



TEST REPORT

Natural stone – Water absorption

REPORT Nº: **232952PN003** DATE: **30-05-2023** PAGE: **1/2**

PETITIONER: **Palin Granit Oy**  
**Paraistentie 4. FI-53650 Lappeenranta. (Finland)**

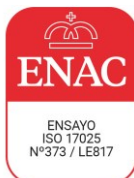
SAMPLE IDENTIFICATION:

Date of delivery **10-01-2023**  
Description **6 cubic specimens of nominal dimensions 50x50x50 mm**  
Commercial name \* **Aurora**  
Petrographic definition \* **Migmatite**  
Place of quarrying \* **Mäntsälä, Finland, N60.560396, E25.436885 (WGS84)**  
Supplier \* **Palin Granit Oy**  
Sampled by \* **Pauli Salmela (26-09-2022)**

\* Information declared by the petitioner

TEST METHOD: **EN 13755:2008 Natural stone test methods. Determination of water absorption at atmospheric pressure**

Deviations –  
Specimen preparation –  
Place of testing **Centro Tecnológico del Mármol**  
Dates of testing **01-03-2023 / 09-03-2023**





## TEST REPORT

### Natural stone – Water absorption

REPORT Nº: **232952PN003**

DATE: **30-05-2023**

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#### RESULTS:

Specimen

Water absorption,  $A_b$  (%)

Mean value of water absorption,  $\bar{A}_b$

01	02	03	04	05	06
0,1	0,1	0,1	0,1	0,1	0,1
0,1 %					

Remarks: The uncertainties are calculated and at the client's disposal  
The results are expressed to the nearest 0,1 %

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**Natural stone – Apparent density and open porosity**

REPORT Nº: **232952PN004A** DATE: **30-05-2023**

PAGE: **1/2**

PETITIONER: **Palin Granit Oy**  
**Paraistentie 4. FI-53650 Lappeenranta. (Finland)**

**SAMPLE IDENTIFICATION:**

Date of delivery **10-01-2023**  
Description **6 cubic specimens of nominal dimensions 50x50x50 mm**  
Commercial name \* **Aurora**  
Petrographic definition \* **Migmatite**  
Place of quarrying \* **Mäntsälä, Finland, N60.560396, E25.436885 (WGS84)**  
Supplier \* **Palin Granit Oy**  
Sampled by \* **Pauli Salmela (26-09-2022)**

\* Information declared by the petitioner

TEST METHOD: **EN 1936:2007 Natural stone test methods. Determination of real density and apparent density, and of total and open porosity. Section 8.1**

Deviations –  
Specimen preparation –  
Place of testing **Centro Tecnológico del Mármol**  
Dates of testing **01-03-2023 / 07-03-2023**





TEST REPORT

Natural stone – Apparent density and open porosity

REPORT Nº: **232952PN004A** DATE: **30-05-2023**

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RESULTS:

Specimen	07	08	09	10	11	12
Apparent density, $\rho_b$ (kg/m <sup>3</sup> )	2640	2660	2650	2680	2640	2660
Open porosity, $p_o$ (%)	0,2	0,2	0,3	0,2	0,2	0,3
Mean value of apparent density, $\bar{\rho}_b$	2650 kg/m <sup>3</sup>					
Mean value of open porosity, $\bar{p}_o$	0,2 %					

Remarks: The uncertainties are calculated and at the client's disposal  
The results of density are expressed to the nearest 10 kg/m<sup>3</sup>  
The results of porosity are expressed to the nearest 0,1 %

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**Natural stone – Abrasion resistance (Capon method)**

REPORT Nº: **232952PN006**

DATE: **30-05-2023**

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PETITIONER: **Palin Granit Oy**  
**Paraistentie 4. FI-53650 Lappeenranta. (Finland)**

SAMPLE IDENTIFICATION:

Date of delivery **10-01-2023**  
Description **6 polished slabs of 150x150x30 mm**  
Commercial name \* **Aurora**  
Petrographic definition \* **Migmatite**  
Place of quarrying \* **Mäntsälä, Finland, N60.560396, E25.436885 (WGS84)**  
Supplier \* **Palin Granit Oy**  
Sampled by \* **Pauli Salmela (26-09-2022)**  
Planes of anisotropy \* **–**

\* Information declared by the petitioner

TEST METHOD: **EN 14157:2017 Natural stone test methods. Determination of the abrasion resistance. Section 3**

Deviations **–**  
Specimen preparation **–**  
Calibration factor **0,1 mm**  
Place of testing **Centro Tecnológico del Mármol**  
Dates of testing **19-04-2023 / 24-04-2023**





## TEST REPORT

### Natural stone – Abrasion resistance (Capon method)

REPORT Nº: **232952PN006**

DATE: **30-05-2023**

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#### RESULTS:

Specimen	13	14	15	16	17	18
Groove lengths (mm)	11,5	11,0	10,0	10,5	12,0	10,5
	11,0	12,0	12,0	12,5	11,5	12,5
Mean value of groove length	12,0 mm					
Standard deviation	0,4 mm					
Higher expected value, $E_H$	13,0 mm					

#### Remarks:

The uncertainties are calculated and at the client's disposal  
The results are expressed to the nearest 0,5 mm  
According to EN 14157, only the biggest grooves of each specimen are considered

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**Natural stone – Frost resistance (technological test)**

REPORT Nº: **232952PN008B** DATE: **30-05-2023**

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PETITIONER: **Palin Granit Oy**  
**Paraistentie 4. FI-53650 Lappeenranta. (Finland)**

SAMPLE IDENTIFICATION:

Date of delivery **10-01-2023**  
Description **2 sets of 10 specimens of nominal dimensions 300x50x50 mm**  
Commercial name \* **Aurora**  
Petrographic definition \* **Migmatite**  
Place of quarrying \* **Mäntsälä, Finland, N60.560396, E25.436885 (WGS84)**  
Supplier \* **Palin Granit Oy**  
Sampled by \* **Pauli Salmela (26-09-2022)**  
Planes of anisotropy \* **Rift identified with two crossed yellow lines**

\* Information declared by the petitioner

TEST METHOD: **EN 12371:2010 Natural stone test methods. Determination of frost resistance. Section 7.3.1**

Deviations **–**  
Specimen preparation **–**  
Conditioning **Drying in oven at 70±5°C to constant mass**  
Load direction **Perpendicular to the rift**  
Place of testing **Centro Tecnológico del Mármol**  
Dates of testing **08-03-2023 / 19-04-2023**



Natural stone – Frost resistance (technological test)

REPORT Nº: **232952PN008B** DATE: **30-05-2023**

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RESULTS:

Set 1 (not subjected to freeze-thaw cycles)

Specimen	49	50	51	52	53	54	55	56	57	58
Breaking thickness, $h$ (mm)	49,4	49,4	49,3	49,5	49,5	49,4	49,6	49,3	49,4	49,5
Breaking width, $b$ (mm)	50,1	50,3	49,9	50,2	50,2	50,1	50,1	50,0	49,9	50,1
Span, $l$ (mm)	250,0	250,0	250,0	250,0	250,0	250,0	250,0	250,0	250,0	250,0
Load increase (MPa/s)	0,26	0,25	0,26	0,25	0,25	0,26	0,25	0,26	0,26	0,25
Breaking load, $F$ (N)	7700	7790	7780	6540	7460	5610	6040	8020	7950	7120
Distance fracture to centre (mm)	6,0	2,3	6,2	9,9	2,1	15,5	4,1	5,9	2,3	1,2
Flexural strength, $R_{tf}$ (MPa)	23,6	23,8	24,0	19,9	22,7	17,3	18,4	24,7	24,5	21,8

Set 2 (subjected to 56 freeze-thaw cycles)

Specimen	19	20	21	22	23	24	25	26	27	28
Breaking thickness, $h$ (mm)	49,3	49,3	49,4	49,3	49,4	49,5	49,4	49,4	49,4	49,4
Breaking width, $b$ (mm)	50,1	50,2	50,0	49,9	49,9	50,2	50,2	50,0	50,0	50,0
Span, $l$ (mm)	250,0	250,0	250,0	250,0	250,0	250,0	250,0	250,0	250,0	250,0
Load increase (MPa/s)	0,26	0,26	0,26	0,26	0,26	0,25	0,26	0,26	0,26	0,26
Breaking load, $F$ (N)	7290	7200	5710	7340	5950	6870	5290	7020	6090	7780
Distance fracture to centre (mm)	10,1	3,4	7,0	5,0	18,5	1,7	13,9	13,6	14,6	4,0
Flexural strength, $R_{tf}$ (MPa)	22,4	22,1	17,5	22,6	18,3	21,0	16,2	21,6	18,8	23,9





## TEST REPORT

### Natural stone – Frost resistance (technological test)

REPORT Nº: **232952PN008B** DATE: **30-05-2023**

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Mean value of flexural strength,  $F_0$

**22,1 MPa**

Standard deviation,  $s$

**2,7 MPa**

Mean value of flexural strength after 56 cycles,  $F_{56}$

**20,5 MPa**

Standard deviation,  $s$

**2,6 MPa**

Decrease of flexural strength after 56 cycles

**7,0 %**

Remarks: The uncertainties are calculated and at the client's disposal

The sample received consisted of 20 undifferentiated specimens. The separation between the two sets of 10 specimens to be tested, was carried out at random by the laboratory

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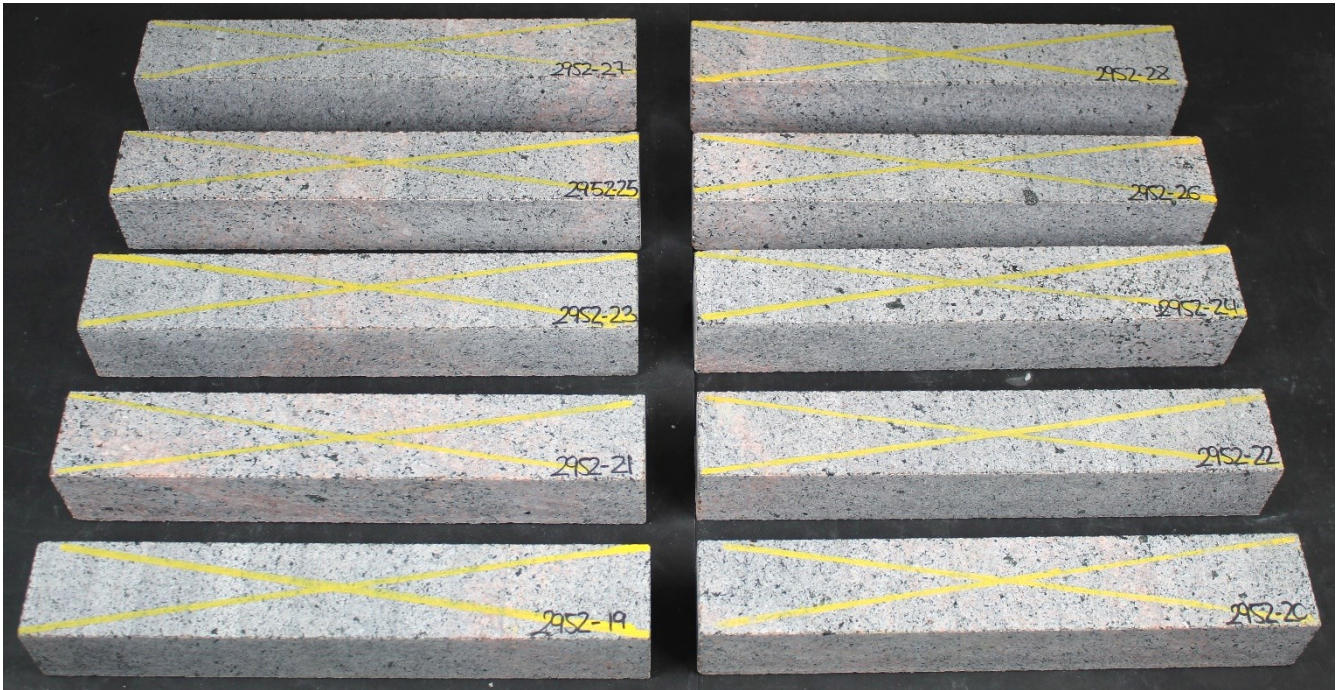
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Natural stone – Frost resistance (technological test)

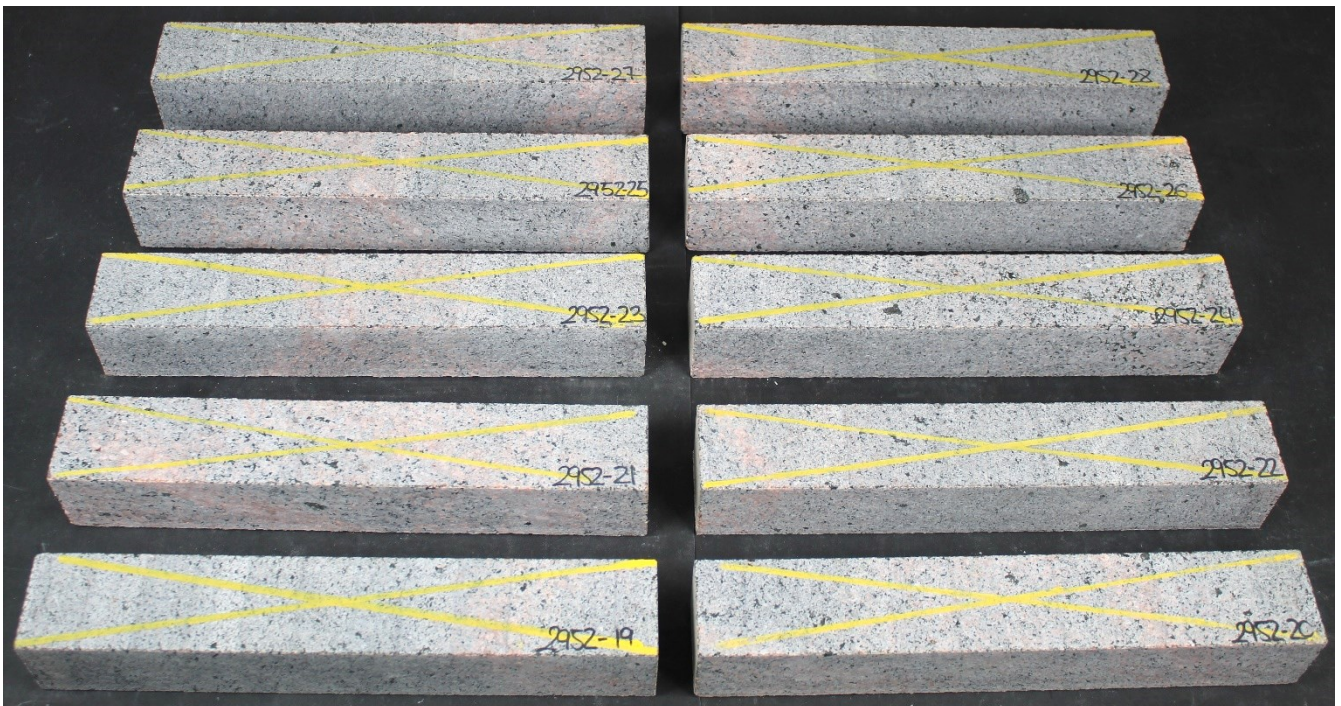
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Set 2 before freeze-thaw cycles



Set 2 after 56 freeze-thaw cycles



**Natural stone – Frost resistance (technological test)**

REPORT Nº: **232952PN008D** DATE: **30-05-2023**

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PETITIONER: **Palin Granit Oy**  
**Paraistentie 4. FI-53650 Lappeenranta. (Finland)**

SAMPLE IDENTIFICATION:

Date of delivery **10-01-2023**  
Description **2 sets of 10 cubic specimens of nominal dimensions 70x70x70 mm**  
Commercial name \* **Aurora**  
Petrographic definition \* **Migmatite**  
Place of quarrying \* **Mäntsälä, Finland, N60.560396, E25.436885 (WGS84)**  
Supplier \* **Palin Granit Oy**  
Sampled by \* **Pauli Salmela (26-09-2022)**  
Planes of anisotropy \* **Rift identified with two crossed yellow lines**

\* Information declared by the petitioner

TEST METHOD: **EN 12371:2010 Natural stone test methods. Determination of frost resistance. Section 7.3.1**

Deviations **–**  
Specimen preparation **–**  
Conditioning **Drying in oven at 70±5°C to constant mass**  
Load direction **Perpendicular to the rift**  
Place of testing **Centro Tecnológico del Mármol**  
Dates of testing **08-03-2023 / 19-04-2023**



## TEST REPORT

### Natural stone – Frost resistance (technological test)

REPORT Nº: **232952PN008D** DATE: **30-05-2023**

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#### RESULTS:

Set 1 (not subjected to freeze-thaw cycles)

Specimen	39	40	41	42	43	44	45	46	47	48
Average width of faces, $\bar{l}$ (mm)	70,5	71,6	71,4	71,8	72,1	71,8	70,8	71,7	71,7	72,3
Height, $h$ (mm)	69,6	69,6	69,5	69,5	69,5	69,5	69,6	69,6	69,6	69,6
Breaking load, $F$ (kN)	1160	1020	1030	1050	1080	1080	1130	1110	1120	1040
Compressive strength, $R$ (MPa)	233	198	202	204	209	209	226	216	218	198

Set 2 (subjected to 56 freeze-thaw cycles)

Specimen	29	30	31	32	33	34	35	36	37	38
Average width of faces, $\bar{l}$ (mm)	71,1	71,8	71,9	71,5	71,6	72,2	71,5	71,5	71,4	70,7
Height, $h$ (mm)	69,5	69,6	69,6	69,6	69,5	69,7	69,5	69,6	69,6	69,6
Breaking load, $F$ (kN)	1140	1120	1010	1150	1040	1050	1060	1130	980	930
Compressive strength, $R$ (MPa)	225	217	196	224	203	202	207	220	193	186



## TEST REPORT

### Natural stone – Frost resistance (technological test)

REPORT Nº: **232952PN008D** DATE: **30-05-2023**

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Mean value of compressive strength,  $R_0$

**211 MPa**

Standard deviation,  $s$

**12 MPa**

Mean value of compressive strength after 56 cycles,  $R_{56}$

**207 MPa**

Standard deviation,  $s$

**14 MPa**

Decrease of compressive strength after 56 cycles

**2,0 %**

Remarks: The uncertainties are calculated and at the client's disposal

The sample received consisted of 20 undifferentiated specimens. The separation between the two sets of 10 specimens to be tested, was carried out at random by the laboratory

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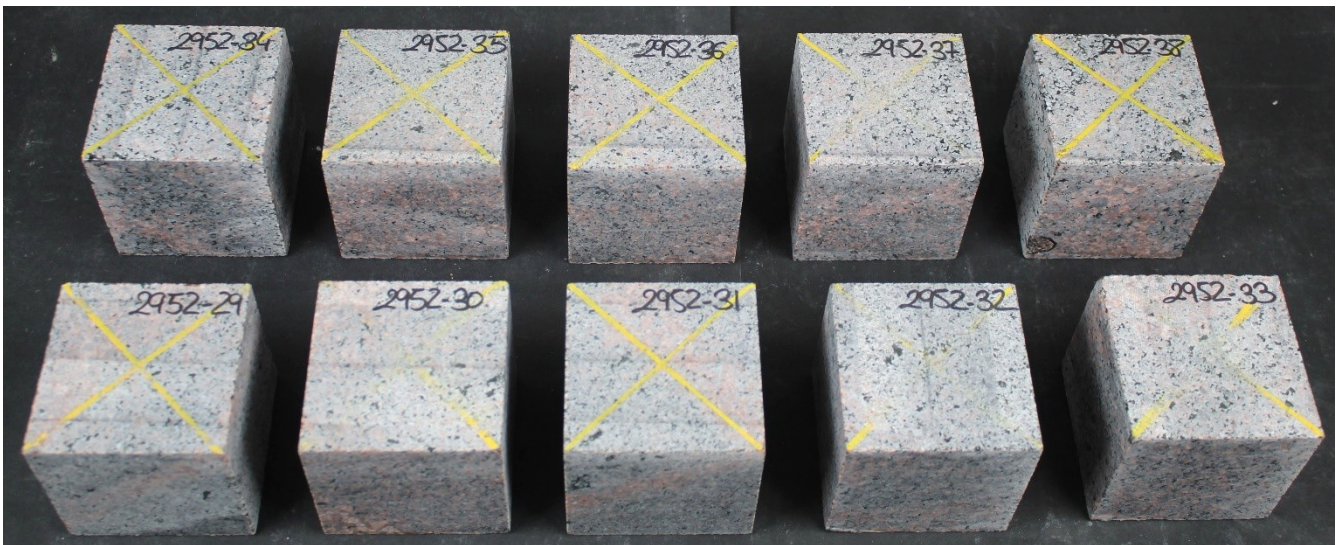
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Director Técnico

## Natural stone – Frost resistance (technological test)

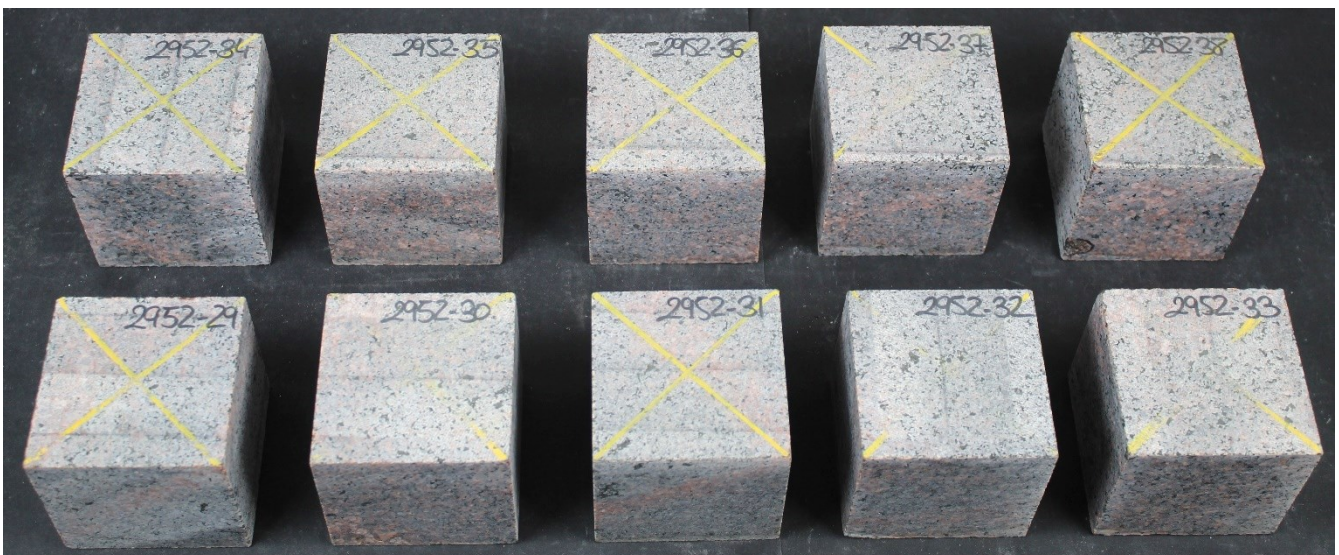
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Set 2 before freeze-thaw cycles



Set 2 after 56 freeze-thaw cycles



Natural stone – Compressive strength

REPORT Nº: **232952PN009A** DATE: **30-05-2023**

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PETITIONER: **Palin Granit Oy**  
**Paraistentie 4. FI-53650 Lappeenranta. (Finland)**

SAMPLE IDENTIFICATION:

Date of delivery **10-01-2023**  
Description **6 cubic specimens of nominal dimensions 70x70x70 mm**  
Commercial name \* **Aurora**  
Petrographic definition \* **Migmatite**  
Place of quarrying \* **Mäntsälä, Finland, N60.560396, E25.436885 (WGS84)**  
Supplier \* **Palin Granit Oy**  
Sampled by \* **Pauli Salmela (26-09-2022)**  
Planes of anisotropy \* **Rift identified with two crossed yellow lines**

\* Information declared by the petitioner

TEST METHOD: **EN 1926:2006 Natural stone test methods. Determination of uniaxial compressive strength**

Deviations –

Specimen preparation –

Conditioning **Drying in oven at 70±5°C to constant mass**

Load direction **Perpendicular to the rift**

Place of testing **Centro Tecnológico del Mármol**

Dates of testing **17-04-2023 / 19-04-2023**



## TEST REPORT

### Natural stone – Compressive strength

REPORT Nº: **232952PN009A** DATE: **30-05-2023**

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#### RESULTS:

Specimen	39	40	41	42	43	44	45	46	47	48
Average width of faces, $\bar{l}$ (mm)	70,5	71,6	71,4	71,8	72,1	71,8	70,8	71,7	71,7	72,3
Height, $h$ (mm)	69,6	69,6	69,5	69,5	69,5	69,5	69,6	69,6	69,6	69,6
Breaking load, $F$ (kN)	1160	1020	1030	1050	1080	1080	1130	1110	1120	1040
Compressive strength, $R$ (MPa)	233	198	202	204	209	209	226	216	218	198
Average compressive strength, $\bar{R}$	211 MPa									
Standard deviation, $s$	12 MPa									
Coefficient of variation, $v$	0,06									
Lower expected value, $E$	188 MPa									

Remarks: The uncertainties are calculated and at the client's disposal

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Director Técnico



Natural stone – Flexural strength

REPORT Nº: **232952PN010**      DATE: **30-05-2023**      PAGE: **1/2**

PETITIONER: **Palin Granit Oy**  
**Paraistentie 4. FI-53650 Lappeenranta. (Finland)**

SAMPLE IDENTIFICATION:

Date of delivery **10-01-2023**  
Description **10 specimens of nominal dimensions 300x50x50 mm**  
Commercial name \* **Aurora**  
Petrographic definition \* **Migmatite**  
Place of quarrying \* **Mäntsälä, Finland, N60.560396, E25.436885 (WGS84)**  
Supplier \* **Palin Granit Oy**  
Sampled by \* **Pauli Salmela (26-09-2022)**  
Planes of anisotropy \* **Rift identified with two crossed yellow lines**

\* Information declared by the petitioner

TEST METHOD: **EN 12372:2022 Natural stone test methods. Determination of flexural strength under concentrated load**

Deviations **–**  
Specimen preparation **–**  
Conditioning **Drying in oven at 70±5°C to constant mass**  
Load direction **Perpendicular to the rift**  
Place of testing **Centro Tecnológico del Mármol**  
Dates of testing **17-04-2023 / 19-04-2023**





## TEST REPORT

### Natural stone – Flexural strength

REPORT Nº: **232952PN010**

DATE: **30-05-2023**

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#### RESULTS:

Specimen	49	50	51	52	53	54	55	56	57	58
Breaking thickness, $h$ (mm)	49,4	49,4	49,3	49,5	49,5	49,4	49,6	49,3	49,4	49,5
Breaking width, $b$ (mm)	50,1	50,3	49,9	50,2	50,2	50,1	50,1	50,0	49,9	50,1
Span, $l$ (mm)	250,0	250,0	250,0	250,0	250,0	250,0	250,0	250,0	250,0	250,0
Load increase (MPa/s)	0,26	0,25	0,26	0,25	0,25	0,26	0,25	0,26	0,26	0,25
Breaking load, $F$ (N)	7700	7790	7780	6540	7460	5610	6040	8020	7950	7120
Distance fracture to centre (mm)	6,0	2,3	6,2	9,9	2,1	15,5	4,1	5,9	2,3	1,2
Flexural strength, $R_{tf}$ (MPa)	23,6	23,8	24,0	19,9	22,7	17,3	18,4	24,7	24,5	21,8
Average flexural strength, $\bar{R}_{tf}$	22,1 MPa									
Standard deviation, $s$	2,7 MPa									
Lower expected value, $E$	16,8 MPa									

Remarks: The uncertainties are calculated and at the client's disposal

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Natural stone – Breaking load at dowel hole

REPORT Nº: **232952PN012A** DATE: **30-05-2023**

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PETITIONER: **Palin Granit Oy**  
**Paraistentie 4. FI-53650 Lappeenranta. (Finland)**

SAMPLE IDENTIFICATION:

Date of delivery **10-01-2023**

Description **10 slabs of nominal dimensions 200x200x30 mm with sawn surface finish (exposed face)**

Commercial name \* **Aurora**

Petrographic definition \* **Migmatite**

Place of quarrying \* **Mäntsälä, Finland, N60.560396, E25.436885 (WGS84)**

Supplier \* **Palin Granit Oy**

Sampled by \* **Pauli Salmela (26-09-2022)**

Planes of anisotropy \* **–**

\* Information declared by the petitioner

TEST METHOD: **EN 13364:2001 Natural stone test methods. Determination of the breaking load at dowel hole**

Deviations **–**

Specimen preparation **–**

Conditioning **Drying in oven at 70±5°C to constant mass**

Load direction **–**

Place of testing **Centro Tecnológico del Mármol**

Dates of testing **12-04-2023 / 19-04-2023**





## TEST REPORT

### Natural stone – Breaking load at dowel hole

REPORT Nº: **232952PN012A** DATE: **30-05-2023**

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#### RESULTS:

Specimen	59	60	61	62	63	64	65	66	67	68
Thickness, $d$ (mm)	30	31	30	30	30	30	30	30	30	30
Breaking thickness, $d_1$ (mm)	10,8	10,9	11,3	11,5	10,6	11,4	11,6	10,7	10,8	10,9
Breaking load, $F$ (N)	2400	2200	2650	2350	2650	3450	2700	2750	4050	3150
Maximum fracture length, $b_A$ (mm)	39,4	35,4	41,8	41,3	34,5	34,6	43,3	39,7	57,3	36,2
Mean value of breaking load, $\bar{F}$	2850 N									
Standard deviation, $s$	550 N									
Lower expected value, $E$	1881 N									
Mean value of breaking thickness, $\bar{d}_1$	11,0 mm									
Mean value of maximum fracture lengths, $\bar{b}_A$	40,3 mm									

Remarks: The uncertainties are calculated and at the client's disposal  
The results of breaking load and standard deviation are expressed to the nearest 50 N

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TEST REPORT

Natural stone – Slip resistance

REPORT Nº: **232952PN020A** DATE: **30-05-2023**

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PETITIONER: **Palin Granit Oy**  
**Paraistentie 4. FI-53650 Lappeenranta. (Finland)**

SAMPLE IDENTIFICATION:

Date of delivery **10-01-2023**  
Description **3 slabs of 300x300x50 mm**  
Surface finish \* **Polished**  
Commercial name \* **Aurora**  
Petrographic definition \* **Migmatite**  
Place of quarrying \* **Mäntsälä, Finland, N60.560396, E25.436885 (WGS84)**  
Supplier \* **Palin Granit Oy**  
Sampled by \* **Pauli Salmela (26-09-2022)**

\* Information declared by the petitioner

TEST METHOD: **EN 14231:2003 Natural stone test methods. Determination of the slip resistance by means of the pendulum tester**

Deviations –  
Specimen preparation –  
Slider used **76,2 x 25,4 mm**  
Place of testing **Centro Tecnológico del Mármol**  
Dates of testing **20-04-2023 / 21-04-2023**





## TEST REPORT

### Natural stone – Slip resistance

REPORT Nº: **232952PN020A** DATE: **30-05-2023**

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#### RESULTS:

Specimen	69.1	69.2	70.3	70.4	71.5	71.6
Individual values of the slip resistance, in dry condition	56	55	55	55	55	56
Individual values of the slip resistance, in wet condition	5	5	5	5	6	5
Average slip resistance, in dry condition (SRV “dry”)	55		Uncertainty		± 3	
Average slip resistance, in wet condition (SRV “wet”)	5		Uncertainty		± 1	

Remarks: The expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor  $K=2$ , which for a normal distribution provides a level of confidence of about 95%

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TEST REPORT

Slip resistance (slipperiness)

REPORT Nº: **232952PN020J** DATE: **30-05-2023**

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PETITIONER: **Palin Granit Oy**  
**Paraistentie 4. FI-53650 Lappeenranta. (Finland)**

SAMPLE IDENTIFICATION:

Date of delivery **10-01-2023**  
Description **1 natural stone slab of 300x300x50 mm**  
Surface finish \* **Polished**  
Commercial name \* **Aurora**  
Petrographic definition \* **Migmatite**  
Place of quarrying \* **Mäntsälä, Finland, N60.560396, E25.436885 (WGS84)**  
Supplier \* **Palin Granit Oy**  
Sampled by \* **Pauli Salmela (26-09-2022)**

\* Information declared by the petitioner

TEST METHOD: **EN 16165:2021 Determination of slip resistance of pedestrian surfaces - Methods of evaluation. Annex C Pendulum test**

Deviations **–**  
Type of slider used **57**  
Place of testing **Centro Tecnológico del Mármol**  
Dates of testing **20-04-2023 / 21-04-2023**





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#### RESULTS:

Test conditions	Dry	Wet
Slipperiness measured towards 0°	55	5
Slipperiness measured towards 90°	55	5
Slipperiness measured towards 45°	56	5
Value of the slipperiness, <i>PTV</i>	55	5
Uncertainty	± 3	± 1

Remarks: The expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor  $K=2$ , which for a normal distribution provides a level of confidence of about 95%

#### DISCLAIMER:

The laboratory is not responsible for the sampling or for the information declared by the client. The results refer only to the sample received at the laboratory, on the expressed date.

This report shall not be reproduced, except in full, without the written consent of the laboratory.

Digitally signed by

Antonio Molina  
Director Técnico