Natural Stone Test
STONE LAB
BY IMM CARRARA

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

# TEST REPORT No. 522e

MATERIAL NAME: **NERO CATTANI**

CLIENT : **ALBA VENTURA S.r.L.**

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

**PERFORMED TESTS:**

| | |
|---|---|
| 1. **Apparent Density and Open Porosity (BS EN 1936:2006)** | **Table 1** |
| 2. **Water Absorption at atmospheric pressure (BS EN 13755:2008)** | **Table 2** |
| 3. **Flexural Strength (BS EN 12372:2006)** | **Table 3** |
| 4. **Compressive Strength (BS EN 1926:2006)** | **Table 4** |
| 5. **Slip Resistance (BS EN 14231:2003– Polished)** | **Table 5** |
| 6. **Abrasion Resistance (BS EN 14157:2017)** | **Table 6** |

**The Test Report No. 522e consists of 10 pages including this one.**

| | | |
|---|---|---|
| **Technological Laboratory**<br>Dr. Geol. Marco Mazzoni | | **DATE**: February 26th, 2021 |

**STONELAB by IMM**
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**A.S.T.M. MEMBER No. 1741518**

# TEST REPORT No. 522e

**(RESULTS SUMMARY TABLE)**

By request of ***ALBA VENTURA S.r.L.*** the under listed Tests have been performed on specimens of the materials named by ***ALBA VENTURA S.r.L.***: NERO CATTANI, quarried in Colonnata – Carrara (MS)-Italy. The relevant results have been reported in the tables enclosed to this document. The tests have been performed on specimens coming from an unknown block. The specimens under testing have been consigned to this laboratory by ***ALBA VENTURA S.r.L.*** in date February 16th, 2020.

No further information about the geological setting of this rock was given.

| Type of Test | Ref. Std. | Units | Conditioning | Average values | Std. Dev. |
|---|---|---|---|---|---|
| **Apparent density (Table 1)** | **BS EN 1936:2006** | **Kg/m$^3$** | **-** | **2714,47** | **-** |
| **Open Porosity (Table 1)** | **BS EN 1936:2006** | **%** | **-** | **0,13** | **-** |
| **Water Absorption at atm. Pressure (Table 2)** | **BS EN 13755:2008** | **%** | **-** | **0,05** | **-** |
| **Flexural Strength under concentrated load (Table 3)** | **BS EN 12372:2006** | **MPa** | **Dry** | **15,33** | **4,87** |
| **Compressive Strength (Table 4)** | **BS EN 1926:2006** | **MPa** | **Dry** | **170,18** | **35,93** |
| **Slip resistance – Polished surface (Table 5)** | **BS EN 14231:2003** | **SRV** | **Dry** | **37** | **-** |
| | | | **Wet** | **13** | **-** |
| **Abrasion resistance (Table 6)** | **BS EN 14157:2017** | **mm** | **Dry** | **17,0** | **-** |

| | | |
|---|---|---|
| **Technological Laboratory**<br>Dr. Geol. Marco Mazzoni | Marco Mazzoni | **DATE**: February 26th, 2021 |

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**Table 1**

| **IMM CarraraFiere S.p.A**<br>**STONELAB**<br>**TECHNOLOGICAL LABORATORY QUALITY TESTS ON DIMENSION STONES AND COMPOSITES** | **Apparent Density and Open Porosity**<br>**(BS EN 1936:2006)** | **Client**:<br>Alba Ventura S.r.L. |
|---|---|---|

**Test Report No.**: 522e

**Material's commercial Name(s):** NERO CATTANI

**Rock's Petrographic nature :** Marble

**Quarry location**: Colonnata-Carrara (MS)-Italy

**Specimens' delivery date:** 16/02/2021

| 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 | gr ($m_d$) | Date | gr ($m_s$) | gr ($m_h$) | | | |
| 01 | 19/02/21 | 345,54 | 23/02/21 | 345,72 | 218,29 | **2711,61** | **0,14** | 50,4x50,2x50,5 |
| 02 | 19/02/21 | 345,74 | 23/02/21 | 345,89 | 218,41 | **2712,11** | **0,12** | 50,4x50,3x50,6 |
| 03 | 19/02/21 | 345,10 | 23/02/21 | 345,25 | 218,19 | **2716,04** | **0,12** | 50,3x50,2x50,5 |
| 04 | 19/02/21 | 345,50 | 23/02/21 | 345,65 | 218,51 | **2717,48** | **0,12** | 50,4x50,2x50,5 |
| 05 | 19/02/21 | 345,31 | 23/02/21 | 345,48 | 218,16 | **2712,14** | **0,13** | 50,3x50,2x50,5 |
| 06 | 19/02/21 | 344,82 | 23/02/21 | 344,98 | 218,09 | **2717,47** | **0,13** | 50,3x50,2x50,5 |

| | Min. | Avg. | Max. |
|---|---|---|---|
| **Apparent Density $\rho_b$ [kg/m$^3$]** | **2711,61** | **2714,47** | **2717,48** |
| **Open Porosity (%)** | **0,12** | **0,13** | **0,14** |

| **Technological Laboratory**<br>Dr.Geol. Marco Mazzoni |  | **DATE**: February 26th, 2021 |
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**Table 2**

| **IMM CarraraFiere S.p.A**<br>**STONELAB**<br>**TECHNOLOGICAL LABORATORY**<br>**QUALITY TESTS ON DIMENSION STONES AND COMPOSITES** | **Water Absorption at atmospheric pressure**<br>**(BS EN 13755:2008)** | **Client**:<br>Alba Ventura S.r.L. |
|---|---|---|

**Test Report No.**: 522e

**Material's commercial Name(s):** NERO CATTANI

**Rock's Petrographic nature :** Marble

**Quarry location**: Colonnata-Carrara (MS)-Italy

**Specimens' delivery date:** 16/02/2021

| **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 | 19/02/21 | 345,22 | 23/02/21 | 345,39 | **0,17** | **0,05** | 50,3x50,2x50,5 |
| 02 | 19/02/21 | 345,97 | 23/02/21 | 346,12 | **0,15** | **0,04** | 50,6x50,3x50,6 |
| 03 | 19/02/21 | 345,42 | 23/02/21 | 345,59 | **0,17** | **0,05** | 50,4x50,2x50,5 |
| 04 | 19/02/21 | 345,34 | 23/02/21 | 345,50 | **0,16** | **0,05** | 50,3x50,2x50,5 |
| 05 | 19/02/21 | 345,74 | 23/02/21 | 345,96 | **0,22** | **0,06** | 50,3x50,3x50,5 |
| 06 | 19/02/21 | 344,55 | 23/02/21 | 344,71 | **0,16** | **0,05** | 50,4x50,2x50,5 |

| | **Min.** | **Avg.** | **Max.** |
|---|---|---|---|
| **Water absorption $A_b$, weight (%)** | **0,04** | **0,05** | **0,06** |

**Maximum expected Value $A_b$, weight (%): 0,07**

| **Technological Laboratory**<br>Dr.Geol. Marco Mazzoni | | **DATE**: February 26th, 2021 |
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**Table 3**

| **IMM CarraraFiere S.p.A**<br>**STONELAB**<br>**TECHNOLOGICAL LABORATORY QUALITY TESTS ON DIMENSION STONES AND COMPOSITES** | **Flexural Strength under concentrated load (BS EN 12372:2006)** | **Client**:<br>Alba Ventura S.r.L. |
|---|---|---|

**Test Report No.**: 522e

**Material's commercial Name(s):** NERO CATTANI

**Rock's Petrographic nature :** Marble

**Quarry location**: Colonnata-Carrara (MS)-Italy

**Specimens' delivery date:** 16/02/2021

| **Specimen No.** | **Dimensions [mm] a x b x h** | **Conditioning** | **Actual Values** | | | | **Note** |
|---|---|---|---|---|---|---|---|
| | | **Dry >48 ore/70°C** | **Fmax [N]** | **R [MPa]** | **$R_{md}$ [MPa]** | **Strain $F_{max}$ [mm]** | |
| 01 D | 180x90,2x28,4 | Dry | 6917,18 | **21,39** | | 0,11 | |
| 02 D | 180x90,4x27,2 | Dry | 5094,39 | **17,14** | | 0,10 | |
| 03 D | 180x89,6x28,3 | Dry | 2818,47 | **8,84** | | 0,07 | |
| 04 D | 180x89,8x28,0 | Dry | 5111,19 | **16,33** | | 0,11 | |
| 05 D | 180x90,3x28,8 | Dry | 6461,20 | **19,41** | **15,33** | 0,10 | |
| 06 D | 180x90,4x28,1 | Dry | 5542,66 | **17,47** | | 0,10 | |
| 07 D | 180x90,3x28,0 | Dry | 5237,89 | **16,65** | | 0,12 | |
| 08 D | 180x89,8x27,4 | Dry | 2374,10 | **7,92** | | 0,06 | |
| 09 D | 180x90,1x28,1 | Dry | 6005,62 | **18,99** | | 0,10 | |
| 10 D | 180x90,2x29,9 | Dry | 3264,01 | **9,11** | | 0,07 | |

**NOTE:**

1) Load applying speed = 0.25 MPa/s
2) Load applying parallel to the rift direction
3) Supports' span =150 mm

**Average Flexural Strength (Dry), $R_{md}$ = 15,33 MPa**

**Standard deviation (Dry), $s_d$ = 4,87 MPa**

**Coefficient of Variation (Dry), $v_d$ = 0,32**

**Lower Expected Value (Dry) $R_d$ = 6,67 MPa**

| **Technological Laboratory**<br>Dr.Geol. Marco Mazzoni | | **DATE**: February 26th, 2021 |
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**Table 4**

| **IMM CarraraFiere S.p.A**<br>**STONELAB**<br>**TECHNOLOGICAL LABORATORY**<br>**QUALITY TESTS ON DIMENSION STONES AND COMPOSITES** | **Compressive Strength**<br>**(BS EN 1926:2006)** | **Client**:<br>Alba Ventura S.r.L. |
|---|---|---|

**Test Report No.**: 522e

**Material's commercial Name(s):** NERO CATTANI

**Rock's Petrographic nature :** Marble

**Quarry location**: Colonnata-Carrara (MS)-Italy

**Specimens' delivery date:** 16/02/2021

| Specimen No. | Dimension [mm] a x b x h | Conditioning | Actual Values | | | | Note |
|---|---|---|---|---|---|---|---|
| | | Dry >48 hrs./70°C | Fmax [kN] | R [MPa] | $R_{avd}$ (Average) [MPa] | $S_{max}$ [mm] | |
| 01D | 50,5x50,2x50,5 | Dry | 514,35 | **202,89** | | 0,399 | |
| 02D | 50,3x50,2x50,5 | Dry | 271,04 | **107,34** | | 0,367 | |
| 03D | 50,3x50,2x50,5 | Dry | 433,55 | **171,70** | | 0,350 | |
| 04D | 50,4x50,3x50,5 | Dry | 503,47 | **198,60** | | 0,412 | |
| 05D | 50,3x50,3x50,5 | Dry | 371,97 | **147,02** | **170,18** | 0,377 | |
| 06D | 50,4x50,3x50,5 | Dry | 480,51 | **189,54** | | 0,416 | |
| 07D | 50,3x50,0x50,5 | Dry | 279,67 | **111,20** | | 0,450 | |
| 08D | 50,2x50,2x50,5 | Dry | 474,02 | **188,10** | | 0,373 | |
| 09D | 50,3x50,3x50,5 | Dry | 501,74 | **198,31** | | 0,449 | |
| 10D | 50,6x50,0x50,5 | Dry | 473,24 | **187,05** | | 0,354 | |

**NOTE:**

1) **Test Speed: 0.5 MPa/sec**

**Avg. Compressive Strength (Dry) $R_{avd\perp}$ = 170,18 MPa**

**Standard Deviation (Dry), $s_d$ = 35,93 MPa**

**Coefficient of variation (Dry), $v_{d\perp}$ = 0,21**

**Lower expected Value $R_d$ = 100,41 MPa**

| **Technological Laboratory**<br>Dr.Geol. Marco Mazzoni | | **Date**: February 26th, 2021 |
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**Table 5**

| **IMM CarraraFiere S.p.A**<br>**STONELAB**<br>**TECHNOLOGICAL LABORATORY QUALITY TESTS ON DIMENSION STONES AND COMPOSITES** | **Slip resistance**<br>**(BS EN 14231:2003)** | **Client**:<br>Alba Ventura S.r.L. |
|---|---|---|

**Test Report No.**: 522e

**Rock's Petrographic nature :** Marble

**Specimens' surface finish:** Polished

**Quarry location**: Colonnata-Carrara (MS)-Italy

**Material's commercial Name(s):**
NERO CATTANI

**Specimens' delivery date:** 16/02/2021

| **Specimen No.** | **Dimensions [mm] a x b x h** | **Actual Values [SRV]** | | | | | | | | | | | **Avg. "A" [SRV]** | **Avg. "B" [SRV]** | **Avg. value [SRV]** | **NOTE** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **"A" direction** | | | | | | **"B" direction "A"dir. + 180° rotation** | | | | | | | | |
| 01 D | 300x300x20 | 38 | 38 | 38 | 38 | 38 | | 38 | 38 | 38 | 38 | 38 | **38** | **38** | **38** | |
| 02 D | 300x300x20 | 37 | 37 | 37 | 37 | 37 | | 38 | 38 | 38 | 37 | 37 | **37** | **38** | **37** | |
| 03 D | 300x300x20 | 37 | 37 | 37 | 37 | 37 | | 37 | 37 | 37 | 37 | 37 | **37** | **37** | **37** | |
| 04 D | 300x300x20 | 37 | 37 | 37 | 37 | 37 | | 37 | 37 | 37 | 37 | 37 | **37** | **37** | **37** | |
| 05 D | 300x300x20 | 38 | 38 | 38 | 38 | 37 | | 37 | 37 | 37 | 37 | 37 | **38** | **37** | **37** | |
| 06 D | 300x300x20 | 38 | 38 | 38 | 38 | 38 | | 38 | 38 | 38 | 38 | 38 | **38** | **38** | **38** | |
| | | | | | | | | | | | | | | | | |
| 01 W | 300x300x20 | 14 | 14 | 14 | 14 | 14 | | 14 | 14 | 14 | 14 | 14 | **14** | **14** | **14** | |
| 02 W | 300x300x20 | 13 | 13 | 13 | 13 | 13 | | 13 | 13 | 13 | 13 | 13 | **13** | **13** | **13** | |
| 03 W | 300x300x20 | 13 | 13 | 13 | 13 | 13 | | 13 | 13 | 13 | 13 | 13 | **13** | **13** | **13** | |
| 04 W | 300x300x20 | 13 | 13 | 13 | 13 | 13 | | 13 | 13 | 13 | 13 | 13 | **13** | **13** | **13** | |
| 05 W | 300x300x20 | 14 | 14 | 14 | 14 | 14 | | 13 | 13 | 13 | 13 | 13 | **14** | **13** | **14** | |
| 06 W | 300x300x20 | 14 | 14 | 14 | 14 | 14 | | 14 | 14 | 14 | 14 | 14 | **14** | **14** | **14** | |

**NOTE**:

- Temperature during test: 20°C
- SRV = Slip Resistance Value
- Sliding Rubber dimension: 76 mm (width)
- Sliding Rubber IRHD: 55

## Avg. SRV (Dry) = 37

## Avg. SRV (Wet) = 13



| **Technological Laboratory**<br>Dr.Geol. Marco Mazzoni | | **Date**: February 26th, 2020 |
|---|---|---|

**Table 6**

| Natural Stone Test STONE LAB BY IMM CARRARA<br>**ASTM MEMBER No. 1741518** | **Abrasion Resistance**<br>**(BS EN 14157:2017)** | **Client**:<br>Alba Ventura S.r.L. |
|---|---|---|

**Test Report No.**: 522e

**Material's commercial Name:** NERO CATTANI

**Rock's Petrographic nature :** Marble

**Quarry location**: Colonnata-Carrara (MS)-Italy

**Specimens' delivery date:** 16/02/2021

**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): 17,2 mm**<br><br>**Approximated Avg. Value for CE marking purposes : 17,0 mm** | **Specimen dimension [mm]** |
|---|---|---|---|---|
| 01 | -0,4 | 17.4 | | 100x70x30 |
| 02 | | 17.1 | | 100x70x30 |
| 03 | | 17.2 | | 100x70x30 |
| 04 | | 17.2 | | 100x70x30 |
| 05 | | 17.1 | | 100x70x30 |
| 06 | | 17.4 | | 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**<br>Dr.Geol. Marco Mazzoni | | **DATE**: February 26th, 2021 |
|---|---|---|

Natural Stone Test
STONE LAB

22.02.21

# Test Report No.522

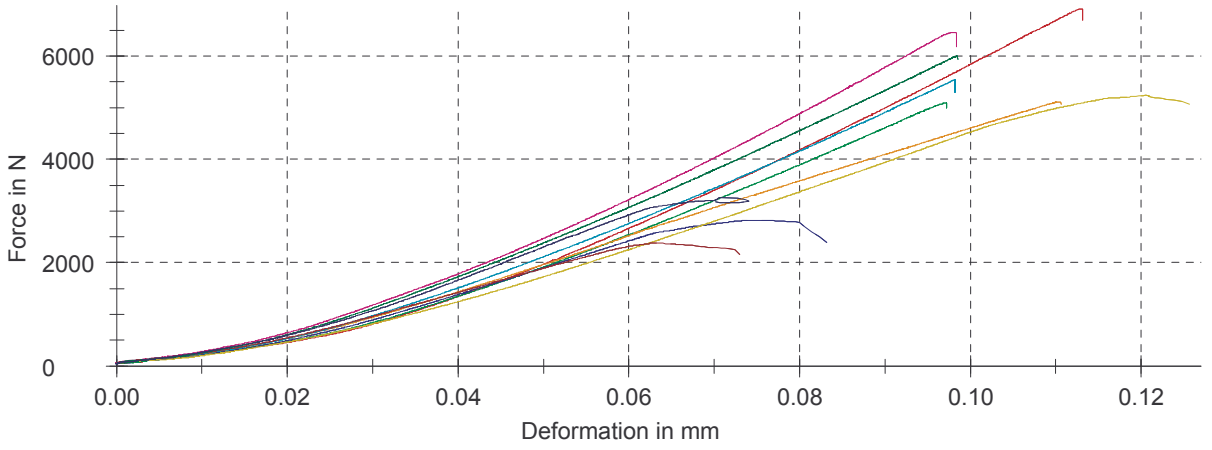
Client : Alba Ventura S.r.L.
Ref. Norm : EN 12372 : 2006
Material name : Nero Cattani - Dry - Polished

Pre-load : 44 N
Test speed : 0,25 MPa/s

## Test results:

| Legenda | No. | Specim.No. | Flex.Strength MPa | F.max N | Def. at Fmax mm | Span mm | Spec.Thk mm | Specim.Width mm |
|---|---|---|---|---|---|---|---|---|
| | 1 | 01D | **21,39** | 6917,18 | 0,11 | 150 | 28,4 | 90,2 |
| | 2 | 02D | **17,14** | 5094,39 | 0,10 | 150 | 27,2 | 90,4 |
| | 3 | 03D | **8,84** | 2818,47 | 0,07 | 150 | 28,3 | 89,6 |
| | 4 | 04D | **16,33** | 5111,19 | 0,11 | 150 | 28,0 | 89,8 |
| | 5 | 05D | **19,41** | 6461,20 | 0,10 | 150 | 28,8 | 90,3 |
| | 6 | 06D | **17,47** | 5542,66 | 0,10 | 150 | 28,1 | 90,4 |
| | 7 | 07D | **16,65** | 5237,89 | 0,12 | 150 | 28,0 | 90,3 |
| | 8 | 08D | **7,92** | 2374,10 | 0,06 | 150 | 27,4 | 89,8 |
| | 9 | 09D | **18,99** | 6005,62 | 0,10 | 150 | 28,1 | 90,1 |
| | 10 | 10D | **9,11** | 3264,01 | 0,07 | 150 | 29,9 | 90,2 |

## Load/Strain Graphs:




## Statistics:

| Alba Ventura S.r.L. n = 10 | Flex.Strength MPa | F.max N | Def. at Fmax mm | Span mm | Spec.Thk mm | Specim.Width mm |
|---|---|---|---|---|---|---|
| $\bar{x}$ | **15,33** | 4882,67 | 0,09 | 150 | 28,2 | 90,1 |
| s | **4,87** | 1553,66 | 0,02 | 0,00 | 0,75 | 0,28 |
| ν | **31,76** | 31,82 | 20,36 | 0,00 | 2,65 | 0,31 |

**Test Report No.522e/i**

Date: 25/02/21

Ref. Norm: BS EN 1926:2006

Client: Alba Ventura S.r.l.

Material: Nero Cattani

Test Device: Controls Mod.C56Z00

Test Speed: 0,5 MPa/sec

Condition: Dry

| Specim.No | a (mm) | b (mm) | c (mm) | Area ($mm^2$) | Force (kN) | Compr. Strength (MPa) | Strain at Fmax (µm) |
|---|---|---|---|---|---|---|---|
| 01D | 50,5 | 50,2 | 50,5 | 2535,10 | 514,35 | 202,89 | 399 |
| 02D | 50,3 | 50,2 | 50,5 | 2525,06 | 271,04 | 107,34 | 367 |
| 03D | 50,3 | 50,2 | 50,5 | 2525,06 | 433,55 | 171,70 | 350 |
| 04D | 50,4 | 50,3 | 50,5 | 2535,12 | 503,47 | 198,60 | 412 |
| 05D | 50,3 | 50,3 | 50,5 | 2530,09 | 371,97 | 147,02 | 377 |
| 06D | 50,4 | 50,3 | 50,5 | 2535,12 | 480,51 | 189,54 | 416 |
| 07D | 50,3 | 50,0 | 50,5 | 2515,00 | 279,67 | 111,20 | 450 |
| 08D | 50,2 | 50,2 | 50,5 | 2520,04 | 474,02 | 188,10 | 373 |
| 09D | 50,3 | 50,3 | 50,5 | 2530,09 | 501,74 | 198,31 | 449 |
| 10D | 50,6 | 50,0 | 50,5 | 2530,00 | 473,24 | 187,05 | 354 |

Average Compr. Strength : 170,18 MPa
Standard deviation : 35,93 MPa