Natural Stone Test
STONE LAB
BY IMM CARRARA

A.S.T.M. MEMBER No. 1741518

TEST REPORT No. 283

MATERIAL NAME: **LITEST1 - Quarziti / Quartzites**

CLIENT : **MARMILAME S.R.L.**

STONELAB BY IMM
TECHNOLOGICAL LABORATORY FOR TESTING ON STONES

PERFORMED TESTS:

1. **Apparent Density-Open Porosity (EN 1936:2006*)** — **Table 1**
2. **Water Absorption (EN 13755:2008*)** — **Table 2**
3. **Abrasion resistance (EN 14157:2017*)** — **Table 3-4**
4. **Linear Thermal Dilatation (EN 14581:2005*)** — **Table 5**
5. **Resistance to Freeze/Thaw cycles (EN 12371:2010* - aesthetics)**
6. **Resistance to Thermal Shock cycles (EN 16140:2016* - aesthetics)**

The Test Report No. 283 consists of 7 pages including this one.

Technological Laboratory Dr. Geol. Marco Mazzoni		**DATE**: August 02nd, 2018

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(RESULTS SUMMARY TABLE)

By request of **MARMILAME S.R.L.** - Via Dorsale, 54 – 54100 – MASSA – ITALY the under listed Tests have been performed on specimens of the material named by **MARMILAME S.R.L.**: "**LITEST1 - Quarziti / Quartzites**". The relevant results have been reported in the tables enclosed to this document. The specimens under testing have been consigned to this laboratory by **MARMILAME S.R.L.** in date June 26th, 2018.

NOTE:
The symbol (*) near the Test method codes highlights the fact that the tested material aren't stone materials but, actually, composite materials.

Type of Test	Ref. Std.	Units	Conditioning	Average values	Std. Dev.
Apparent Density (Table 1)	**EN 1936:2006***	**Kg/m^3**	**-**	**1440,05**	**-**
Open Porosity (Table 1)	**EN 1936:2006***	**%**	**-**	**5,15**	**-**
Water Absorption (Table 2)	**EN 13755:2006***	**%**	**-**	**3,57**	**-**
Abrasion Resistance (Table 3)	**EN 14157:2017***	**mm**	**Dry**	**19,0**	**-**
Abrasion Resistance – Hardened surface (Table 4)	**EN 14157:2017***	**mm**	**Dry**	**18,5**	**-**
Linear Thermal Dilatation (Table 5)	**EN 14581:2005***	**α coef. (10^{-6}/°C)**	**Dry**	**18,5**	**-**
Resistance to Freeze/Thaw cycles	**EN 12371:2010* (Aesthetics)**	**No noticeable surface aesthetic variations after No. 56 EN 12371:2010* Freeze/ Thaw cycles**			
Resistance to Thermal Shock cycles	**EN 16140:2016* (Aesthetics)**	**No noticeable surface aesthetic variations after No. 20 EN 16140:2016* Thermal Shock cycles**			

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Table 1

IMM Carrara S.p.A **STONELAB** **TECHNOLOGICAL LABORATORY** **QUALITY TESTS ON DIMENSION STONES AND COMPOSITES**	**Apparent Density and Open Porosity** **(EN 1936:2006*)**	**Client**: MARMILAME S.r.l.

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Material's commercial Name(s):
LITEST1 - Quarziti / Quartzites

Specimens' delivery date: 26/06/2018

Specim No.	Specimens' weight					Apparent Density [kg/m^3]	Open Porosity (%)	Specimen Dimension (mm)
	After Dry conditioning (>48 hrs. / 70°C)		After Wet conditioning (>48 hrs. / 20°C)					
	Date	g (m_d)	Date	g (m_s)	g (m_h)			
01	07/06/18	16,28	07/09/18	16,88	4,99	1369,22	5,05	99.2x99.1x1.3
02	07/06/18	19,16	07/09/18	19,79	6,14	1403,66	4,62	99.3x99.2x1.4
03	07/06/18	21,19	07/09/18	21,79	6,70	1404,24	3,98	99.4x99.3x1.4
04	07/06/18	14,56	07/09/18	15,18	5,17	1454,55	6,19	99.1x99.1x1.3
05	07/06/18	18,82	07/09/18	19,50	6,31	1426,84	5,16	99.2x99.2x1.4
06	07/06/18	17,40	07/09/18	18,05	7,05	1581,82	5,91	99.2x99.1x1.4

	Min.	**Avg.**	**Max.**
Apparent Density ρ_b [kg/m^3]	**1369,22**	**1440,05**	**1581,82**
Open Porosity (%)	**3,98**	**5,15**	**6,19**

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Table 2

IMM Carrara S.p.A **STONELAB** **TECHNOLOGICAL LABORATORY** **QUALITY TESTS ON DIMENSION STONES AND COMPOSITES**	**Water Absorption at atmospheric pressure** **(EN 13755:2008*)**	**Client**: MARMILAME S.r.l.

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Material's commercial Name(s):
LITEST1 - Quarziti / Quartzites

Specimens' delivery date: 26/06/2018

Specim No.	**Specimens' weight**						**Specimen Dimension**
	After Dry conditioning (>48 hrs. / 70°C)		**After Wet conditioning (>48 hrs. / 20°C)**		**(m_s-m_d)**	**100x (m_s-m_d)/m_d**	
	Date	**g (m_d)**	**Date**	**g (m_s)**	**[g]**	**[%]**	**(mm)**
01	07/12/18	16,28	07/16/18	16,88	0,60	3,69	99.2x99.1x1.3
02	07/12/18	19,16	07/16/18	19,79	0,63	3,29	99.3x99.2x1.4
03	07/12/18	21,19	07/16/18	21,79	0,60	2,83	99.4x99.3x1.4
04	07/12/18	14,56	07/16/18	15,18	0,62	4,26	99.1x99.1x1.3
05	07/12/18	18,82	07/16/18	19,50	0,68	3,61	99.2x99.2x1.4
06	07/12/18	17,40	07/16/18	18,05	0,65	3,74	99.2x99.1x1.4

	Min.	**Avg.**	**Max.**
Water absorption A_b, weight (%)	**2,83**	**3,57**	**4,26**

Maximum expected Value A_b, weight (%): 4,89

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Table 3

Natural Stone Test STONE LAB BY IMM CARRARA **ASTM MEMBER No. 1741518**	**Abrasion Resistance** **(EN 14157:2017*)**	**Client**: MARMILAME S.r.l.

Test Report No.: 283

Material's commercial Name:
LITEST1 - Quarziti / Quartzites
Untreated surface

Specimens' delivery date: 26/06/2018

Type of Test:
Method A (Wide Wheel Abrasion Test)

Specimen No.	Calibration factor (mm)	Width of the groove (corrected by the calibration factor) (mm)	Avg. width of the groove (corrected by the calibration factor): 19,0 mm **Approximated Avg. Value for CE marking purposes : 19,0 mm**	Specimen dimension [mm]
01	-0,4	18,9		100x70x30
02		19,2		100x70x30
03		19,1		100x70x30
04		18,8		100x70x30
05		19,1		100x70x30
06		19,1		100x70x30

Note:
Before being subjected to the abrasion Test, the specimens have been dried in a ventilated oven (T = 70°C) until the reaching of a constant mass.

Calibration factor: arithmetic difference between the 20 mm value and the calibration value (expressed in mm).

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Table 4

Natural Stone Test STONE LAB BY IMM CARRARA **ASTM MEMBER No. 1741518**	**Abrasion Resistance** **(EN 14157:2017*)**	**Client**: MARMILAME S.r.l.

Test Report No.: 283

Material's commercial Name:
LITEST1 - Quarziti / Quartzites
Hardened surface

Specimens' delivery date: 26/06/2018

Type of Test:
Method A (Wide Wheel Abrasion Test)

Specimen No.	Calibration factor (mm)	Width of the groove (corrected by the calibration factor) (mm)	Avg. width of the groove (corrected by the calibration factor): 18,5 mm **Approximated Avg. Value for CE marking purposes : 18,5 mm**	Specimen dimension [mm]
01	-0,4	18,6		100x70x30
02		18,5		100x70x30
03		18,4		100x70x30
04		18,3		100x70x30
05		18,6		100x70x30
06		18,5		100x70x30

Note:
Before being subjected to the abrasion Test, the specimens have been dried in a ventilated oven (T = 70°C) until the reaching of a constant mass.

Calibration factor: arithmetic difference between the 20 mm value and the calibration value (expressed in mm).

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Table 5

IMM Carrara S.p.A **STONELAB** **TECHNOLOGICAL LABORATORY QUALITY TESTS ON DIMENSION STONES AND COMPOSITES**	**Determination of linear thermal expansion** **(EN 14581:2004*)**	**Client**: MARMILAME S.r.l.

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Material name:

LITEST1 - Quarziti / Quartzites

Specimens' delivery date: 26/06/2018

Specim No.	**Specimen length (mm)**		**Actual values**				**Specimen Dimension (mm)**
	T = 20°C	**T = 80°C**	**ΔT [°C]**	**ΔL [mm]**	**α_1 (10^{-6}/°C)**	**α (10^{-6}/°C)**	
01	251,56	251,84	60	0,28	18,4	**18,5**	251,56x50x1,4
02	251,98	252,26	60	0,28	18,2		251,98x50x1,4
03	251,77	252,05	60	0,28	18,6		251,77x50x1,4
04	251,62	251,91	60	0,29	18,9		251,62x50x1,4

Average Linear Thermal Expansion (10^{-6}/°C) = 18,5

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