



**INT**  
Instituto Nacional de Tecnología

**TECHNICAL REPORT NR.018/03**

**Nature of Work: Technological Testing on artificially colored stone**

**Client: Royal Marble & Granite Ltd.**

# TECHNICAL REPORT NR.018/03

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Technical Unit : Laboratórios de Materiais e Componentes da Construção – LAMAC.

Client: Royal Marbles & Granite Ltd.

Address: Rua Olga, 16 – Bonsucesso – Rio de Janeiro / RJ

Contract/Process nr. 01240.002178/02

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Nature of Work: Technological Testing on artificially colored stone

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Material Supplied: Samples were delivered by the client at LAMAC facilities in Oct 17<sup>th</sup> 2002

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Description of Material:

02 (two) samples of petric Slabs, each one composed of:

- 31 (thirty one) petric white color slabs with one polished surface, being 12 (twelve) with nominal dimensions of about (70 x 70 x 20)mm, 12 (twelve) about (80 x 40 x 20)mm , and 07 (seven) about (200 x 200 x 20)mm, in sealed isopor boxes and named by the Client as samples of “ **White Marble**”; and
- 26 (twenty six) petric blue colored Slabs with one polished surface, being 09 (nine) with nominal dimensions of about (70 x 70 x 20)mm, 12 (twelve) about (80 x 40 x 20)mm , and 05 (five) about (200 x 200 x 20)mm, in sealed isopor boxes and named by the Client as samples of “ **Blue Marble**”

In the reference document, the samples were identified by the Client, respectively as: “ Royal Soft Classic Marble ( Colored Material) “ and” White Classic Marble ( Original Material )

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Methods and Procedures:

In the reference document, the Client asks “Elaboration of conclusive technical report, regarding to the tests... referred with emphasis on the efficiency and durability of our technological process of color application in ornamental rocks, named : Cor Intercristalina...”

so far:

1. The tests used were:

- a) Stone for Revetment - Resistance to flexion , according to Norm NBR 12763/92;
- b) Inorganic Materials - Erosion by abrasion, according to Norm NBR 12042/91;
- c) Stone for Revetment - Definition of Physical Indexes, according to Norm NBR 12766/92

2. It was evaluated the stability of blue color on the surface of the petric slab, identified as “ Blue Marble” during the test according to NRB 12042/91. The evaluation was made by visual form – naked eye – and comparative of the test samples without polishing surfaces - obtained after the initial 200 meters of erosion – and, after the test conclusion – Obtained after 1000 meters of erosion – disposed side by side, from a distance of 30 cm from the evaluator in a 300 lux ambience..

3. was evaluated the performance of the petric slab identified as “ Blue Marble” in compare with the sample “ White Marble”, throughout comparing it’s absolutely values results obtained in tests, according to Norms NBR 12763/92, NBR 12042/91 and NBR 12766/92 for each one of the two samples.

On the above evaluations indicated as “2 “and “3 “. We considered that the Petric Slabs of the two samples are ordinary from the same marble mineral deposit and that they have the same properties.

**RESULTS**

**1.a) Stones for Revetment -Determination Resistance to flexion , according to Norm NBR 12763/92**

Sample “White Marble”

Test Conditions: Sample saturated in water of dry surface

Test sample nr.	Average dimensions ( mm )			Break point (Mpa)	
	Length	width	height	individual	Average
1	200	99	20	5,4	
2	200	99	20	5,0	<b>5,2</b>
3	200	100	20	5,3	

Test Conditions: Dry Sample

Test sample nr.	Average dimensions ( mm )			Break point (Mpa)	
	Length	width	height	individual	Average
1	200	98	20	6,8	
2	200	98	19	7,5	<b>6,9</b>
3	200	98	20	6,4	

**RESULTS**

**1.a) Stones for Revetment -Determination Resistance to flexion , according to Norm NBR 12763/92**

Sample “ Blue Marble”

Test Conditions: Sample saturated in water of dry surface

Test sample nr.	Average dimensions ( mm )			Break point (Mpa)	
	Length	width	height	individual	Average
1	200	97	20	4,8	
2	200	99	20	5,4	<b>5,0</b>
3	200	99	20	4,7	

Test Conditions: Dry Sample

Test sample nr.	Average dimensions ( mm )			Break point (Mpa)	
	Length	width	height	individual	Average
1	200	97	20	5,1	
2	200	97	19	6,8	<b>6,2</b>
3	200	98	20	6,8	

Obs.:

- The tests in samples “White Marble” and “Blue Marble” were performed in November 13<sup>th</sup>, 2002.
- The space between supports on the Flexion test device was 180mm.

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## 1.b) Determination of Erosion by abrasion, according to Norm NBR 12042/91;

Erosion by abrasion in mm, of

Test sample nr.	Sample of "White Marble"		Sample of "Blue Marble"	
	At 500 m	At 1000 m	At 500 m	At 1000 m
1	2,5	5,1	4,1	9,2
2	2,5	5,0	3,8	8,1
3	2,6	5,0	4,1	8,0
4	2,8	6,5	3,5	7,4
<b>Average</b>	<b>2,6</b>	<b>5,4</b>	<b>3,9</b>	<b>8,2</b>

Obs.:

- The tests were performed on October 28<sup>th</sup> 2002.
- The tests were performed with the test samples in dry conditions to the ambient.
- It was performed a pre-erosion about 20 m on the test surface, meaning, the polished surfaces of the test samples.

## RESULTS

### 1.c) Stone for Revetment - Definition of the apparent specific density, apparent porosity and apparent absorption of water, according to Norm NBR 12766/92.

Samples of "White Marble"			
	Apparent specific density (Kg/m <sup>3</sup> )	Apparent porosity (%)	Apparent Absorption (%)
<b>Dry</b>	<b>Saturated</b>		
<b>2,87</b>	<b>2,88</b>	<b>0,35</b>	<b>0,12</b>

Samples of "Blue Marble"			
	Apparent specific density (Kg/m <sup>3</sup> )	Apparent porosity (%)	Apparent Absorption (%)
<b>Dry</b>	<b>Saturated</b>		
<b>2,86</b>	<b>2,86</b>	<b>0,27</b>	<b>0,10</b>

Obs.:

- The tests were performed on November 06<sup>th</sup> 2002.

### 2. Visual and comparative evaluation of blue color stability on the surface without polishing of the sample "Blue Marble" before and after the tests according to Norm NBR 12042/91.


The result of testing does not show visual or comparative significant differences in hue of blue color on the surfaces of the tests samples of "Blue Marble". It's is evident, so, that the Blue hue of the petric slabs, obtained in the technological process of color application of the Client "Cor Intercristalina" was not altered after 1000 m of erosion, on the indicate conditions of Norm NBR 12042/91.

### 3-Results of the sample "Blue Marble" in relation with "White Marble"

The resistance to flexion tests results, measured according to NBR 12763/92, the tests results of erosion by abrasion, according to NBR 12042/91 and the tests results of dry apparent specific density, according to Norm NBR 12766/92, of samples "Mármore Azul" and "Mármore Branco" are similar, considering the dispersion characteristics on the sample and these tests results, even though a little higher for the sample "Mármore Branco", showing that the process "Cor intercristalina" did not altered the performance of the petric slabs.

The tests results of satured apparent specific density, apparent porosity and apparent absorption of water, according to Norm NBR 12766/92, of samples "Mármore Azul" and "Mármore Branco" are similar, considering the dispersion characteristics on the sample and these tests results, even though a little higher for the sample "Mármore Branco", showing that the process "Cor intercristalina" did not altered the performance of the petric slabs.

The counterproof sample received from Client will be discarded after 03 (three) months from the issue date of this test report, at LAMAC convenience.

  
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Responsável Técnico pelo LAMAC



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### Blue Marble Sample

#### Average dimensions ( mm )-distance between supports- conditions- charge(N)-breaking point

Test sample nr.	Length	width	height	(mm)			
1	200	97	20	180	dry	686	4,8
2	200	99	20	180	dry	785	5,4
3	200	99	20	180	dry	686	4,7
<b>Average</b>							<b>5,0</b>

1	200	97	20	180	wet	735	5,1
2	200	97	19	180	wet	883	6,8
3	200	98	20	180	wet	981	6,8
<b>Average</b>							<b>6,2</b>

Obs: The tests were performed on “Mármore Branco” and “Mármore Azul” on November, 13<sup>th</sup>, 2002.

#### 2 - Erosion by abrasion, according to Norm NBR 12042/91.

### White Marble Sample

#### Erosion by abrasion in mm, at.

Test sample nr	Erosion by abrasion in mm, at.	
	500 m	1000 m
1	2,5	5,1
2	2,5	5,0
3	2,6	5,0
4	2,8	6,5
<b>Average</b>	<b>2,6</b>	<b>5,4</b>

Obs:

- The tests were performed on October 10<sup>th</sup>, 2002.
- The erosion by abrasion was performed on the polished surface of the white sample. After the test was performed in 1000 m, the sample lost it's polish but the white color remain unaltered.

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### 2 - Erosion by abrasion, according to Norm NBR 12042/91.

#### Blue Marble Sample

Erosion by abrasion in mm, at.

Test sample nr	Erosion by abrasion in mm, at.	
	500 m	1000 m
1	4,1	9,2
2	3,8	8,1
3	4,1	8,0
4	3,5	7,4
<b>Average</b>	<b>3,9</b>	<b>8,2</b>

#### Obs:

- The tests were performed on October 28<sup>th</sup>, 2002.
- The erosion by abrasion was performed on the polished surface of the blue sample. After the test was performed in 1000 m , the sample lost it's polish but the blue color remain unaltered.

### 3 - Apparent specific density, apparent porosity and apparent absorption of water, according to Norm NBR 12766/923

#### White Marble Sample

Apparent specific Density (Kg/m <sup>3</sup> )		apparent porosity	apparent absorption
Dry	Wet	(%)	(%)
2,87	2,88	0,35	0,12


#### Blue Marble Sample

Apparent specific Density (Kg/m <sup>3</sup> )		apparent porosity	apparent absorption
Dry	Wet	(%)	(%)
2,86	2,86	0,27	0,10

Obs: The tests were performed on "Mármore Branco" and "Mármore Azul" on November, 11<sup>th</sup>, 2002.

The counterproof sample received from Client will be discarded after 03 (three) months from the issue date of this test report, at LAMAC convenience.

**Date of issue: November, 29<sup>th</sup> 2002**

  
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## TEST REPORT NR.276

Organic Analysis Laboratory – LANOR

Client: Royal Marbles & Granite Ltd.

Address: Rua Olga, 16 – Bonsucesso – Rio de Janeiro / RJ

Client's Ref: Fax received on April, 15<sup>th</sup>, 2003

Contract/Process nr. 01240.002178/02

Nature of Work: Testing for Alterability of Chemical products (cleaning products)

Material Supplied: Samples were delivered by the client on October, 10<sup>th</sup>, 2002

Description of Material:

The sample delivered at this institute is of total responsibility of the Client. The sample ( 5 test samples ) we received in isopor package , named as “ Mármore Clássico Royal Suave” colored material, with 20 cm x 20 cm x 2 cm in blue color.

Methods and Procedures: : As agreed between the client ( Fax of 11/14/02) as follows:

Results:

**“This report cancels and replaces the Test Report nr. 268 “**

Six (6) tiles with 10cm x 10cm x 2cm were plunged to the half in the products indicated by the Client, for a 6 hour period.

After that time, they were washed in water and dry in the air. After that, we made a visual comparative evaluation between the plunged and not plunged parts, considering: loss of shine and color changing.

1) Treatment with Sodium Hypochlorite (10% concentration) Alcohol, ammonia, paint solvent, liquid detergent.

No changes were noticed regarding to loss of shine and color changing.


Period of testing: 11/21/02 to 11/22/02.

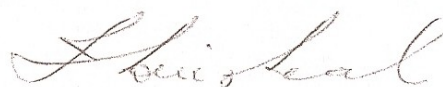
### Supplementary information

This report's results refer exclusively to the samples presented to tests.

The copy of this document only can be done in total and its use, for promotional meanings, must have written approval from INT.

Date of issue: 04/22/02

  
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