

TEST REPORT No. 281

MATERIAL NAME: LITEST1 - Ardesie / Slates

CLIENT : MARMILAME S.R.L.


STONELAB BY IMM **TECHNOLOGICAL LABORATORY FOR TESTING ON STONES**

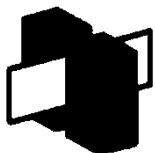


PERFORMED TESTS:

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|---|------------------|
| 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. 281 consists of 7 pages including this one.

Technological Laboratory Dr. Geol. Marco Mazzoni		DATE: August 02 nd , 2018
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<p>STONELAB by IMM Technological Laboratory Viale G.Galilei, 133 - 54033 M. di Carrara - Italy Tel. +39 0585 787963 - Fax. +39 0585 787602 E-mail: m.mazzoni@immcarrara.it A.S.T.M. MEMBER No. 1741518</p>	<p>TEST REPORT No. 281 (RESULTS SUMMARY TABLE)</p>
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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 - Ardesie / Slates”**. 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	-	1500,77	-
Open Porosity (Table 1)	EN 1936:2006*	%	-	6,69	-
Water Absorption (Table 2)	EN 13755:2008*	%	-	4,47	-
Abrasion Resistance (Table 3)	EN 14157:2017*	mm	Dry	16,5	-
Abrasion Resistance – Hardened surface (Table 4)	EN 14157:2017*	mm	Dry	15,0	-
Linear Thermal Dilatation (Table 5)	EN 14581:2005*	α coef. (10 ⁻⁶ /°C)	Dry	18,2	-
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			

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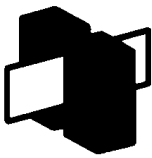



Table 1

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.			
Test Report No.: 281						Material's commercial Name(s): LITEST1 - Ardesie / Slates		
Specimens' delivery date: 26/06/2018								
Speci m 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	23,56	07/09/18	24,37	8,85	1518,04	5,22	98,5x98,4x0,8
02	07/06/18	17,16	07/09/18	18,10	6,48	1476,76	8,09	98,1x98,1x0,7
03	07/06/18	22,21	07/09/18	23,10	8,50	1521,23	6,10	98,5x98,3x0,8
04	07/06/18	23,82	07/09/18	24,71	8,79	1496,23	5,59	98,5x98,4x0,8
05	07/06/18	21,77	07/09/18	22,64	8,20	1507,62	6,02	98,4x98,4x0,8
06	07/06/18	15,59	07/09/18	16,55	6,05	1484,76	9,14	98,1x98,1x0,7
				Min.	Avg.	Max.		
Apparent Density ρ_b [kg/m³]				1476,76	1500,77	1521,23		
Open Porosity (%)				5,22	6,69	9,14		

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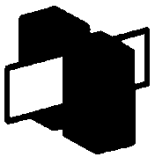


Table 2



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.												
Test Report No.: 281					Material's commercial Name(s): LITEST1 - Ardesie / Slates												
					Specimens' delivery date: 26/06/2018												
Specim No.	Specimens' weight						Specimen Dimension (mm)										
	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]	[%]											
01	07/12/18	23,56	07/16/18	24,37	0,81	3,44	98,5x98,4x0,8										
02	07/12/18	17,16	07/16/18	18,10	0,94	5,48	98,1x98,1x0,7										
03	07/12/18	22,21	07/16/18	23,10	0,89	4,01	98,5x98,3x0,8										
04	07/12/18	23,82	07/16/18	24,71	0,89	3,74	98,5x98,4x0,8										
05	07/12/18	21,77	07/16/18	22,64	0,87	4,00	98,4x98,4x0,8										
06	07/12/18	15,59	07/16/18	16,55	0,96	6,16	50,2x49,7x50,2										
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 40%;"></td> <td style="width: 10%; text-align: center;">Min.</td> <td style="width: 15%; text-align: center;">Avg.</td> <td style="width: 10%; text-align: center;">Max.</td> <td style="width: 25%;"></td> </tr> <tr> <td style="text-align: center;">Water absorption A_b, weight (%)</td> <td style="text-align: center;">3,44</td> <td style="border: 2px solid black; text-align: center;">4,47</td> <td style="text-align: center;">6,16</td> <td></td> </tr> </table> <p style="text-align: center; margin-top: 20px;">Maximum expected Value A_b, weight (%): 7,49</p>									Min.	Avg.	Max.		Water absorption A_b, weight (%)	3,44	4,47	6,16	
	Min.	Avg.	Max.														
Water absorption A_b, weight (%)	3,44	4,47	6,16														
Technological Laboratory Dr.Geol. Marco Mazzoni						Date: August 02 nd , 2018											

Table 3

		Abrasion Resistance (EN 14157:2017*)		Client: MARMILAME S.r.l.	
Test Report No.: 281			Material's commercial Name: LITEST1 - Ardesie / Slates 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): 16,7 mm Approximated Avg. Value for CE marking purposes : 16,5 mm	Specimen dimension [mm]	
01	-0,4	16,7		100x70x30	
02		16,5		100x70x30	
03		16,6		100x70x30	
04		16,8		100x70x30	
05		16,7		100x70x30	
06		16,7		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).



Technological Laboratory Dr.Geol. Marco Mazzoni		Date: August 02 nd , 2018
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Table 4

		Abrasion Resistance (EN 14157:2017*)		Client: MARMILAME S.r.l.	
Test Report No.: 281			Material's commercial Name: LITEST1 - Ardesie / Slates 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): 14,8 mm Approximated Avg. Value for CE marking purposes : 15,0 mm	Specimen dimension [mm]	
01	-0,4	14,7		100x70x30	
02		15,1		100x70x30	
03		14,8		100x70x30	
04		14,6		100x70x30	
05		14,7		100x70x30	
06		14,8		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).

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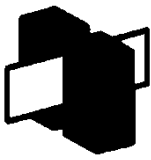


Table 5

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.			
Test Report No.: 281		Material name: LITEST1 - Ardesie / Slates					
		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 ($10^{-6}/^{\circ}C$)	α ($10^{-6}/^{\circ}C$)	
01	251,23	251,51	60	0,28	18,7	18,2	251,23x50x0.8
02	251,09	251,37	60	0,27	18,2		251,09 x50x0.8
03	250,89	251,16	60	0,26	17,6		250,89 x50x0.8
04	251,32	251,59	60	0,27	18,2		251,32 x50x0.8
Average Linear Thermal Expansion ($10^{-6}/^{\circ}C$) = 18,2							

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