3° - 30.3°	OVER 27° UP TO 35°	R 12
		OVER 35°	R 13

Sr No	Sample Name	Measured Value	Average Value	Class
1	900x600 mm Glazed Porcelain Tile Matt Finish Surface	(1) 26.6° ,(2) 26.8° ,(3) 27.0° (4) 27.2°	26.9°	R 11

Verify by
Testing Engineer Nimesh J. Kavar

For
National Cera Lab

Name of Authorised signatory : J.M. Kavar
Designation of signatory : Technical Manager

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As per all Countries Export report of Wall, Floor, Vitrified Tiles & Sanitary Wares

Ref. No. **Date :**

NCL/Bond/EN/ 04/001/2021-22 **April. 20. 2021**

Receive date of test sample :- 09. 03. 2021

Issued To
M/s GRANOLAND TILES LLP
Sartanpar - Matel Road , N.H. 27, Village-Matel
Tal - Wankaner, Dist - Morbi ; Gujarat ; India

SAMPLE DECRIPTION & NAME: Ceramic Glazed Porcelain tiles " First Grade " , Nominal size 900x600x20.0 mm (Rectified) as submited by the party. Sample not drawn by National Cera Lab

Test require as per **EN : 14411 : 2016 (Group B I a) ANNEX - G**

BOND STRENGTH **As per EN 12004 - 1 : 2017**

TEST REPORT

1 Determination of tensile adhesion for cementitious adhesives C 2

- **Test materials**
- **Ceramic tiles.**

The tiles shall be checked prior to conditioning to ensure that they are unused, clean and dry.
The tiles used for this test shall be dry pressed tile in accordance with EN 14411, Group BI a fully vitrified, with a water absorption of ≤ 0.5% by mass, unglazed and with a plain matt, adhering surface, with a facial dimensions of (50 ± 1) mm x (50±1) mm.
Condition all test material for at least 24 h under standard condition.

- **Test Substrate**
- **Concrete slab**

The mandatory concrete test substrate shall be 35 mm thick, have a moisture content of less than 3% by mass and have a water absorption at the surface after 4 hr in the range of 0.5cm³ to 1.5cm³.
The tensile adhesion strength shall be at least 1.5 N/mm².
The test surface hava a finish similar to that obtain by using a wooden float and be clean dust-free at the of the test.
A method for manufacturing a suitable concrete test slab and the procedure for measuring the performances are givan in Annex A

- **Weight (mass)**

A mass capable of exerting a force of (20±0.05) N, with a cross sectional area of less than 50 mmx50 mm

- **Pull head plate**

Square mettalic plates, with dimensions (50 ± 1) mm x (50 ± 1) mm and minimum thickness of 10 mm with a suitable fitting for connection to the test machine

- **Air circulating oven.**

An air - circulating oven capable of controlling the temperature to within ±3° c

- **Notched trowel**

A notched trowel having 6 mm x 6 mm notched at 12 mm centre.

- **Preparation of test units**

Apply a thin layer ot adhesive, to the concrete slab with a straight edge trowel. Than apply a thicker layer and comb with a notched trowel. The trowel shall be held at an angle of approximately 60° to the substrate at a right angle to one edge of the slab and drawn across the slab parallel to that edge (in a straight line).
After 5 min place tiles on the adhesive at a distance of 50 mm and load each tile with (20±0.05) N for 30 s.

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A **Initial tessile adhesion strength**

After 27 d storage under standard conditions bond the pull - head plate to the tiles with a suitable high strength adhesive e.g. (exopide),
After a furthe 24 h storage under standard conditions determine the tensile adhesion strength of the adhesive by applying force at a constant rate of (250 ± 50) N/s.

Tensile Strength in normal condition — **Requirement** ≥ 0.5N/mm² — **Test Mthod** EN 12004 - : 2017 — **Result**

Sample No.	Pull-head plate length in mm	Pull-head plate Width in mm	Square area pull-head plate mm²	Maximun loadin N	Tensile Bond strength in N/mm²	Failure Mode
1	50.01	50.02	2501.50	3284.6	1.31	Adhesive failure between adhesive and substrate (AF - S)
2	50.01	50.02	2501.50	3266.8	1.31	Adhesive failure between tile and adhesive (AF - T)
3	50.01	50.02	2501.50	3258.5	1.30	Adhesive failure between tile and adhesive (AF - T)
4	50.01	50.02	2501.50	3348.2	1.34	Adhesive failure between adhesive and substrate (AF - S)
5	50.01	50.02	2501.50	3280.6	1.31	Adhesive failure between adhesive and substrate (AF - S)

B **Tensile adhesion strength after water immersion**

Condition the test unit under standard conditions for 7 d, and immerse in water at the standard temperature.

After 20 d remove the test units from the water, wipe with a cloth and bond the pull-head plates to the tiles. After a further 7 h in standard conditions immerrse the test units in water at the standard temperature.

The following day remove the test units from water and immediately carry out the tensile adhesion test.

Type of Test
Tensile adhesion strength after water immersion — **Requirement** ≥ 0.5N/mm² — **Test Mthod** EN 12004 - : 2017 — **Result**

Sample No.	Pull-head plate length in mm	Pull-head plate Width in mm	Square area pull-head plate mm²	Maximun loadin N	Tensile Bond strength in N/mm²	Failure Mode
1	50.01	50.02	2501.50	3198.6	1.28	Adhesive failure between adhesive and substrate (AF - S)
2	50.01	50.02	2501.50	3242.4	1.30	Adhesive failure between adhesive and substrate (AF - S)
3	50.01	50.02	2501.50	3180.2	1.27	Adhesive failure between tile and adhesive (AF - T)
4	50.01	50.02	2501.50	3186.8	1.27	Adhesive failure between adhesive and substrate (AF - S)
5	50.01	50.02	2501.50	3212.4	1.28	Adhesive failure between adhesive and substrate (AF - S)

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C Tensile adhesion strength after heat ageing.

Condition the test units under standard conditions for 14 d and than place the units in an air - circulating oven at (70 ± 3) ° c for a further 14 d. Remove the oven and bond pull-head plates to the tiles with a suitable high strength adhesive (e.g. epoxide)

Condition the test units for a further 24 h under standard conditions. Determine the tensile adhesion strength.

	Requirement	Test Mthod	Result
1 Tensile Strength after heat ageing.	≥ 0.5N/mm²	EN 12004 - : 2017	

Sample No.	Pull-head plate length in mm	Pull-head plate Width in mm	Square area pull-head plate mm²	Maximun loadin N	Tensile Bond strength in N/mm²	Failure Mode
1	50.01	50.02	2501.50	3196.8	1.28	Adhesive failure between adhesive and substrate (AF - S)
2	50.01	50.02	2501.50	3216.4	1.29	Adhesive failure between tile and adhesive (AF - T)
3	50.01	50.02	2501.50	3180.6	1.27	Adhesive failure between adhesive and substrate (AF - S)
4	50.01	50.02	2501.50	3220.8	1.29	Adhesive failure between adhesive and substrate (AF - S)
5	50.01	50.02	2501.50	3186.8	1.27	Adhesive failure between adhesive and substrate (AF - S)

Verify by
Testing Engineer

Nimesh J. Kavar
(Nimesh J. Kavar)

For
National Cera Lab

Name of Authorised signatory :
Designation of signatory :

NATIONAL CERA LAB MORBI

20/4/2021