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## Evaluation Report (ER) of ETA 23/0194 (27/03/2023)

Technical Assessment Body issuing the ETA and designated according to Article 29 of the Regulation (EU) No 305/2011: BRE Global Ireland

Trade name of the construction product	Lapitec sintered stone
Product family to which the construction product belongs	PAC 09 – Curtain walling/Cladding/Structural sealant glazing
Manufacturer	Breton Spa. Stabilimento di Vedelago Via Bassanese, 6 Vedelago (TV) 31050 Italy
Manufacturing plant(s)	As above
This European Technical Assessment contains	45 pages including Annexes 1 and 2 which form an integral part of this assessment.
This European Technical Assessment is issued in accordance with regulation (EU) No 305/2011, on the basis of	EAD 090142-00-0404 <i>Full-bodied sintered stone slabs for use in cladding, flooring, paving, stairs, rainscreen and curtain walling kits</i>

## Foreword

This Evaluation Report [“ER”] describes the methods used to assess the Lapitec sintered stone formulations for their intended use, the results and the evaluation.

The tests and the evaluation have been performed in accordance with EAD 090142-00-0404 used as European Assessment Document (EAD), and reference should be made to the results shown in the Annexes of this Evaluation Report.

Tests were carried out at the laboratories detailed in Table 1. Tests were carried out on representative samples from current production taken by BRE Global at the factory. The test results are taken from the reports shown in the Annexes of this Evaluation report.

**Table 1 - List of laboratories / organisations**

	<b>Name</b>	<b>Address</b>
1.	BRE Global	BRE, Bucknalls Lane, Watford, Herts, WD25 9NH
2.	Witnessed by BRE Global At Sandberg LLP	Sandberg LLP, 5 Carpenter's Place, London, SW4 7TD
3.	Witnessed by BRE Global At British Board of Agrément	British Board of Agrément, BRE Innovation Campus, Building 5.1, Bucknalls Lane, Watford, Herts, WD25 9BA

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## 1.0 Schedule of testing

### 1.1 Schedule of testing at BRE Global

Schedule of tests that were carried out at the premises of BRE, Bucknalls Lane, Watford, Herts, WD25 9NH.

Description of test (Formulation 1)	Table number
Flexural Strength $R_{tf}$	4.1.4.1
Flexural Strength $RM_f$ (after 25 freeze/thaw cycles)	4.1.4.17
Change in flexural strength (as a percentage from the original value after 25 freeze/thaw cycles) $KM_f$ 25	4.1.4.17
Flexural Strength $R_{sf}$ (after 20 cycles thermal shock)	4.1.6.1
Change in flexural strength (as a percentage change from the original value after 20 cycles thermal shock) $\Delta R_f$ , 20	4.1.6.1
Impact Resistance (L) – 12 mm	4.1.4.2
Impact Resistance (L) – 20 mm	4.1.4.3
Impact Resistance (L) – 30 mm	4.1.4.4
Linear thermal expansion coefficient	4.1.4.18
Dimensional Stability – 12 mm	4.1.4.14
Dimensional Stability – 20 mm	4.1.4.15
Dimensional Stability – 30 mm	4.1.4.16
Water Vapour Resistance Factor ( $\mu$ )	4.1.3.1
Chemical Resistance – Finish Lux Category)	4.1.4.13
Slip Resistance – Finish Lux	4.1.4.6
Slip Resistance – Finish Satin	4.1.4.7
Slip Resistance – Finish Lithos	4.1.4.8
Slip Resistance – Finish Vesuvio	4.1.4.9
Slip Resistance – Finish Dune	4.1.4.10
Slip Resistance – Finish Arena	4.1.4.11
Slip Resistance – Finish Meridio	4.1.4.12

Description of test (Formulation 2)	Table number
Flexural Strength $R_{tf}$	4.1.4.19
Flexural Strength $RM_f$ (after 25 freeze/thaw cycles)	4.1.4.25
Change in flexural strength (as a percentage of original value after 25 freeze/thaw cycles) $KM_f$ 25	4.1.4.25
Flexural Strength $R_{sf}$ (after 20 cycles thermal shock)	4.1.6.3
Change in flexural strength (as a percentage change from the original value after 20 cycles thermal shock) $\Delta R_f$ , 20	4.1.6.3
Impact Resistance (L) – 12 mm	4.1.4.20
Impact Resistance (L) – 20 mm	4.1.4.21
Impact Resistance (L) – 30 mm	4.1.4.22
Linear thermal expansion coefficient	4.1.4.26
Chemical Resistance – Finish Lux (Category)	4.1.4.24

## 1.2 Schedule of testing at Sandberg LLP

Schedule of tests that were carried out at the premises of Sandberg LLP, 5 Carpenter's Place, London, SW4 7TD

Description of test (Formulation 1)	Table number
Abrasion Resistance	4.1.4.5

Description of test (Formulation 2)	Table number
Abrasion Resistance	4.1.4.23

## 1.3 Schedule of testing at British Board of Agrément

Schedule of tests that were carried out at the premises of British Board of Agrément, BRE Innovation Campus, Building 5.1, Bucknalls Lane, Watford, Herts, WD25 9BA

Description of test (Formulation 1)	Table number
Thermal resistance	4.1.6.2

Description of test (Formulation 2)	Table number
Thermal resistance	4.1.6.4

## 2. Technical description of the product

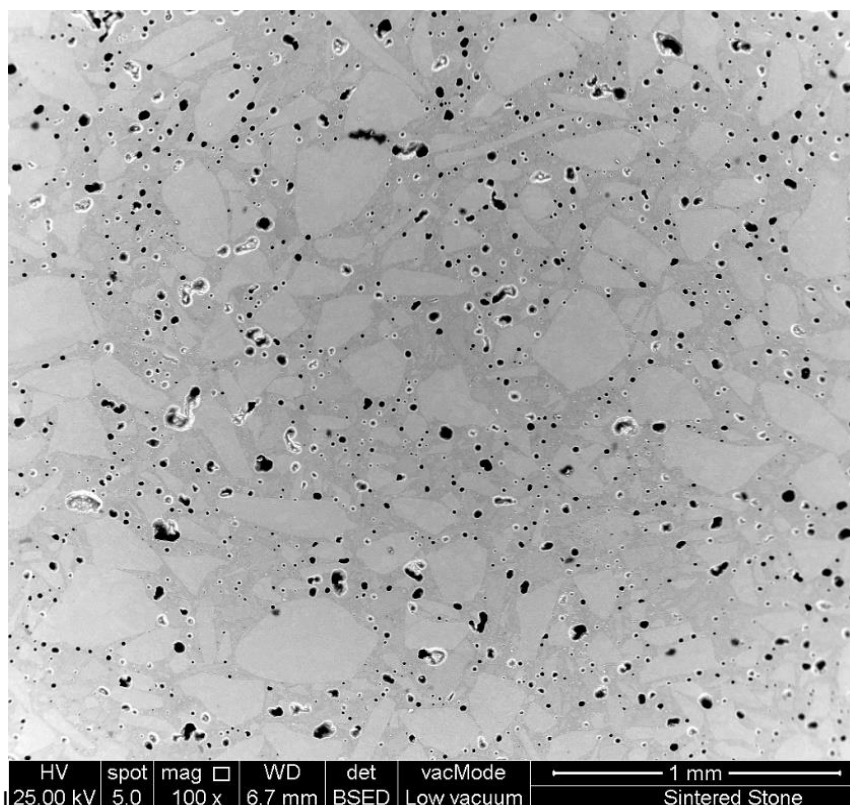
### 2.1 Scope

The ER relates to Sintered Stone Slabs, as manufactured by Lapitec.

The product is a full bodied (see 1.3.1 of EAD) sintered stone (see 1.3.2 of EAD) material. It is manufactured from fine powdered natural minerals which are sintered in a high-temperature process (at between 1,100°C and 1,200°C) to produce large format (normally up to 3650mm x 2015mm, or larger if the manufacturing process allows) stone-like slabs. The slabs emerge from the manufacturing process and are then trimmed to the final size (normally up to 3500mm x 1550mm or larger if the manufacturing process allows) to release the internal tensions acquired during the sintering process. Slabs are then trimmed to the size required by the customer, generally to a tolerance of  $\pm 1.5\text{mm}$  (depending on the length of the pieces).

The slabs are available in a range of thicknesses and a variety of colours and finishes. The slabs comprise entirely of the sintered material, there is no mesh bonding to the rear of the slabs.

The image below, a Scanning Electron Microscope (SEM) image produced by a Back-scattered Electron Detector (BSE) clearly indicates the structure of sintered stone.



### 2.2 Working Life

The assessment methods included or referred to in this EAD take into account a working life for the full-bodied sintered stone slab (for the intended uses noted in 2.1) of 25 years when installed in the works. These provisions are based upon the current state of the art and the available knowledge and experience.

## **2.3 Identification of the product**

Full-bodied sintered stone slabs for use in cladding, flooring, paving, stairs, rainscreen and curtain walling kits. Formulation 1 and 2.

- 3440 x 1540 mm for slabs with a thickness of 12 mm and 20 mm.
- 3400 x 1500 mm for slabs with a thickness of 30 mm.

## **2.4 Installation**

Please refer to the TDS and manuals as issued by the manufacturer for further information.

## **3. Specification of the intended use(s) in accordance with the applicable European Assessment Document (EAD)**

### **3.1 Intended use**

The slab product has a variety of non-structural uses, these include:

- internal or external finishing in walls
- internal or external floors and stairs
- infill panels in curtain walling, and
- cladding elements in external wall cladding systems

### **3.2 Assumptions for the manufacturer**

Concerning product packaging, transport, storage, maintenance, replacement and repair it is the responsibility of the manufacturer to undertake the appropriate measures and to advise his clients on the transport, storage, maintenance, replacement and repair of the product as is considered necessary.

It is assumed that the product will be installed according to the manufacturer's instructions or, in the absence of such instructions, according to the usual practice of the building professionals.

## **4. Performance of the product and references to the methods used for its assessment**

The product was tested against the criteria as listed in Clause 2 of EAD 090142-00-0404.

Two different formulations are covered by this ETA. It is acknowledged that some tests might be influenced by different factors. It is considered that both dimensional stability and water vapour resistance could be influenced by thickness but not formulation. On this basis only one formulation was used but at the different thicknesses.

### **4.1 Basic Requirements for Construction Works (BRCW) and Essential characteristics**

#### **4.1.1 BRCW 1: Mechanical resistance and stability**

Not applicable, according to Table 2.1 of EAD 090142-00-0404

#### 4.1.2 BRCW 2: Safety in case of fire

##### 4.1.2.1 Reaction to fire

Formulation 2	Standard	Classification
Reaction to Fire Classification	EN 13501-1:2018	A1

Only 1 formulation was chosen to be tested during the sample selection stage due to the similar nature of the formulations when undergoing the reaction to fire tests.

Test method & test number	Parameter	No. test runs	Results	
			Continuous parameter - mean (m)	Compliance with parameters Criterion / Compliance status, A1
<b>BS EN ISO 1716</b> E14267 Tested: 07 November 2022 P123476-1000	$Q_{PCS}$	3	0.16 MJ/kg	$Q_{PCS} \leq 2.0 \text{ MJ/kg}$ / Compliant
<b>BS EN ISO 1182</b> E14268 Tested: 28 October 2022 & 31 October 2022 P123476-1001	$\Delta T$	5	0.49 °C	$\Delta T \leq 30 \text{ °C}$ / Compliant
	$\Delta m$		0.0 %	$\Delta m \leq 50 \text{ %}$ / Compliant
	$t_f$		0 s	$t_f = 0 \text{ s}$ / Compliant

#### 4.1.3 BRCW 3: Hygiene health and the environment

##### 4.1.3.1 Water Vapour Resistance Factor ( $\mu$ )

BS EN ISO 12572:2016 Determination of water vapour transmission properties							
Formulazione 1 - 12 mm thickness							
Name of Stone:	Lapitec		Sample type:		Sintered Stone		
Sample details:	Formulazione 1		Anisotropic Features:		None		
Supplier:	Lapitec SpA		Country of Origin:		Italy		
Dimensions (mm):	95 x 95 x 12		Project Reference:		CERT 015		
Surface Finish:	Polished		Preparation:		BS EN ISO 12572		
Date Tested:	11/05/2022	29/07/2022					
		Specimen Number P122097/01/					
		1	2	3	4	5	6
Thickness (mm):		12.5	12.50	12.50	12.50	12.5	12.5
Density of water vapour flow rate (g): x 10 <sup>-9</sup> kg/m <sup>2</sup> /s		0.38	2.40	1.50	1.00	0.54	0.68
Water vapour resistance factor (μ): x 10 <sup>4</sup>		7.70	1.20	1.90	2.80	5.40	4.30
water vapour diffusion equivalent air layer thickness (s <sub>d</sub> ): m		959	151	243	350	677	535
Mean thickness:				12.5	m		
Mean density of water vapour flow rate (g):				1.08	x 10 <sup>-9</sup> kg/m <sup>2</sup> /s		
Mean water vapour resistance factor (μ):				3.88	x 10 <sup>4</sup>		
Mean water vapour diffusion equivalent air layer thickness (s <sub>d</sub> ):				486	m		

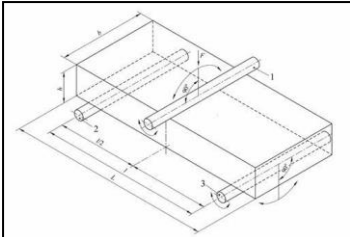
Note, although the EAD states the characteristic water vapour permeability,  $\delta p$ , of the material is expressed in kg/(msPa), the  $\delta p$  value is not required in the reporting requirements of ISO 12572. It is used in determining the value for  $\mu$ . As part of the data processing the  $\delta p$  value was generated.



### 3.1.4 BRCW 4: Safety and accessibility in use

#### Formulation 1

#### 4.1.4.1 Flexural Strength $R_{tf}$

BS EN 14617-2: 2016 Determination of Flexural Strength Tested Dry						
						
Name of Stone:	Lapitec		Sample type:	Sintered Stone		
Sample details:	Formulazione 1		Anisotropic Features:	None		
Supplier:	Lapitec SpA		Country of Origin:	Italy		
Dimensions (mm):	300 x 75 x 12		Project Reference:	CERT 015		
Surface Finish:	Polished		Preparation:	BS EN 14617-2		
Date Tested:	07/04/2022					
Sample No.	Load Rate	Span	Width	Thickness	Failure Load	Flexural Strength
P122097/22/01/	MPa.s <sup>-1</sup>	mm	mm	mm	N	MPa
241	0.25	280	73.7	12.5	1320	48.1
242	0.25	280	76.5	12.5	1330	46.7
243	0.25	280	75.5	12.7	1380	47.6
244	0.25	280	75.6	12.7	1480	51.0
245	0.25	280	74.8	12.8	1090	37.4
246	0.25	280	75.0	12.8	1280	43.8
247	0.25	280	73.2	12.5	1150	42.2
248	0.25	280	76.9	12.6	1320	45.4
249	0.25	280	74.3	12.7	1360	47.7
250	0.25	280	78.2	12.6	1270	43.0
251	0.25	280	75.0	12.8	1190	40.7
252	0.25	280	75.3	12.8	1350	46.0
					Mean $R_{tf}$	45.0
					SD	3.73

#### 4.1.4.2 Impact Resistance (L) – 12 mm

<b>BS EN 14617-9:2016 Determination of Impact Resistance</b>																																				
<b>Formulazione 1 - 12 mm thickness</b>																																				
Name of Stone:	Lapitec	Sample type:	Sintered Stone																																	
Sample details:	Formulazione 1	Anisotropic Features:	None																																	
Supplier:	Lapitec SpA	Country of Origin:	Italy																																	
Dimensions (mm):	200 x 200 x 12	Project Reference:	CERT 015																																	
Surface Finish:	Polished	Preparation:	BS EN 14617-9																																	
Mass of impactor (kg)	1.05																																			
Date Tested:	20/07/2022																																			
<table border="1" style="width: 100%; border-collapse: collapse; margin: 10px auto;"> <thead> <tr> <th style="width: 30%;">Sample No.</th> <th style="width: 30%;">Failure Height</th> <th style="width: 40%;">Fracture Work</th> </tr> <tr> <th>P122097/22/01/</th> <th>m</th> <th>Joules ( J )</th> </tr> </thead> <tbody> <tr><td>321</td><td>0.110</td><td>1.13</td></tr> <tr><td>322</td><td>0.110</td><td>1.13</td></tr> <tr><td>323</td><td>0.160</td><td>1.65</td></tr> <tr><td>324</td><td>0.210</td><td>2.16</td></tr> <tr><td>325</td><td>0.210</td><td>2.16</td></tr> <tr><td>326</td><td>0.210</td><td>2.16</td></tr> <tr><td>327</td><td>0.210</td><td>2.16</td></tr> <tr><td>328</td><td>0.210</td><td>2.16</td></tr> <tr> <td></td> <td>Mean</td> <td>1.84</td> </tr> </tbody> </table> <div style="text-align: center; margin-top: 20px;"> <b>Mean Fracture Work (L)                      1.84                      Joules</b> </div>				Sample No.	Failure Height	Fracture Work	P122097/22/01/	m	Joules ( J )	321	0.110	1.13	322	0.110	1.13	323	0.160	1.65	324	0.210	2.16	325	0.210	2.16	326	0.210	2.16	327	0.210	2.16	328	0.210	2.16		Mean	1.84
Sample No.	Failure Height	Fracture Work																																		
P122097/22/01/	m	Joules ( J )																																		
321	0.110	1.13																																		
322	0.110	1.13																																		
323	0.160	1.65																																		
324	0.210	2.16																																		
325	0.210	2.16																																		
326	0.210	2.16																																		
327	0.210	2.16																																		
328	0.210	2.16																																		
	Mean	1.84																																		

#### 4.1.4.3 Impact Resistance (L) – 20 mm

<b>BS EN 14617-9:2016 Determination of Impact Resistance</b>			
<b>Formulazione 1 - 20 mm thickness</b>			
Name of Stone:	Lapitec	Sample type:	Sintered Stone
Sample details:	Formulazione 1	Anisotropic Features:	None
Supplier:	Lapitec SpA	Country of Origin:	Italy
Dimensions (mm):	200 x 200 x 20	Project Reference:	CERT 015
Surface Finish:	Polished	Preparation:	BS EN 14617-9
Mass of impactor (kg)	1.05		
Date Tested:	20/07/2022		

Sample No.	Failure Height	Fracture Work
P122097/22/03/	m	Joules ( J)
321	0.260	2.68
322	0.260	2.68
323	0.260	2.68
324	0.310	3.19
325	0.360	3.71
326	0.360	3.71
327	0.360	3.71
328	0.410	4.22
	Mean	3.32

**Mean Fracture Work (L)                      3.32                      Joules**

#### 4.1.4.4 Impact Resistance (L) – 30 mm

<b>BS EN 14617-9:2016 Determination of Impact Resistance</b>																																				
<b>Formulazione 1 - 30 mm thickness</b>																																				
Name of Stone:	Lapitec	Sample type:	Sintered Stone																																	
Sample details:	Formulazione 1	Anisotropic Features:	None																																	
Supplier:	Lapitec SpA	Country of Origin:	Italy																																	
Dimensions (mm):	200 x 200 x 30	Project Reference:	CERT 015																																	
Surface Finish:	Polished	Preparation:	BS EN 14617-9																																	
Mass of impactor (kg)	1.05																																			
Date Tested:	20/07/2022																																			
<table border="1" style="width: 100%; border-collapse: collapse; margin: 10px auto;"> <thead> <tr> <th style="width: 30%;">Sample No.</th> <th style="width: 30%;">Failure Height</th> <th style="width: 40%;">Fracture Work</th> </tr> <tr> <th>P122097/22/05/</th> <th>m</th> <th>Joules ( J)</th> </tr> </thead> <tbody> <tr><td>321</td><td>0.510</td><td>5.25</td></tr> <tr><td>322</td><td>0.660</td><td>6.80</td></tr> <tr><td>323</td><td>0.460</td><td>4.74</td></tr> <tr><td>324</td><td>0.510</td><td>5.25</td></tr> <tr><td>325</td><td>0.610</td><td>6.28</td></tr> <tr><td>326</td><td>0.410</td><td>4.22</td></tr> <tr><td>327</td><td>0.510</td><td>4.74</td></tr> <tr><td>328</td><td>0.460</td><td>4.74</td></tr> <tr> <td></td> <td>Mean</td> <td>5.25</td> </tr> </tbody> </table> <div style="text-align: center; margin-top: 20px;"> <b>Mean Fracture Work (L)</b>                      <b>5.25</b>                      <b>Joules</b> </div>				Sample No.	Failure Height	Fracture Work	P122097/22/05/	m	Joules ( J)	321	0.510	5.25	322	0.660	6.80	323	0.460	4.74	324	0.510	5.25	325	0.610	6.28	326	0.410	4.22	327	0.510	4.74	328	0.460	4.74		Mean	5.25
Sample No.	Failure Height	Fracture Work																																		
P122097/22/05/	m	Joules ( J)																																		
321	0.510	5.25																																		
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326	0.410	4.22																																		
327	0.510	4.74																																		
328	0.460	4.74																																		
	Mean	5.25																																		

#### 4.1.4.5 Abrasion Resistance

**SANDBERG**

**Sandberg LLP**  
5 Carpenter's Place  
Clapham High Street  
London SW4 7TD  
Tel: 020 7565 7000  
Fax: 020 7565 7101  
email: [clapham@sandberg.co.uk](mailto:clapham@sandberg.co.uk)  
web: [www.sandberg.co.uk](http://www.sandberg.co.uk)

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Sheet 1 of 1

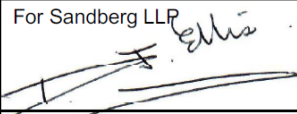
**AGGLOMERATED STONE**  
**ABRASION RESISTANCE - NARROW WHEEL**  
BS EN 14617-4:2012

Description	White
Commercial name	Not advised
Country of origin	Not advised
Supplier	Not advised
Sampled by	Not advised
Surface finish	Polished
Client reference	122097/22/01/91-6
Date of receipt	16.05.22
Date of preparation	n/a
No. of specimens / size (mm)	6 no. 150 x 100 x 12
Test by / date	HO / 07.06.22
Checked by / date	MB / 07.06.22

#### RESULTS


Sandberg sample reference	Individual abrasion value (mm)	Mean abrasion value (mm)
G52259 a	29.5	29
G52259 b	29	
G52259 c	28.5	
G52259 d	28.5	
G52259 e	28.5	
G52259 f	28.5	

\* To nearest 0.5 mm


<b>Client</b>	BRE Bucknalls Lane Watford Hertfordshire WD25 9XX For the attention of Dr Martyn Webb	<b>Signed</b>	For Sandberg LLP 
		<b>Name</b>	David J Ellis
		<b>Position</b>	Partner
<b>Reference</b>	PO no. : 544111 dated 11 May 2022	<b>Date</b>	9 June 2022

The results contained in this certificate apply to the sample as received and tested.  
This certificate shall not be reproduced except in full without the written approval of Sandberg LLP  
Materials, samples and test specimens are retained for a period of 2 months from the issue of this test certificate.  
Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.


#### 4.1.4.6 Slip Resistance – Finish Lux

BS EN 14231:2003 Natural stone test methods.						
Determination of the slip resistance by means of the pendulum tester						
Name of Stone:	Lapitec		Sample type:	Sintered Stone		
Sample details:	Formulazione 1		Anisotropic Features:	None		
Supplier:	Lapitec SpA		Country of Origin:	Italy		
Dimensions (mm):	300 x 150 x 12		Project Reference:	No data supplied.		
Surface Finish:	Lux		Preparation:	BS EN 14231		
Date Tested:	24/07/2022 & 08/08/2022					
Slider	Slider 55		Temperature during test	20°C		
Sample No.	Condition: Dry					
P122097/22/01/	151	152	153	154	155	156
Direction 0°	79	69	70	73	74	70
Direction 180°	78	69	75	75	75	70
Mean	79	69	73	74	75	70
Sample No.	Condition: Wet					
P122097/22/01/	151	152	153	154	155	156
Direction 0°	17	17	19	18	16	18
Direction 180°	17	16	19	17	17	16
Mean	17	17	19	18	17	17
Mean Slip Resistance Value Dry			73			
Mean Slip Resistance Value Wet			17			
						
0378						

#### 4.1.4.7 Slip Resistance – Finish Satin


BS EN 14231:2003 Natural stone test methods. Determination of the slip resistance by means of the pendulum tester						
Name of Stone:	Lapitec		Sample type:		Sintered Stone	
Sample details:	Formulazione 1		Anisotropic Features:		None	
Supplier:	Lapitec SpA		Country of Origin:		Italy	
Dimensions (mm):	300 x 150 x 12		Project Reference:		No data supplied.	
Surface Finish:	Satin		Preparation:		BS EN 14231	
Date Tested:	24/07/2022 & 08/08/2022					
Slider	Slider 55		Temperature during test		20°C	
Sample No.	Condition: Dry					
P122097/22/07/	151	152	153	154	155	156
Direction 0°	64	62	59	57	59	60
Direction 180°	64	65	59	59	61	59
Mean	64	64	59	58	60	60
Sample No.	Condition: Wet					
P122097/22/07/	151	152	153	154	155	156
Direction 0°	20	20	20	20	20	21
Direction 180°	20	20	20	19	19	21
Mean	20	20	20	20	20	21
Mean Slip Resistance Value Dry			61			
Mean Slip Resistance Value Wet			20			
				 0378		

#### 4.1.4.8 Slip Resistance – Finish Lithos

BS EN 14231:2003 Natural stone test methods.						
Determination of the slip resistance by means of the pendulum tester						
Name of Stone:	Lapitec		Sample type:		Sintered Stone	
Sample details:	Formulazione 1		Anisotropic Features:		None	
Supplier:	Lapitec SpA		Country of Origin:		Italy	
Dimensions (mm):	300 x 150 x 12		Project Reference:		No data supplied.	
Surface Finish:	Lithos		Preparation:		BS EN 14231	
Date Tested:	24/07/2022 & 08/08/2022					
Slider	Slider 55		Temperature during test		20°C	
Sample No.	Condition: Dry					
P122097/22/08/	151	152	153	154	155	156
Direction 0°	85	80	84	90	85	80
Direction 180°	85	80	83	90	85	82
Mean	85	80	84	90	85	81
Sample No.	Condition: Wet					
P122097/22/08/	151	152	153	154	155	156
Direction 0°	36	35	34	34	34	33
Direction 180°	36	35	34	34	33	33
Mean	36	35	34	34	34	33
Mean Slip Resistance Value Dry			84			
Mean Slip Resistance Value Wet			34			
						




#### 4.1.4.9 Slip Resistance – Finish Vesuvio

BS EN 14231:2003 Natural stone test methods.						
Determination of the slip resistance by means of the pendulum tester						
Name of Stone:	Lapitec		Sample type:		Sintered Stone	
Sample details:	Formulazione 1		Anisotropic Features:		None	
Supplier:	Lapitec SpA		Country of Origin:		Italy	
Dimensions (mm):	300 x 150 x 12		Project Reference:		No data supplied.	
Surface Finish:	Vesuvio		Preparation:		BS EN 14231	
Date Tested:	24/07/2022 & 08/08/2022					
Slider	Slider 55		Temperature during test		20°C	
Sample No.	Condition: Dry					
P122097/22/09/	151	152	153	154	155	156
Direction 0°	80	90	90	83	95	95
Direction 180°	81	90	90	83	97	95
Mean	81	90	90	83	96	95
Sample No.	Condition: Wet					
P122097/22/09/	151	152	153	154	155	156
Direction 0°	29	30	30	30	30	30
Direction 180°	29	30	30	30	30	30
Mean	29	30	30	30	30	30
Mean Slip Resistance Value Dry			89		 0378	
Mean Slip Resistance Value Wet			30			

#### 4.1.4.10 Slip Resistance – Finish Dune


BS EN 14231:2003 Natural stone test methods. Determination of the slip resistance by means of the pendulum tester						
Name of Stone:	Lapitec		Sample type:		Sintered Stone	
Sample details:	Formulazione 1		Anisotropic Features:		None	
Supplier:	Lapitec SpA		Country of Origin:		Italy	
Dimensions (mm):	300 x 150 x 12		Project Reference:		No data supplied.	
Surface Finish:	Dune		Preparation:		BS EN 14231	
Date Tested:	24/07/2022 & 08/08/2022					
Slider	Slider 55		Temperature during test		20°C	
Sample No.	Condition: Dry					
P122097/22/10/	151	152	153	154	155	156
Direction 0°	65	64	64	64	66	67
Direction 180°	64	64	64	65	66	67
Mean	65	64	64	65	66	67
Sample No.	Condition: Wet					
P122097/22/10/	151	152	153	154	155	156
Direction 0°	28	28	29	29	28	27
Direction 180°	28	28	29	29	28	26
Mean	28	28	29	29	28	27
Mean Slip Resistance Value Dry			65			
Mean Slip Resistance Value Wet			28			




0378



#### 4.1.4.11 Slip Resistance – Finish Arena

BS EN 14231:2003 Natural stone test methods.						
Determination of the slip resistance by means of the pendulum tester						
Name of Stone:	Lapitec		Sample type:		Sintered Stone	
Sample details:	Formulazione 1		Anisotropic Features:		None	
Supplier:	Lapitec SpA		Country of Origin:		Italy	
Dimensions (mm):	300 x 150 x 12		Project Reference:		No data supplied.	
Surface Finish:	Arena		Preparation:		BS EN 14231	
Date Tested:	24/07/2022 & 08/08/2022					
Slider	Slider 55		Temperature during test		20°C	
Sample No.	Condition: Dry					
P122097/22/11/	151	152	153	154	155	156
Direction 0°	106	105	106	105	105	107
Direction 180°	104	102	109	105	109	106
Mean	105	104	108	105	107	107
Sample No.	Condition: Wet					
P122097/22/11/	151	152	153	154	155	156
Direction 0°	77	75	74	75	75	75
Direction 180°	74	73	75	76	75	75
Mean	76	74	75	76	75	75
Mean Slip Resistance Value Dry			106			
Mean Slip Resistance Value Wet			75			

#### 4.1.4.12 Slip Resistance – Finish Meridio

BS EN 14231:2003 Natural stone test methods. Determination of the slip resistance by means of the pendulum tester						
Name of Stone:	Lapitec		Sample type:		Sintered Stone	
Sample details:	Formulazione 1		Anisotropic Features:		None	
Supplier:	Lapitec SpA		Country of Origin:		Italy	
Dimensions (mm):	300 x 150 x 12		Project Reference:		No data supplied.	
Surface Finish:	Meridio		Preparation:		BS EN 14231	
Date Tested:	24/07/2022 & 08/08/2022					
Slider	Slider 55		Temperature during test		20°C	
Sample No.	Condition: Dry					
P122097/22/12/	151	152	153	154	155	156
Direction 0°	111	110	108	105	108	109
Direction 180°	111	109	109	104	109	111
Mean	111	110	109	105	109	110
Sample No.	Condition: Wet					
P122097/22/12/	151	152	153	154	155	156
Direction 0°	60	60	63	63	64	61
Direction 180°	60	62	64	63	64	62
Mean	60	61	64	63	64	62
Mean Slip Resistance Value Dry			109		 0378	
Mean Slip Resistance Value Wet			62			

#### 4.1.4.13 Chemical Resistance – Finish Lux

BS EN 14617-10:2012 – Determination of chemical resistance								
Name of Stone:	Lapitec				Sample type:		Sintered Stone	
Sample details:	Formulazione 1				Anisotropic Features:		None	
Supplier:	Lapitec SpA				Country of Origin:		Italy	
Dimensions (mm):	300 x 300 x 12				Project Reference:		CERT 015	
Surface Finish:	Lux				Preparation:		BS EN 14617-10	
Final test date:	27/07/2022							
Sample No.								
P122097/22/01/	331		332		333		334	
Condition	1 Hour HCl		8 Hour HCl		1 Hour NaOH		8 Hour NaOH	
Test No.	Before	After	Before	After	Before	After	Before	After
1	79.0	75.7	80.2	61.9	80.4	77.7	84.2	66.7
2	79.5	75.0	80.5	62.4	80.5	77.2	84	65.9
3	79.8	74.2	80.6	61.8	80.9	76.8	84.2	66.2
4	79.4	73.8	81.2	62.1	80.7	76.7	84.2	66.4
5	79.9	73.7	81.1	61.3	80.0	76.9	84.5	67
6	80.2	73.9	80.9	60.5	79.8	76.9	84.4	67.3
7	80.2	74.0	80.9	60.7	80.2	76.8	85.2	67.1
8	79.7	74.0	81.2	62.9	80.5	76.9	85.6	66.6
9	79.2	74.0	81.1	62.6	80.9	76.7	85.5	66.5
10	78.6	73.8	81.0	60.0	81.0	76.6	86.1	66.1
Average	79.6	73.9	80.9	61.6	80.5	76.9	84.8	66.6
Results	92.9%		76.2%		95.6%		78.5%	
Category	C <sub>3</sub>							
<p>C4: materials, which keep at least 80 % of the reflection reference value after 8 h ± 30 min of acid and basic attack (or if only in one specimen the attack is between 60 % and 80 %);</p> <p>C3: materials, which keep between 60 % and 80 % of the reflection reference value after 8 h ± 30 min of acid and basic attack;</p> <p>C2: materials, which keep between 60 % and 80 % of the reflection reference value after 1 h ± 30 min of acid and basic attack;</p> <p>C1: materials, which keep less than 60 % of the reflection reference values after 1 h ± 30 min of basic and acid attack.</p>								

#### 4.1.4.14 Dimensional Stability – 12 mm

BS EN 14617-12:2012 Determination of Dimensional Stability			
Formulazione 1 - 12 mm thickness			
Name of Stone:	Lapitec	Sample type:	Sintered Stone
Sample details:	Formulazione 1	Anisotropic Features:	None
Supplier:	Lapitec SpA	Country of Origin:	Italy
Dimensions (mm):	300 x 300 x 12	Project Reference:	CERT 015
Surface Finish:	Polished	Preparation:	BS EN 14617-12
Date Tested:	20/07/2022		
		Temperature during test	21°C
P122097/01/201	Digital Gauge	Vertical Displacement	
		mm	
	d(3)	0.01	
	d(1)	0.00	
	Displacement ( <i>D</i> )		0.01
P122097/01/202	Digital Gauge	Vertical Displacement	
		mm	
	d(3)	0.00	
	d(1)	0.00	
	Displacement ( <i>D</i> )		0.00
Class A		Stable and not sensitive to humidity ( <i>D</i> ≤0.3 mm)	

#### 4.1.4.15 Dimensional Stability – 20 mm

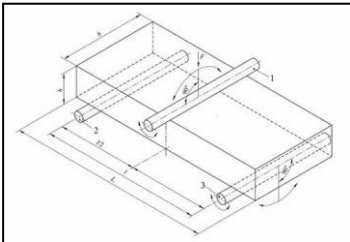
BS EN 14617-12:2012 Determination of Dimensional Stability Formulazione 1 - 20 mm thickness																																	
Name of Stone:	Lapitec	Sample type:	Sintered Stone																														
Sample details:	Formulazione 1	Anisotropic Features:	None																														
Supplier:	Lapitec SpA	Country of Origin:	Italy																														
Dimensions (mm):	300 x 300 x 20	Project Reference:	CERT 015																														
Surface Finish:	Polished	Preparation:	BS EN 14617-12																														
Date Tested:	20/07/2022																																
		Temperature during test	21°C																														
<table> <tr> <td rowspan="5">P122097/03/201</td><td rowspan="2">Digital Gauge</td><td>Vertical Displacement</td><td></td></tr> <tr> <td>mm</td><td></td></tr> <tr> <td>d(3)</td><td>0.01</td><td></td></tr> <tr> <td>d(1)</td><td>0.00</td><td></td></tr> <tr> <td>Displacement (<i>D</i>)</td><td>0.01</td><td></td></tr> </table> <table> <tr> <td rowspan="5">P122097/03/202</td><td rowspan="2">Digital Gauge</td><td>Vertical Displacement</td><td></td></tr> <tr> <td>mm</td><td></td></tr> <tr> <td>d(3)</td><td>0.00</td><td></td></tr> <tr> <td>d(1)</td><td>0.00</td><td></td></tr> <tr> <td>Displacement (<i>D</i>)</td><td>0.00</td><td></td></tr> </table> <p><b>Class A</b>                      Stable and not sensitive to humidity (<math>D \leq 0.3</math> mm)</p>				P122097/03/201	Digital Gauge	Vertical Displacement		mm		d(3)	0.01		d(1)	0.00		Displacement ( <i>D</i> )	0.01		P122097/03/202	Digital Gauge	Vertical Displacement		mm		d(3)	0.00		d(1)	0.00		Displacement ( <i>D</i> )	0.00	
P122097/03/201	Digital Gauge	Vertical Displacement																															
		mm																															
	d(3)	0.01																															
	d(1)	0.00																															
	Displacement ( <i>D</i> )	0.01																															
P122097/03/202	Digital Gauge	Vertical Displacement																															
		mm																															
	d(3)	0.00																															
	d(1)	0.00																															
	Displacement ( <i>D</i> )	0.00																															

#### 4.1.4.16 Dimensional Stability – 30 mm

BS EN 14617-12:2012 Determination of Dimensional Stability Formulazione 1 - 30 mm thickness			
Name of Stone:	Lapitec	Sample type:	Sintered Stone
Sample details:	Formulazione 1	Anisotropic Features:	None
Supplier:	Lapitec SpA	Country of Origin:	Italy
Dimensions (mm):	300 x 300 x 30	Project Reference:	CERT 015
Surface Finish:	Polished	Preparation:	BS EN 14617-12
Date Tested:	20/07/2022		
		Temperature during test	21°C
P122097/05/201	Digital Gauge	Vertical Displacement	
		mm	
	d(3)	0.00	
	d(1)	0.00	
	Displacement ( <i>D</i> )	0.00	
P122097/05/202	Digital Gauge	Vertical Displacement	
		mm	
	d(3)	0.03	
	d(1)	0.00	
	Displacement ( <i>D</i> )	0.03	
<b>Class A</b>		Stable and not sensitive to humidity ( $D \leq 0.3$ mm)	



**4.1.4.17 Flexural Strength  $R_{mf}$  (after 25 freeze/thaw cycles) & Change in flexural strength (as a percentage of the original value after 25 freeze/thaw cycles)  $KM_f 25$**

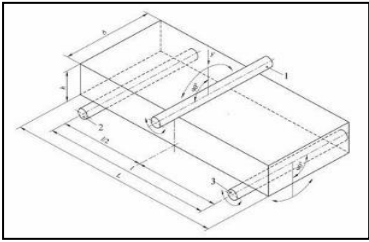
<b>BS EN 14617-2:2016 Determination of Flexural Strength</b> <b>After 25 cycles of freeze thaw conditioning to BS EN 14617-5:2012</b>						
						
Name of Stone:	Lapitec		Sample type:	Sintered Stone		
Sample details:	Formulazione 1		Anisotropic Features:	None		
Supplier:	Lapitec SpA		Country of Origin:	Italy		
Dimensions (mm):	300 x 75 x 12		Project Reference:	CERT 015		
Surface Finish:	Polished		Preparation:	BS EN 14617-2 & BS EN 14617-5		
Date Tested:	10/06/2022					
Sample No.	Load Rate	Span	Width	Thickness	Failure Load	Flexural Strength
P122097/22/01/	MPa.s <sup>-1</sup>	mm	mm	mm	N	MPa
101	0.25	280	73.8	12.8	1100	38.2
102	0.25	280	75.0	12.7	1200	41.7
103	0.25	280	72.7	12.5	1220	45.1
104	0.25	280	76.7	12.5	1350	47.3
105	0.25	280	74.9	12.5	1010	36.2
106	0.25	280	75.0	12.5	1290	46.2
107	0.25	280	73.9	12.7	1320	46.5
108	0.25	280	74.3	12.9	1250	42.5
109	0.25	280	74.5	12.5	1320	47.6
110	0.25	280	76.2	12.5	1150	40.6
					<b>Mean <math>RM_f</math></b>	<b>43.2</b>
					<b>SD</b>	<b>3.99</b>
<b>Change in flexural strength (as a percentage of original value after 25 freeze/thaw cycles) <math>KM_f 25</math></b>				<b>96%</b>		

#### 4.1.4.18 Linear thermal expansion coefficient

In house method based on BS EN 14617-11: 2005 Determination of Linear Thermal Expansion Coefficient Formulazione 1 - 12 mm thickness				
Name of Stone:	Lapitec		Sample type:	Sintered Stone
Sample details:	Formulazione 1		Anisotropic Features:	None
Supplier:	Lapitec SpA		Country of Origin:	Italy
Dimensions (mm):	300 x 75 x 12		Project Reference:	CERT 015
Surface Finish:	Polished		Preparation:	In house based on BS EN 14617-11
Date Tested:	25/07/2022	02/08/2022		
	Linear Thermal Expansion Coefficient x 10 <sup>-6</sup>			
	Cycle 1		Cycle 2	
P122097/01/	Polished Face	Rear Face	Polished Face	Rear Face
361	5.60	5.52	6.23	6.20
362	5.09	5.09	6.63	5.85
363	5.26	5.78	6.28	6.11
364	5.78	5.78	6.20	6.20
365	6.03	5.78	6.20	5.93
<b>Mean</b>	<b>5.55</b>	<b>5.59</b>	<b>6.31</b>	<b>6.06</b>
<p>Mean Linear Thermal Expansion Coefficient (<math>\alpha</math>)</p> <p><b>5.88</b>      10<sup>-6</sup>.(°C<sup>-1</sup>)</p>				

## Formulation 2

### 4.1.4.19 Flexural Strength $R_{tf}$

BS EN 14617-2: 2016 Determination of Flexural Strength Tested Dry						
						
Name of Stone:	Lapitec		Sample type:		Sintered Stone	
Sample details:	Formulazione 2		Anisotropic Features:		None	
Supplier:	Lapitec SpA		Country of Origin:		Italy	
Dimensions (mm):	300 x 75 x 12		Project Reference:		CERT 015	
Surface Finish:	Polished		Preparation:		BS EN 14617-2	
Date Tested:	07/04/2022					
Sample No.	Load Rate	Span	Width	Thickness	Failure Load	Flexural Strength
P122097/22/02/	MPa.s <sup>-1</sup>	mm	mm	mm	N	MPa
241	0.25	280	73.2	12.8	1880	65.8
242	0.25	280	75.8	12.8	1580	53.4
243	0.25	280	74.4	13.1	1410	46.4
244	0.25	280	77.9	13.1	1430	44.9
245	0.25	280	75.7	13.1	1320	42.7
246	0.25	280	75.0	13.1	1510	49.3
247	0.25	280	73.5	12.7	1530	54.2
248	0.25	280	75.1	12.8	1240	42.3
249	0.25	280	75.1	13.0	1450	48.0
250	0.25	280	76.8	13.0	1410	45.6
251	0.25	280	75.8	13.0	1360	44.6
252	0.25	280	76.4	13.1	1390	44.5
					<b>Mean <math>R_{tf}</math></b>	<b>48.5</b>
					<b>SD</b>	<b>6.65</b>

#### 4.1.4.20 Impact Resistance (L) – 12 mm

<b>BS EN 14617-9:2016 Determination of Impact Resistance</b>			
<b>Formulazione 2 – 12 mm thickness</b>			
Name of Stone:	Lapitec	Sample type:	Sintered Stone
Sample details:	Formulazione 2	Anisotropic Features:	None
Supplier:	Lapitec SpA	Country of Origin:	Italy
Dimensions (mm):	200 x 200 x 12	Project Reference:	CERT 015
Surface Finish:	Polished	Preparation:	BS EN 14617-9
Mass of impactor (kg)	1.05		
Date Tested:	20/07/2022		

Sample No.	Failure Height	Fracture Work
P122097/22/02/	m	Joules ( J )
321	0.160	1.65
322	0.160	1.65
323	0.160	1.65
324	0.160	1.65
325	0.110	1.13
326	0.110	1.13
327	0.210	2.16
328	0.160	1.65
	Mean	1.58

**Mean Fracture Work (L)                      1.58                      Joules**

#### 4.1.4.21 Impact Resistance (L) – 20 mm

<b>BS EN 14617-9:2016 Determination of Impact Resistance</b>																																				
<b>Formulazione 2 – 20 mm thickness</b>																																				
Name of Stone:	Lapitec	Sample type:	Sintered Stone																																	
Sample details:	Formulazione 2	Anisotropic Features:	None																																	
Supplier:	Lapitec SpA	Country of Origin:	Italy																																	
Dimensions (mm):	200 x 200 x 20	Project Reference:	CERT 015																																	
Surface Finish:	Polished	Preparation:	BS EN 14617-9																																	
Mass of impactor (kg)	1.05																																			
Date Tested:	20/07/2022																																			
<table border="1" style="width: 100%; border-collapse: collapse; margin: 10px auto;"> <thead> <tr> <th style="width: 30%;">Sample No.</th> <th style="width: 20%;">Failure Height</th> <th style="width: 50%;">Fracture Work</th> </tr> <tr> <th>P122097/22/04/</th> <th>m</th> <th>Joules ( J )</th> </tr> </thead> <tbody> <tr><td>321</td><td>0.260</td><td>2.68</td></tr> <tr><td>322</td><td>0.310</td><td>3.19</td></tr> <tr><td>323</td><td>0.310</td><td>3.19</td></tr> <tr><td>324</td><td>0.260</td><td>2.68</td></tr> <tr><td>325</td><td>0.260</td><td>2.68</td></tr> <tr><td>326</td><td>0.310</td><td>3.19</td></tr> <tr><td>327</td><td>0.310</td><td>3.19</td></tr> <tr><td>328</td><td>0.310</td><td>3.19</td></tr> <tr> <td></td> <td>Mean</td> <td>3.00</td> </tr> </tbody> </table> <div style="text-align: center; margin-top: 20px;"> <b>Mean Fracture Work (L)                      3.00                      Joules</b> </div>				Sample No.	Failure Height	Fracture Work	P122097/22/04/	m	Joules ( J )	321	0.260	2.68	322	0.310	3.19	323	0.310	3.19	324	0.260	2.68	325	0.260	2.68	326	0.310	3.19	327	0.310	3.19	328	0.310	3.19		Mean	3.00
Sample No.	Failure Height	Fracture Work																																		
P122097/22/04/	m	Joules ( J )																																		
321	0.260	2.68																																		
322	0.310	3.19																																		
323	0.310	3.19																																		
324	0.260	2.68																																		
325	0.260	2.68																																		
326	0.310	3.19																																		
327	0.310	3.19																																		
328	0.310	3.19																																		
	Mean	3.00																																		

#### 4.1.4.22 Impact Resistance (L) – 30 mm

<b>BS EN 14617-9:2016 Determination of Impact Resistance</b>																																				
<b>Formulazione 2 – 30 mm thickness</b>																																				
Name of Stone:	Lapitec	Sample type:	Sintered Stone																																	
Sample details:	Formulazione 2	Anisotropic Features:	None																																	
Supplier:	Lapitec SpA	Country of Origin:	Italy																																	
Dimensions (mm):	200 x 200 x 30	Project Reference:	CERT 015																																	
Surface Finish:	Polished	Preparation:	BS EN 14617-9																																	
Mass of impactor (kg)	1.05																																			
Date Tested:	20/07/2022																																			
<table border="1" style="width: 100%; border-collapse: collapse; margin: 10px auto;"> <thead> <tr> <th style="width: 30%;">Sample No.</th> <th style="width: 30%;">Failure Height</th> <th style="width: 40%;">Fracture Work</th> </tr> <tr> <th>P122097/22/06/</th> <th>m</th> <th>Joules ( J )</th> </tr> </thead> <tbody> <tr><td>321</td><td>0.660</td><td>6.80</td></tr> <tr><td>322</td><td>0.560</td><td>5.77</td></tr> <tr><td>323</td><td>0.760</td><td>7.83</td></tr> <tr><td>324</td><td>0.710</td><td>7.31</td></tr> <tr><td>325</td><td>0.760</td><td>7.83</td></tr> <tr><td>326</td><td>0.610</td><td>6.28</td></tr> <tr><td>327</td><td>0.710</td><td>7.31</td></tr> <tr><td>328</td><td>0.660</td><td>6.80</td></tr> <tr> <td></td> <td>Mean</td> <td>6.99</td> </tr> </tbody> </table> <div style="text-align: center; margin-top: 20px;"> <b>Mean Fracture Work (L)                      6.99                      Joules</b> </div>				Sample No.	Failure Height	Fracture Work	P122097/22/06/	m	Joules ( J )	321	0.660	6.80	322	0.560	5.77	323	0.760	7.83	324	0.710	7.31	325	0.760	7.83	326	0.610	6.28	327	0.710	7.31	328	0.660	6.80		Mean	6.99
Sample No.	Failure Height	Fracture Work																																		
P122097/22/06/	m	Joules ( J )																																		
321	0.660	6.80																																		
322	0.560	5.77																																		
323	0.760	7.83																																		
324	0.710	7.31																																		
325	0.760	7.83																																		
326	0.610	6.28																																		
327	0.710	7.31																																		
328	0.660	6.80																																		
	Mean	6.99																																		

#### 4.1.4.23 Abrasion Resistance

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email: [clapham@sandberg.co.uk](mailto:clapham@sandberg.co.uk)  
web: [www.sandberg.co.uk](http://www.sandberg.co.uk)

72439/G/1

Sheet 1 of 1

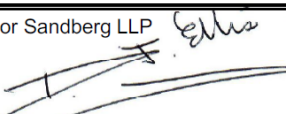
**AGGLOMERATED STONE**  
**ABRASION RESISTANCE - NARROW WHEEL**  
BS EN 14617-4:2012

Description	Black
Commercial name	Not advised
Country of origin	Not advised
Supplier	Not advised
Sampled by	Not advised
Surface finish	Polished
Client reference	122097/22/02/91-6
Date of receipt	16.05.22
Date of preparation	n/a
No. of specimens / size (mm)	6 no. 150 x 100 x 12
Test by / date	HO / 07.06.22
Checked by / date	MB / 07.06.22

#### RESULTS

Sandberg sample reference	Individual abrasion value (mm)	Mean abrasion value (mm)
G52260 a	29.5	30
G52260 b	30	
G52260 c	30	
G52260 d	30.5	
G52260 e	30	
G52260 f	30	

\* To nearest 0.5 mm

<b>Client</b>	BRE Bucknalls Lane Watford Hertfordshire WD25 9XX For the attention of Dr Martyn Webb	<b>Signed</b>	For Sandberg LLP 
		<b>Name</b>	David J Ellis
		<b>Position</b>	Partner
<b>Reference</b>	PO no. : 544111 dated 11 May 2022	<b>Date</b>	9 June 2022

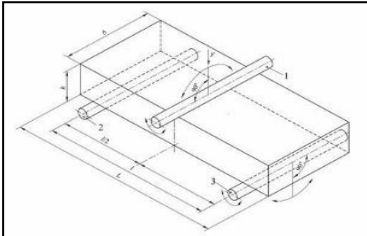
The results contained in this certificate apply to the sample as received and tested.  
This certificate shall not be reproduced except in full without the written approval of Sandberg LLP  
Materials, samples and test specimens are retained for a period of 2 months from the issue of this test certificate.  
Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

#### 4.1.4.24 Chemical Resistance – Finish Lux

BS EN 14617-10:2012 – Determination of chemical resistance								
Name of Stone:	Lapitec				Sample type:		Sintered Stone	
Sample details:	Formulazione 2				Anisotropic Features:		None	
Supplier:	Lapitec SpA				Country of Origin:		Italy	
Dimensions (mm):	300 x 300 x 12				Project Reference:		CERT 015	
Surface Finish:	Lux				Preparation:		BS EN 14617-10	
Final test date:	27/07/2022							
Sample No.								
P122097/22/02/	331		332		333		334	
Condition	1 Hour HCl		8 Hour HCl		1 Hour NaOH		8 Hour NaOH	
Test No.	Before	After	Before	After	Before	After	Before	After
1	75.5	71.3	75.9	54.7	75.1	67.4	78.3	56.2
2	74.8	71.7	76.2	54.7	75.1	68.0	77.9	57.1
3	74.7	71.1	76.2	54.6	75.2	67.7	78.3	56.4
4	74.6	70.7	76.0	54.1	75.5	67.5	77.8	56.3
5	74.8	70.7	75.8	53.9	75.5	67.2	77.1	56.0
6	75.5	70.6	76.0	53.6	75.8	67.4	77.0	55.6
7	75.6	69.7	76	53.4	75.8	67.5	76.7	55.7
8	74.8	69.2	75.9	53.5	75.6	67.7	76.6	55.7
9	74.5	69.0	75.9	54.0	75.4	67.3	76.9	55.3
10	75.1	69.5	76.2	54.6	75.5	67.3	76.7	54.9
Average	75.0	70.4	76.0	54.1	75.5	67.5	77.3	55.9
Results	93.8%		71.2%		89.5%		72.3%	
Category	C <sub>3</sub>							
C4: materials, which keep at least 80 % of the reflection reference value after 8 h ± 30 min of acid and basic attack (or if only in one specimen the attack is between 60 % and 80 %); C3: materials, which keep between 60 % and 80 % of the reflection reference value after 8 h ± 30 min of acid and basic attack; C2: materials, which keep between 60 % and 80 % of the reflection reference value after 1 h ± 30 min of acid and basic attack; C1: materials, which keep less than 60 % of the reflection reference values after 1 h ± 30 min of basic and acid attack.								



**4.1.4.25 Flexural Strength  $R_{mf}$  (after 25 freeze/thaw cycles) & Change in flexural strength (as a percentage of the original value after 25 freeze/thaw cycles)  $KM_{f25}$**

<b>BS EN 14617-2:2016 Determination of Flexural Strength</b> <b>After 25 cycles of freeze thaw conditioning to BS EN 14617-5:2012</b>						
						
Name of Stone:	Lapitec		Sample type:	Sintered Stone		
Sample details:	Formulazione 2		Anisotropic Features:	None		
Supplier:	Lapitec SpA		Country of Origin:	Italy		
Dimensions (mm):	300 x 75 x 12		Project Reference:	CERT 015		
Surface Finish:	Polished		Preparation:	BS EN 14617-2 & BS EN 14617-5		
Date Tested:	10/06/2022					
Sample No.	Load Rate	Span	Width	Thickness	Failure Load	Flexural Strength
P122097/22/02/	MPa.s <sup>-1</sup>	mm	mm	mm	N	MPa
101	0.25	280	75.8	12.9	1380	45.9
102	0.25	280	75.9	12.8	1560	52.7
103	0.25	280	74.7	12.8	1240	42.6
104	0.25	280	75.8	12.7	1300	44.7
105	0.25	280	75.7	13.1	1330	43.0
106	0.25	280	74.9	13.1	1460	47.7
107	0.25	280	75.2	12.8	1150	39.2
108	0.25	280	76.0	12.8	1530	51.6
109	0.25	280	74.1	12.7	1270	44.6
110	0.25	280	77.0	12.7	1450	49.0
					<b>Mean <math>RM_f</math></b>	<b>46.1</b>
					<b>SD</b>	<b>4.20</b>
<b>Change in flexural strength (as a percentage of the original value after 25 freeze/thaw cycles)</b> <div style="display: flex; justify-content: space-between; align-items: center;"> <div><b><math>KM_{f25}</math></b></div> <div><b>95%</b></div> </div>						

#### 4.1.4.26 Linear thermal expansion coefficient

In house method based on BS EN 14617-11: 2005 Determination of Linear Thermal Expansion Coefficient Formulazione 2 - 12 mm thickness				
Name of Stone:	Lapitec		Sample type:	Sintered Stone
Sample details:	Formulazione 2		Anisotropic Features:	None
Supplier:	Lapitec SpA		Country of Origin:	Italy
Dimensions (mm):	300 x 75 x 12		Project Reference:	CERT 015
Surface Finish:	Polished		Preparation:	In house based on BS EN 14617-11
Date Tested:	25/07/2022	02/08/2022		
	Linear Thermal Expansion Coefficient x 10 <sup>-6</sup>			
	Cycle 1		Cycle 2	
P122097/02/	Polished Face	Rear Face	Polished Face	Rear Face
361	5.17	5.78	6.72	6.20
362	5.95	5.78	6.28	6.54
363	6.03	5.78	6.54	6.11
364	6.72	5.52	6.20	6.20
365	6.03	5.09	6.28	6.28
<b>Mean</b>	<b>5.98</b>	<b>5.59</b>	<b>6.40</b>	<b>6.27</b>
<p><b>Mean Linear Thermal Expansion Coefficient (<math>\alpha</math>)</b></p> <p><b>6.06      10<sup>-6</sup>.(°C<sup>-1</sup>)</b></p>				

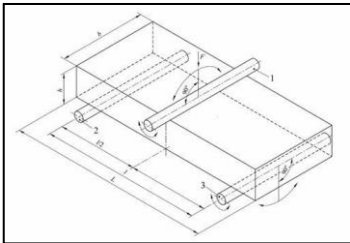
#### 4.1.5 BRCW 5 Protection against noise

Not applicable, according to Table 2.1 of EAD 090142-00-0404

#### 4.1.6 BRCW 6 Energy, economy and heat retention

##### Formulation 1

4.1.6.1 Flexural Strength  $R_{sf}$  (after 20 cycles thermal shock) & Change in flexural strength (as a percentage change from the original value after 20 cycles thermal shock)  $\Delta R_f$ , 20

BS EN 14617-2:2016 Determination of Flexural Strength After 20 cycles of thermal shock conditioning to BS EN 14617-6:2012						
						
Name of Stone:	Lapitec		Sample type:	Sintered Stone		
Sample details:	Formulazione 1		Anisotropic Features:	None		
Supplier:	Lapitec SpA		Country of Origin:	Italy		
Dimensions (mm):	300 x 75 x 12		Project Reference:	CERT 015		
Surface Finish:	Polished		Preparation:	BS EN 14617-2 & BS EN 14617-6		
Date Tested:	10/06/2022					
Sample No.	Load Rate	Span	Width	Thickness	Failure Load	Flexural Strength
P122097/22/01/	MPa.s <sup>-1</sup>	mm	mm	mm	N	MPa
211	0.25	280	75.4	12.7	1300	44.9
212	0.25	280	76.0	12.7	1300	44.5
213	0.25	280	75.3	12.7	1260	43.6
214	0.25	280	73.6	12.7	1260	44.6
215	0.25	280	74.1	12.6	1350	48.2
216	0.25	280	74.2	12.7	1180	41.4
217	0.25	280	74.5	12.7	1330	46.5
218	0.25	280	77.8	12.7	1290	43.2
219	0.25	280	75.0	12.7	1160	40.3
220	0.25	280	74.2	12.7	1380	48.4
					<b>Mean <math>R_{sf}</math></b>	<b>44.6</b>
					<b>SD</b>	<b>2.64</b>
Change in flexural strength (as a percentage change from the original value after 20 cycles thermal shock) $\Delta R_f$ , 20				<b>-0.89 %</b>		

#### 4.1.6.2 Thermal resistance

## TEST REPORT

SERIAL NUMBER T164775THA

### 4 MEASURED PROPERTIES

Thermal resistance per 12.73mm layer ( $\text{W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$ )	Density ( $\text{kg}\cdot\text{m}^{-3}$ )	Mean temperature ( $^{\circ}\text{C}$ )
$0.0230 \pm 2.5\%$	2452	10.7

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor  $k=2$ , providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with ISO/IEC 17025:2005.

This report provides traceability of measurement to recognised national standards, and to the units of measurement realised at the National Physical Laboratory or other recognised national standards laboratories. This report may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

### 5 RESULTS

#### Test details

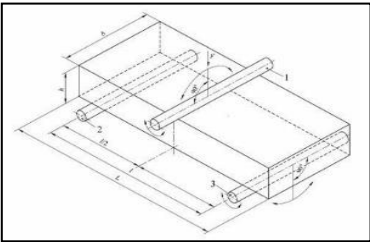
Cold face temperature	8.63 $^{\circ}\text{C}$
Hot face temperature	12.86 $^{\circ}\text{C}$
Average temperature difference across specimen	4.23 K
Relative mass change during test	0.00%
Average imposed specimen thickness (mm)	25.5
Mean heat flux	90.4 $\text{W}\cdot\text{m}^{-2}$
Direction of heat flux	Upwards
Applied load (Pa)	~ 250
Cold face emissivity	0.89
Hot face emissivity	0.89
Duration of test (hh:mm)	04:31
Duration of steady state (hh:mm)	01:30
Date of test completion	31 March 2022

#### Calibration details

Date of last verification	Mar-22
Certified reference material	Type: Acrylic, Ref: QM295C, Cal Date: 25 May 2012

## Formulation 2

### 4.1.6.3 Flexural Strength $R_{sf}$ (after 20 cycles thermal shock) & Change in flexural strength (as a percentage change from the original value after 20 cycles thermal shock) $\Delta R_f$ , 20

BS EN 14617-2:2016 Determination of Flexural Strength After 20 cycles of thermal shock conditioning to BSEN 14617-6:2012						
						
Name of Stone:	Lapitec		Sample type:		Sintered Stone	
Sample details:	Formulazione 2		Anisotropic Features:		None	
Supplier:	Lapitec SpA		Country of Origin:		Italy	
Dimensions (mm):	300 x 75 x 12		Project Reference:		CERT 015	
Surface Finish:	Polished		Preparation:		BS EN 14617-2 & BS EN 14617-6	
Date Tested:	10/06/2022					
Sample No.	Load Rate	Span	Width	Thickness	Failure Load	Flexural Strength
P122097/22/02/	MPa.s <sup>-1</sup>	mm	mm	mm	N	Mpa
211	0.25	280	74.9	12.7	1260	43.8
212	0.25	280	75.1	12.7	1260	43.7
213	0.25	280	75.0	13.0	1380	45.7
214	0.25	280	75.0	13.1	1300	42.4
215	0.25	280	75.6	12.8	1380	46.8
216	0.25	280	74.9	12.8	1510	51.7
217	0.25	280	74.4	12.6	1440	51.2
218	0.25	280	77.4	12.7	1460	49.1
219	0.25	280	75.0	13.0	1460	48.4
220	0.25	280	72.6	13.0	1300	44.5
					Mean $R_{sf}$	46.7
					SD	3.26
Change in flexural strength (as a percentage change from the original value after 20 cycles thermal shock) $\Delta R_f$ , 20					-3.7%	

#### 4.1.6.4 Thermal resistance

## TEST REPORT

SERIAL NUMBER T164775THB

### 4 MEASURED PROPERTIES

Thermal resistance per 13.14mm layer ( $\text{W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$ )	Density ( $\text{kg}\cdot\text{m}^{-3}$ )	Mean temperature ( $^{\circ}\text{C}$ )
$0.0230 \pm 2.5\%$	2467	10.5

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor  $k=2$ , providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with ISO/IEC 17025:2005.

This report provides traceability of measurement to recognised national standards, and to the units of measurement realised at the National Physical Laboratory or other recognised national standards laboratories. This report may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

### 5 RESULTS

#### Test details

Cold face temperature	8.40 $^{\circ}\text{C}$
Hot face temperature	12.66 $^{\circ}\text{C}$
Average temperature difference across specimen	-4.25 K
Relative mass change during test	0.00%
Average imposed specimen thickness (mm)	26.3
Mean heat flux	92.6 $\text{W}\cdot\text{m}^{-2}$
Direction of heat flux	Upwards
Applied load (Pa)	~ 250
Cold face emissivity	0.89
Hot face emissivity	0.89
Duration of test (hh:mm)	04:27
Duration of steady state (hh:mm)	01:30
Date of test completion	1 April 2022

#### Calibration details

Date of last verification	Mar-22
Certified reference material	Type: Acrylic, Ref: QM295C, Cal Date: 25 May 2012

#### 4.1.7 BRCW 7 Sustainable use of natural resources

Not applicable, according to Table 2.1 of EAD 090142-00-0404

#### 4.1.8. Identification

The ETA is issued for the product on the basis of agreed data/information, held on file by BRE Global Ireland which identifies the product and its constituent materials that have been assessed and judged. Identification tests according to this EAD have been carried out on components, which confirm that the system under assessment conforms to its declared characteristics.

#### 5. Assessment and verification of constancy of performance (hereinafter AVCP) system applied, with reference to its legal base

According to the table below the System of assessment and verification of consistency of performance (see Annex V to Regulation (EU) No 305/2011) is:

Sintered slab usage	Decision	AVCP System
<b>Internal or external finishing in walls</b>		
Complete elements, used for fire protection of walls	2001/596/EC	3
Walls subject to requirements against accidental injuries from cutting objects	2001/596/EC	3
Walls subject to reaction to fire regulations (Reaction to Fire classes: A <sup>(**)</sup> , B <sup>(**)</sup> and C <sup>(**)</sup> )	2001/596/EC	3
Walls subject to regulations on dangerous substances	2001/596/EC	3
<b>Internal or external floors and stairs</b>		
Internal floors and stairs including enclosed public transport premises (Reaction to Fire classes: A1 <sub>FL</sub> <sup>(1)</sup> - A2 <sub>FL</sub> <sup>(1)</sup> - B <sub>FL</sub> <sup>(1)</sup> - C <sub>FL</sub> <sup>(1)</sup> )	2006/190/EC	1
Internal floors and stairs including enclosed public transport premises (Reaction to Fire classes: A1 <sub>FL</sub> <sup>(2)</sup> - A2 <sub>FL</sub> <sup>(2)</sup> - B <sub>FL</sub> <sup>(2)</sup> - C <sub>FL</sub> <sup>(2)</sup> - D <sub>FL</sub> - E <sub>FL</sub> )	2006/190/EC	3
Internal floors and stairs including enclosed public transport premises (Reaction to Fire classes: (A1 <sub>FL</sub> to E <sub>FL</sub> ) <sup>(3)</sup> , F <sub>FL</sub> )	2006/190/EC	4
External floors and stairs	2006/190/EC	4
<b>Cladding in external wall cladding systems</b> Infill panels in curtain walling.		
Walls subject to reaction to fire regulations (Reaction to Fire classes: A <sup>(*)</sup> , B <sup>(*)</sup> and C <sup>(*)</sup> )	2001/596/EC	1
Walls subject to regulations on dangerous substances	2001/596/EC	3
<b>Notes to Table</b> (1) Products/materials for which a clearly identifiable stage in the production process results in an improvement of the reaction to fire classification (e.g., an addition of fire retardants or a limiting of organic material). (2) Products/materials not covered by (1) above.		

- (3) Products/materials that do not require to be tested for reaction to fire
- (\*) Materials for which the Reaction to Fire performance is susceptible to change during the production process.
- (\*\*) Materials for which the Reaction to Fire performance is not susceptible to change during the production process.

## 6. Conclusion

The tests necessary for assessment were carried out in accordance with EAD 090142-00-0404 with reference to the relevant clauses. The results satisfy the requirements of EAD 090142-00-0404 with reference to the relevant clauses.

BRE Global Ireland considers that the Lapitec sintered stone formulations and corresponding system performance are those declared in the European Technical Assessment and fulfil the conditions for assessment.

### 6.1 Summary of tests

<b>Formulation 1</b>	<b>Standard</b>	<b>Value</b>	<b>Unit</b>
Flexural Strength $R_{tf}$	EN 14617-2:2016	45.0	MPa
Impact Resistance (L) – 12 mm	EN 14617-9:2005	1.84	J
Impact Resistance (L) – 20 mm		3.32	
Impact Resistance (L) – 30 mm		5.25	
Abrasion Resistance	EN 14617-4:2012	29	mm
Slip Resistance – Finish Lux – Finish Satin – Finish Lithos – Finish Vesuvio – Finish Dune – Finish Arena – Finish Meridio	EN 14231:2003	<b>Dry / Wet</b> 73 17 61 20 84 34 89 30 65 28 106 62 109 62	-
Chemical Resistance – Finish Lux	EN 14617-10:2012	C3	-
Dimensional Stability – 12 mm	EN 14617-12:2012	A	Class
Dimensional Stability – 20 mm		A	
Dimensional Stability – 30 mm		A	
Coefficient of freeze-thaw resistance in flexural strength $KM_{f,25}$	EN 14617-5:2012	0.96	-
Flexural Strength $R_{mf}$ (after 25 freeze/thaw cycles)	EN 14617-2:2016	43.2	MPa
Linear thermal expansion coefficient	EN 14617-11:2005	5.88	$10^{-6} C^{-1}$
<b>Formulation 2</b>	<b>Standard</b>	<b>Value</b>	<b>Unit</b>
Flexural Strength $R_{tf}$	EN 14617-2:2016	48.5	MPa
Impact Resistance (L) – 12 mm	EN 14617-9:2005	1.58	J
Impact Resistance (L) – 20 mm		3.00	
Impact Resistance (L) – 30 mm		6.99	
Abrasion Resistance	EN 14617-4:2012	30	mm
Chemical Resistance – Finish Lux	EN 14617-10:2012	C3	-
Coefficient of freeze-thaw resistance in flexural strength $KM_{f,25}$	EN 14617-5:2012	0.95	-
Flexural Strength $R_{mf}$ (after 25 freeze/thaw cycles)	EN 14617-2:2016	46.1	MPa
Linear thermal expansion coefficient	EN 14617-11:2005	6.06	$10^{-6} C^{-1}$



<b>Formulation 1</b>	<b>Standard</b>	<b>Value</b>	<b>Unit</b>
Coefficient of thermal shock resistance as change in flexural strength (as a percentage after 20 cycles) $\Delta R_f$ , 20	EN 14617-6:2012	0.89	%
Flexural Strength $R_{sf}$ (after 20 cycles thermal shock)	EN 14617-2:2016	44.6	MPa
Thermal resistance	EN 15285:2008	0.023	$Wm^{-1}K^{-1}$
<b>Formulation 2</b>	<b>Standard</b>	<b>Value</b>	<b>Unit</b>
Coefficient of thermal shock resistance as change in flexural strength (as a percentage after 20 cycles) $\Delta R_f$ , 20	EN 14617-6:2012	3.71	%
Flexural Strength $R_{sf}$ (after 20 cycles thermal shock)	EN 14617-2:2016	46.7	MPa
Thermal resistance	EN 15285:2008	0.023	$Wm^{-1}K^{-1}$

## **7. Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD**

All the necessary technical details for the implementation of the AVCP system are laid down in the *Control Plan*<sup>1</sup> deposited with BRE Global Ireland and the factory production control shall be in accordance with it.

### **7.1 Tasks for the manufacturer**

#### **Factory production control**

The manufacturer shall exercise permanent on-going internal control of production. All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures, including records of results performed. This production control system shall insure that the product is in conformity with this European Technical Assessment.

The manufacturer may only use initial material stated in the technical documentation of this European Technical Assessment.

The factory production control shall be in accordance with the Lapitec Factory Production Control Plan<sup>1</sup> relating to this European Technical Assessment which is part of the technical documentation of this European Technical Assessment. The Lapitec Factory Production Control Plan is laid down in the context of the factory production control system operated by the manufacturer and deposited at BRE Global Ireland.

The prescribed test plan defined in Annex 2 gives the type and frequency of checks and tests conducted during production and on the final product as part of the continuous internal production control.

The results of factory production control shall be recorded and evaluated in accordance with the provisions of the Lapitec Factory Production Control Plan.

The records contain at least the following information:

- designation of the product or basic materials and the components.
- type of control or testing.
- date of manufacture and of testing of product or components and of basic materials or components.
- results of controls and tests and, where relevant, comparison with the requirements.
- signature of person responsible for the factory production control.

If the test results are unsatisfactory, the manufacturer shall immediately implement measures to eliminate defects. Construction products or components which are not in compliance with the requirements shall be handled such that they cannot be mistaken for products complying with the requirements. After elimination of the defects the relevant tests shall be immediately repeated as far as is technically possible and necessary for verifying the deficiency elimination.

<sup>#1</sup> The "control plan" is a confidential part of the European Technical Assessment and only handed over to the notified body or bodies involved in the process of assessment and verification of constancy of perform

## 7.2 Tasks for the notified body

The notified body (bodies) shall perform the

- Determination of the product-type on the basis of type testing (including sampling), type calculation, tabulated values, or descriptive documentation of the product,
- initial inspection of factory and of factory production control,
- continuous surveillance, assessment, and approval of factory production control,

in accordance with the provisions laid down in the "Control Plan" relating to this European Technical Assessment.

The notified body (bodies) shall retain the essential points of its actions referred to above and state the results obtained and conclusions drawn in a written report.

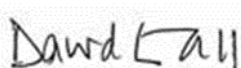
The main production centre is checked at least once a year by the notified body. Each component manufacturer is checked at least once every five years by the notified body.

The notified body involved by the manufacturer shall issue an EC certificate of conformity of the product stating the conformity with the provisions of this European Technical Assessment.

In cases where the provisions of the European Technical Assessment and the Lapitec Factory Production Control Plan are no longer fulfilled the notified body shall withdraw the certificate of conformity and inform BRE Global Ireland without delay.

Issued in Dublin, Ireland on 27.03.2023

By

A handwritten signature in black ink that reads "David Gall". The signature is written in a cursive style with a large 'G'.

**David Gall**  
**Certification Engineer**  
**BRE Global Assurance (Ireland) Ltd**

## **Annex 1 – Handling and Storage**

The manufacturer has provided extensive information on the methods for mechanical loading and unloading Lapitec slabs, even stipulating the use of air bags.

For handling of individual slabs, the following list of precautions is offered.

- The slabs should always be handled from the side to prevent bending.
- Operators should avoid any type of impact on the slabs. In the event of accidental impact, it is necessary to check that there is no breakage or cracks. This check is important because any cracks may cause breakage even after laying.
- Any format exceeding 25 kg and in general any long-sized format must be handled by two operators.
- Slabs can be moved individually using rubber-coated canvas straps, rubber grippers or suction cups. Under no circumstances should steel chains or ropes be used as these may ruin the material.
- To grip the individual slab, it is recommended to position the gripper at the load centre to balance the weight and minimize oscillations. When putting down a slab with the gripper, make sure that between what is being positioned and the support (other slab or floor) there are no empty spaces.
- To grip multiple slabs, it is recommended to use a balancing frame connected to canvas straps spaced on the bottom and on top of the slabs by a wooden shim slightly longer than the slab pack. In this way, the stress exerted during handling does not weigh on the slabs, preventing material breakage.
- Handling using suction cups is permitted, subject to verification of compatibility with the roughness of the surface.

Refer to the TDS and manuals as issued by the manufacturer for further information.

## Annex 2 – Test/Control plan

No	Subject/type of control (product, raw/constituent material, component - indicating characteristic concerned)	Test or control method (refer to 2.2)	Criteria, if any	Minimum number of samples	Minimum frequency of control
<b>Factory production control (FPC)</b> <b>[including testing of samples taken at the factory in accordance with a prescribed Test Plan]</b> <i>(for AVCP System 4 only)</i>					
1	Reaction to fire	2.2.1	Control plan	See test method	Initial testing <sup>1</sup>
2	Water vapour permeability	2.2.2	Control plan	See test method	Initial testing <sup>1</sup>
3	Flexural strength	2.2.3	Control plan	See test method	Every 6,000 slabs produced
4	Impact resistance	2.2.4	Control plan	See test method	Every 6,000 slabs produced
5	Abrasion resistance	2.2.5	Control plan	See test method	Every 6,000 slabs produced
6	Slip resistance	2.2.6	Control plan	See test method	Every 40,000 slabs produced
7	Chemical resistance	2.2.7	Control plan	See test method	Initial testing <sup>1</sup>
8	Dimensional stability	2.2.8	Control plan	See test method	Initial testing <sup>1</sup>
9	Resistance to freeze-thaw	2.2.9	Control plan	See test method	Every 36,000 slabs produced
10	Linear thermal expansion	2.2.10	Control plan	See test method	Initial testing <sup>1</sup>
11	Thermal shock	2.2.11	Control plan	See test method	Every 36,000 slabs produced
12	Thermal conductivity	2.2.12	Control plan	See test method	Initial testing <sup>1</sup>
Notes to Table.  <sup>1</sup> Performance will be assessed when the ETA is first developed. Subsequent periodic testing will not be required as product performance will not change unless the input materials or the production process itself changes. This eventuality will be covered by the Factory Production Control system for the product.  The clauses stated in this table refer to the clause numbers within EAD 090142-00-0404.					