

Natural stone – Water absorption

REPORT Nº: **232948PN003**      DATE: **13-04-2023**      PAGE: **1/2**

PETITIONER: **Suomen Kivivalmiste Oy**  
**Petäjävendentie 3. 41800 Korpilahti. (Finland)**

SAMPLE IDENTIFICATION:

Date of delivery **10-01-2023**  
Description **6 cubic specimens of nominal dimensions 50x50x50 mm**  
Commercial name \* **Korpilahden Musta / Korpi Black**  
Petrographic definition \* **Gabbro**  
Place of quarrying \* **Punamäki Korpilahti N6882951 E425771**  
Supplier \* **Suomen Kivivalmiste Oy**  
Sampled by \* **Mikko Paljakka (30-11-2022)**

\* 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 **22-02-2023 / 02-03-2023**



## TEST REPORT

### Natural stone – Water absorption

REPORT Nº: **232948PN003**

DATE: **13-04-2023**

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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: **232948PN004A** DATE: **13-04-2023**PAGE: **1/2**PETITIONER: **Suomen Kivivalmiste Oy**  
**Petäjävendentie 3. 41800 Korpilahti. (Finland)**

## SAMPLE IDENTIFICATION:

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

Description **6 cubic specimens of nominal dimensions 50x50x50 mm**

Commercial name \* **Korpilahden Musta / Korpi Black**

Petrographic definition \* **Gabbro**

Place of quarrying \* **Punamäki Korpilahti N6882951 E425771**

Supplier \* **Suomen Kivivalmiste Oy**

Sampled by \* **Mikko Paljakka (30-11-2022)**

\* Information declared by the petitioner

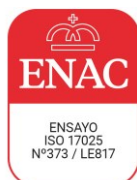
TEST METHOD: **EN 1936:2007 Natural stone test methods. Determination of real density and apparent density, and of total and open porosity. Section 8.1**

Deviations –

Specimen preparation –

Place of testing **Centro Tecnológico del Mármol**

Dates of testing **08-02-2023 / 14-02-2023**





TEST REPORT

Natural stone – Apparent density and open porosity

REPORT Nº: **232948PN004A** DATE: **13-04-2023**

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RESULTS:

Specimen	07	08	09	10	11	12
Apparent density, $\rho_b$ (kg/m <sup>3</sup> )	2940	2940	2930	2940	2930	2950
Open porosity, $p_o$ (%)	0,3	0,3	0,3	0,3	0,3	0,3
Mean value of apparent density, $\bar{\rho}_b$	2940 kg/m <sup>3</sup>					
Mean value of open porosity, $\bar{p}_o$	0,3 %					

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: **232948PN006**      DATE: **13-04-2023**      PAGE: **1/2**

PETITIONER: **Suomen Kivivalmiste Oy**  
**Petäjävendentie 3. 41800 Korpilahti. (Finland)**

SAMPLE IDENTIFICATION:

Date of delivery **10-01-2023**  
Description **6 polished slabs of 150x150x30 mm**  
Commercial name \* **Korpilahden Musta / Korpi Black**  
Petrographic definition \* **Gabbro**  
Place of quarrying \* **Punamäki Korpilahti N6882951 E425771**  
Supplier \* **Suomen Kivivalmiste Oy**  
Sampled by \* **Mikko Paljakka (30-11-2022)**  
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 **0,3 mm**  
Place of testing **Centro Tecnológico del Mármol**  
Dates of testing **22-03-2023 / 27-03-2023**



## TEST REPORT

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

REPORT Nº: **232948PN006**

DATE: **13-04-2023**

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#### RESULTS:

Specimen	13	14	15	16	17	18
Groove lengths (mm)	14,0	13,5	14,0	14,0	14,0	12,5
	13,5	14,0	13,5	14,5	14,0	13,5
Mean value of groove length	14,0 mm					
Standard deviation	0,3 mm					
Higher expected value, $E_H$	15,0 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: **232948PN008B** DATE: **13-04-2023** PAGE: **1/4**

PETITIONER: **Suomen Kivivalmiste Oy**  
**Petäjävendentie 3. 41800 Korpilahti. (Finland)**

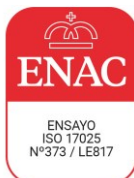
SAMPLE IDENTIFICATION:

Date of delivery **10-01-2023**  
Description **2 sets of 10 specimens of nominal dimensions 300x50x50 mm**  
Commercial name \* **Korpilahden Musta / Korpi Black**  
Petrographic definition \* **Gabbro**  
Place of quarrying \* **Punamäki Korpilahti N6882951 E425771**  
Supplier \* **Suomen Kivivalmiste Oy**  
Sampled by \* **Mikko Paljakka (30-11-2022)**  
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 **20-02-2023 / 04-04-2023**



Natural stone – Frost resistance (technological test)

REPORT Nº: **232948PN008B** DATE: **13-04-2023**

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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)	50,2	50,2	50,2	50,1	50,3	50,2	50,2	50,1	50,2	50,2
Breaking width, $b$ (mm)	50,1	50,3	50,2	50,2	50,1	50,3	50,2	50,2	49,9	50,3
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)	0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25
Breaking load, $F$ (N)	6680	6920	6920	6730	7340	7180	7060	6800	6840	6670
Distance fracture to centre (mm)	5,4	2,7	6,5	13,6	3,1	2,2	2,3	9,7	8,0	3,7
Flexural strength, $R_{tf}$ (MPa)	19,9	20,5	20,5	20,0	21,7	21,3	20,9	20,2	20,4	19,7

Set 2 (subjected to 56 freeze-thaw cycles)

Specimen	19	20	21	22	23	24	25	26	27	28
Breaking thickness, $h$ (mm)	50,2	50,2	50,2	50,2	50,1	50,3	50,3	50,2	50,2	50,2
Breaking width, $b$ (mm)	50,1	50,1	50,1	50,1	50,2	50,1	50,3	50,1	50,1	50,2
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)	0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25
Breaking load, $F$ (N)	6710	6680	6840	5930	6760	6010	5920	7010	6340	6340
Distance fracture to centre (mm)	0,0	3,7	13,1	8,4	5,8	0,5	5,1	5,9	4,2	2,0
Flexural strength, $R_{tf}$ (MPa)	20,0	19,8	20,3	17,6	20,1	17,8	17,5	20,8	18,9	18,8





## TEST REPORT

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

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Mean value of flexural strength,  $F_0$

**20,5 MPa**

Standard deviation,  $s$

**0,6 MPa**

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

**19,2 MPa**

Standard deviation,  $s$

**1,2 MPa**

Decrease of flexural strength after 56 cycles

**6,0 %**

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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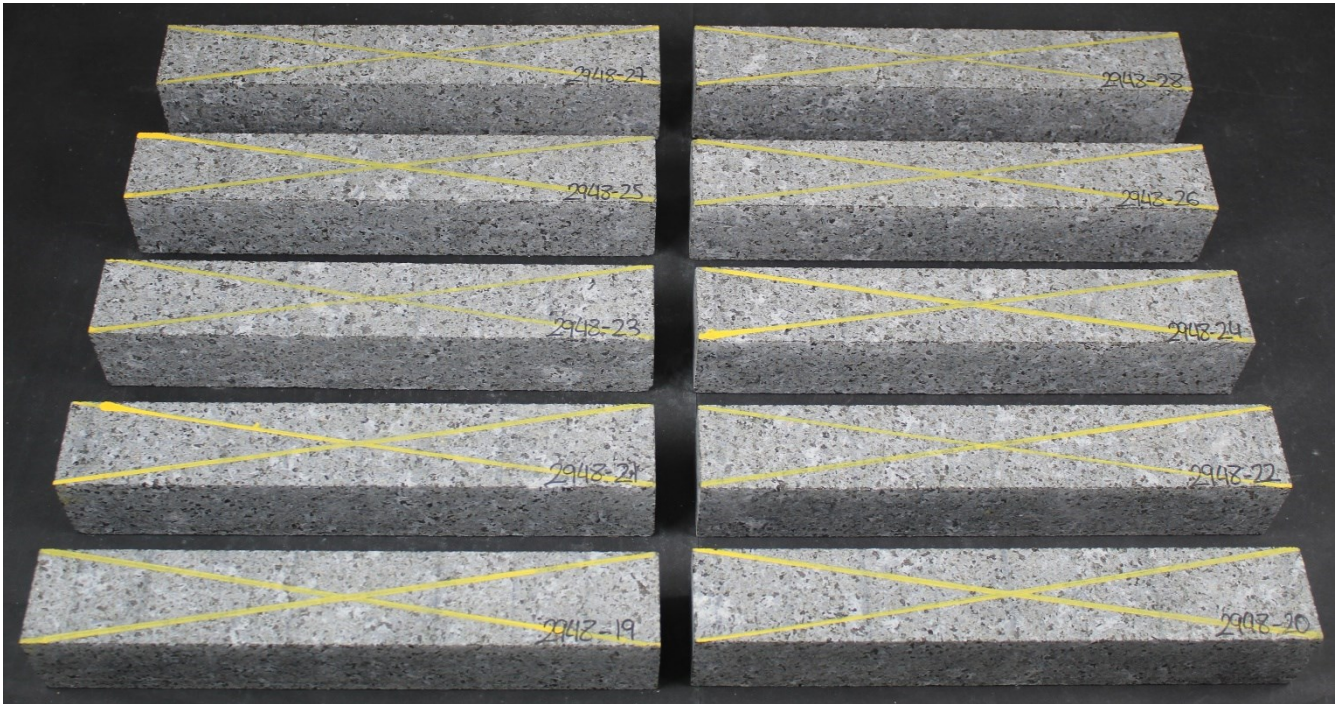
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Natural stone – Frost resistance (technological test)

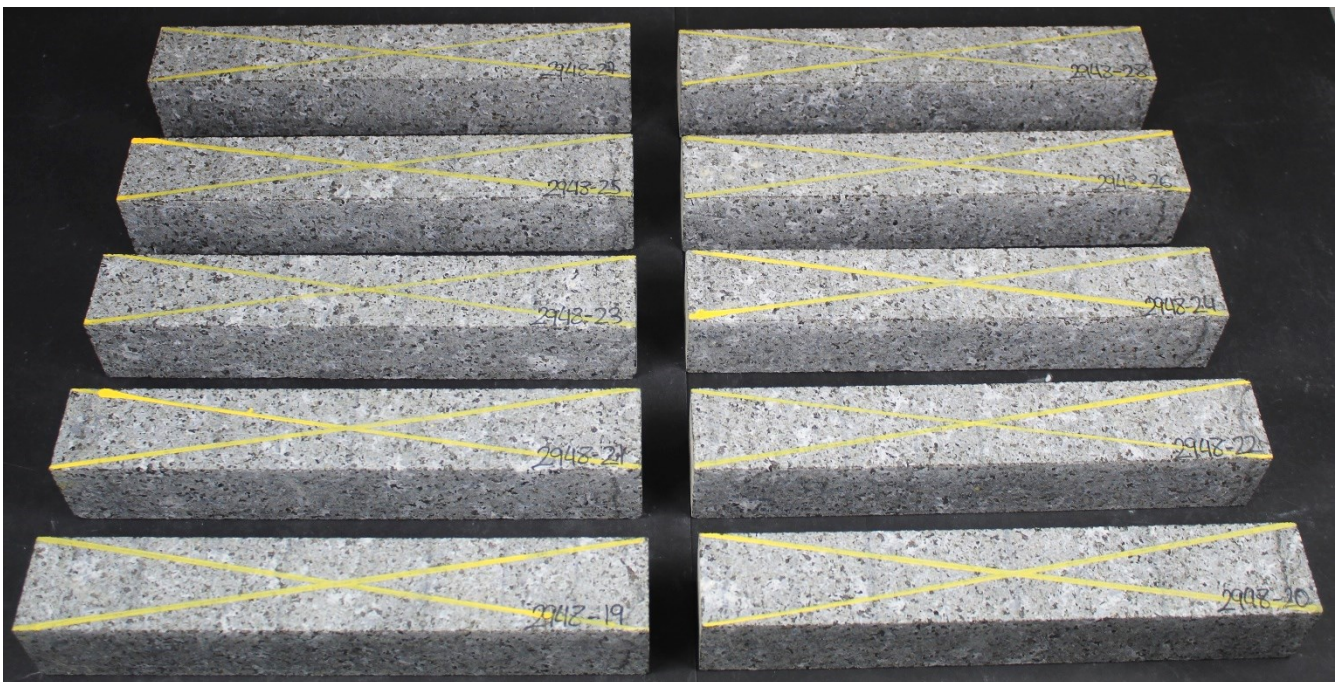
REPORT Nº: 232948PN008B DATE: 13-04-2023

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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: **232948PN008D** DATE: **13-04-2023**

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PETITIONER: **Suomen Kivivalmiste Oy**  
**Petäjävendentie 3. 41800 Korpilahti. (Finland)**

SAMPLE IDENTIFICATION:

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

Description **2 sets of 10 cubic specimens of nominal dimensions 70x70x70 mm**

Commercial name \* **Korpilahden Musta / Korpi Black**

Petrographic definition \* **Gabbro**

Place of quarrying \* **Punamäki Korpilahti N6882951 E425771**

Supplier \* **Suomen Kivivalmiste Oy**

Sampled by \* **Mikko Paljakka (30-11-2022)**

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 **20-02-2023 / 29-03-2023**





## TEST REPORT

Centro Tecnológico  
del mármol

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

REPORT Nº: **232948PN008D** DATE: **13-04-2023**

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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)	71,5	70,8	70,8	70,9	71,8	71,9	71,6	71,9	71,9	71,9
Height, $h$ (mm)	70,5	70,4	70,5	70,5	70,6	70,4	70,8	70,4	70,5	70,4
Breaking load, $F$ (kN)	1170	1060	1160	1170	840	1150	1140	1160	1170	890
Compressive strength, $R$ (MPa)	229	212	231	232	163	223	221	225	227	172

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)	71,6	70,6	71,9	71,8	71,5	71,8	71,6	71,8	71,8	71,7
Height, $h$ (mm)	70,7	70,5	70,6	70,4	70,6	70,4	70,5	70,6	70,5	70,5
Breaking load, $F$ (kN)	1170	1110	520	1140	1100	1120	1110	890	1170	1110
Compressive strength, $R$ (MPa)	229	224	101	220	215	218	217	172	227	217



## TEST REPORT

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

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Mean value of compressive strength,  $R_0$

**214 MPa**

Standard deviation,  $s$

**25 MPa**

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

**204 MPa**

Standard deviation,  $s$

**40 MPa**

Decrease of compressive strength after 56 cycles

**5,0 %**

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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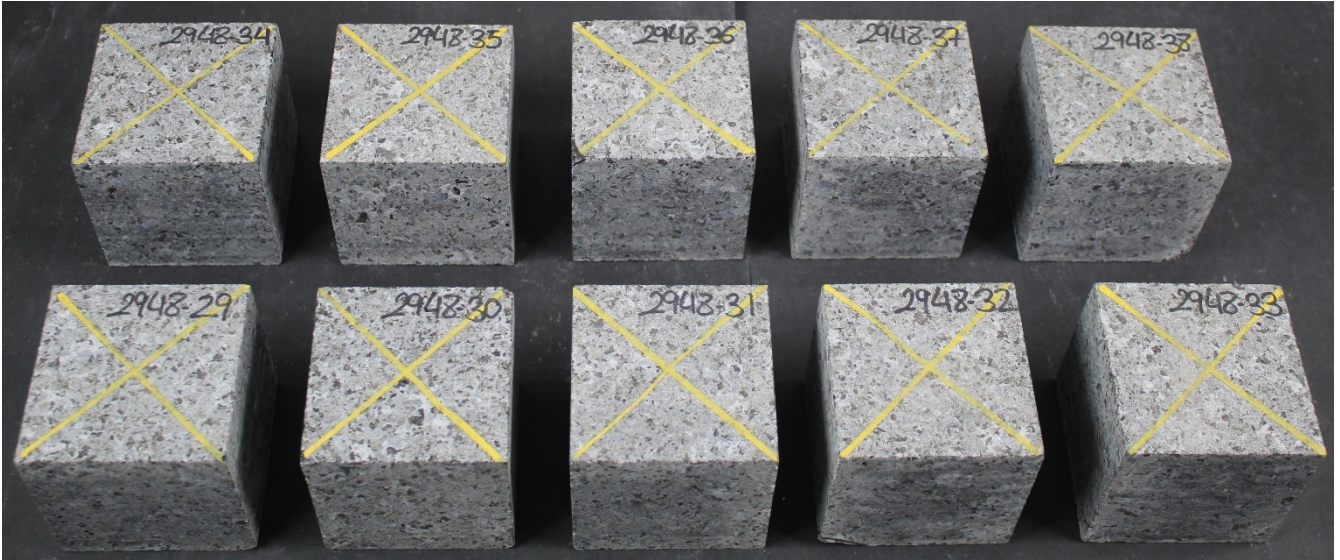
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Natural stone – Frost resistance (technological test)

REPORT Nº: 232948PN008D DATE: 13-04-2023

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Set 2 before freeze-thaw cycles



Set 2 after 56 freeze-thaw cycles



**Natural stone – Compressive strength**REPORT Nº: **232948PN009A** DATE: **13-04-2023**PAGE: **1/2**

PETITIONER: **Suomen Kivivalmiste Oy**  
**Petäjävendentie 3. 41800 Korpilahti. (Finland)**

## SAMPLE IDENTIFICATION:

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

Description **10 cubic specimens of nominal dimensions 70x70x70 mm**

Commercial name \* **Korpilahden Musta / Korpi Black**

Petrographic definition \* **Gabbro**

Place of quarrying \* **Punamäki Korpilahti N6882951 E425771**

Supplier \* **Suomen Kivivalmiste Oy**

Sampled by \* **Mikko Paljakka (30-11-2022)**

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 **–**

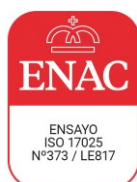
Specimen preparation **–**

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 **15-03-2023 / 17-03-2023**





## TEST REPORT

Centro Tecnológico  
del mármol

## Natural stone – Compressive strength

REPORT Nº: **232948PN009A** DATE: **13-04-2023**

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## RESULTS:

Specimen	39	40	41	42	43	44	45	46	47	48
Average width of faces, $\bar{l}$ (mm)	71,5	70,8	70,8	70,9	71,8	71,9	71,6	71,9	71,9	71,9
Height, $h$ (mm)	70,5	70,4	70,5	70,5	70,6	70,4	70,8	70,4	70,5	70,4
Breaking load, $F$ (kN)	1170	1060	1160	1170	840	1150	1140	1160	1170	890
Compressive strength, $R$ (MPa)	229	212	231	232	163	223	221	225	227	172
Average compressive strength, $\bar{R}$	214 MPa									
Standard deviation, $s$	25 MPa									
Coefficient of variation, $v$	0,12									
Lower expected value, $E$	162 MPa									

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

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Natural stone – Flexural strength

REPORT Nº: **232948PN010** DATE: **13-04-2023** PAGE: **1/2**

PETITIONER: **Suomen Kivivalmiste Oy**  
**Petäjävendentie 3. 41800 Korpilahti. (Finland)**

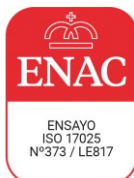
SAMPLE IDENTIFICATION:

Date of delivery **10-01-2023**  
Description **10 specimens of nominal dimensions 300x50x50 mm**  
Commercial name \* **Korpilahden Musta / Korpi Black**  
Petrographic definition \* **Gabbro**  
Place of quarrying \* **Punamäki Korpilahti N6882951 E425771**  
Supplier \* **Suomen Kivivalmiste Oy**  
Sampled by \* **Mikko Paljakka (30-11-2022)**  
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 **29-03-2023 / 04-04-2023**





## TEST REPORT

### Natural stone – Flexural strength

REPORT Nº: **232948PN010**

DATE: **13-04-2023**

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#### RESULTS:

Specimen	49	50	51	52	53	54	55	56	57	58
Breaking thickness, $h$ (mm)	50,2	50,2	50,2	50,1	50,3	50,2	50,2	50,1	50,2	50,2
Breaking width, $b$ (mm)	50,1	50,3	50,2	50,2	50,1	50,3	50,2	50,2	49,9	50,3
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)	0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25
Breaking load, $F$ (N)	6680	6920	6920	6730	7340	7180	7060	6800	6840	6670
Distance fracture to centre (mm)	5,4	2,7	6,5	13,6	3,1	2,2	2,3	9,7	8,0	3,7
Flexural strength, $R_{tf}$ (MPa)	19,9	20,5	20,5	20,0	21,7	21,3	20,9	20,2	20,4	19,7
Average flexural strength, $\bar{R}_{tf}$	20,5 MPa									
Standard deviation, $s$	0,6 MPa									
Lower expected value, $E$	19,2 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: **232948PN012A** DATE: **13-04-2023**

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PETITIONER: **Suomen Kivivalmiste Oy**  
**Petäjävendentie 3. 41800 Korpilahti. (Finland)**

SAMPLE IDENTIFICATION:

Date of delivery **10-01-2023**  
Description **10 slabs of nominal dimensions 200x200x30 mm**  
Commercial name \* **Korpilahden Musta / Korpi Black**  
Petrographic definition \* **Gabbro**  
Place of quarrying \* **Punamäki Korpilahti N6882951 E425771**  
Supplier \* **Suomen Kivivalmiste Oy**  
Sampled by \* **Mikko Paljakka (30-11-2022)**  
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 **27-03-2023 / 31-03-2023**





## TEST REPORT

### Natural stone – Breaking load at dowel hole

REPORT Nº: **232948PN012A** DATE: **13-04-2023**

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#### RESULTS:

Specimen	59	60	61	62	63	64	65	66	67	68
Thickness, $d$ (mm)	30	30	30	30	30	30	30	30	30	30
Breaking thickness, $d_1$ (mm)	10,5	10,7	10,8	10,4	10,5	10,9	10,5	10,4	10,3	10,6
Breaking load, $F$ (N)	2600	3100	2700	3050	2850	3100	2350	2500	2550	2800
Maximum fracture length, $b_A$ (mm)	43,1	35,5	42,8	37,9	32,0	42,1	45,4	43,9	35,2	37,3
Mean value of breaking load, $\bar{F}$	2750 N									
Standard deviation, $s$	250 N									
Lower expected value, $E$	2251 N									
Mean value of breaking thickness, $\bar{d}_1$	10,6 mm									
Mean value of maximum fracture lengths, $\bar{b}_A$	39,5 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: **232948PN020A** DATE: **13-04-2023**

PAGE: **1/2**

PETITIONER: **Suomen Kivivalmiste Oy**  
**Petäjävendentie 3. 41800 Korpilahti. (Finland)**

SAMPLE IDENTIFICATION:

Date of delivery **10-01-2023**  
Description **3 slabs of 300x300x50 mm**  
Surface finish \* **Polished**  
Commercial name \* **Korpilahden Musta / Korpi Black**  
Petrographic definition \* **Gabbro**  
Place of quarrying \* **Punamäki Korpilahti N6882951 E425771**  
Supplier \* **Suomen Kivivalmiste Oy**  
Sampled by \* **Mikko Paljakka (30-11-2022)**

\* 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**

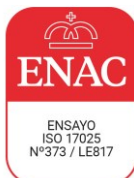
Deviations –

Specimen preparation –

Slider used **76,2 x 25,4 mm**

Place of testing **Centro Tecnológico del Mármol**

Dates of testing **23-03-2023 / 28-03-2023**





TEST REPORT

Natural stone – Slip resistance

REPORT Nº: **232948PN020A** DATE: **13-04-2023**

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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	51	53	50	52	53	57
Individual values of the slip resistance, in wet condition	10	10	10	10	10	10
Average slip resistance, in dry condition (SRV “dry”)	53		Uncertainty		± 3	
Average slip resistance, in wet condition (SRV “wet”)	10		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%

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.

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Antonio Molina  
Director Técnico



Centro Tecnológico  
del mármol

PN020JE2201

## TEST REPORT

### Slip resistance (slipperiness)

REPORT Nº: **232948PN020J** DATE: **13-04-2023** PAGE: **1/2**

PETITIONER: **Suomen Kivivalmiste Oy**  
**Petäjävendentie 3. 41800 Korpilahti. (Finland)**

#### SAMPLE IDENTIFICATION:

Date of delivery **10-01-2023**  
Description **1 natural stone slab of 300x300x50 mm**  
Surface finish \* **Polished**  
Commercial name \* **Korpilahden Musta / Korpi Black**  
Petrographic definition \* **Gabbro**  
Place of quarrying \* **Punamäki Korpilahti N6882951 E425771**  
Supplier \* **Suomen Kivivalmiste Oy**  
Sampled by \* **Mikko Paljakka (30-11-2022)**

\* 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 **23-03-2023 / 28-03-2023**



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## TEST REPORT

### Slip resistance (slipperiness)

REPORT Nº: **232948PN020J** DATE: **13-04-2023**

PAGE: **2/2**

#### RESULTS:

Test conditions	Dry	Wet
Slipperiness measured towards 0°	50	10
Slipperiness measured towards 90°	55	10
Slipperiness measured towards 45°	52	10
Value of the slipperiness, <i>PTV</i>	50	10
Uncertainty	± 2	± 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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