



Client: Bettazza Graniti SA, Cevio
 Work: Certification of natural stones
 Date: 06.04.05 Mandate: 04-4389

DETERMINATION OF FROST RESISTANCE BY DROP OF FLEXURAL STRENGTH

Standards: EN 12372, EN 12371, EN 1341

Tested samples:

Description: Biotitic paragneiss
Location: Quarry Boschetto, Bettazza Graniti SA, CH - 6675 Cevio
Dimensions: Slabs 150x100x30 mm
Sampled by: Client
Date of delivery: 12.11.04
Date of testing: Reference test: 22.11.04; After the frost cycles: 18.03.05
Technician: Reference test: Dr. F. Jauch; After the frost cycles: Geom. M. Mezzetti

Load: Concentrated
Loading orientation: Perpendicular to the schistosity
Loading velocity: 0.250 MPa/s

Reference test								After the frost cycles							
Name	Length L [mm]	Width b [mm]	Thickn. h [mm]	Mass m [kg]	Density ρ [t/m ³]	Load F [kN]	R_t [MPa]	Name	Length L [mm]	Width b [mm]	Thickn. h [mm]	Mass m [kg]	Density ρ [t/m ³]	Load F [kN]	R_t [MPa]
B-1	300.8	102.0	48.9	4.085	2.723	13.62	20.9	B-11	301.5	101.6	49.6	4.166	2.742	13.31	20.0
B-2	302.7	100.7	49.4	4.107	2.727	13.32	20.3	B-12	303.5	100.8	49.3	4.107	2.723	13.48	20.6
B-3	301.0	100.7	49.1	4.062	2.729	14.35	22.2	B-13	301.5	100.6	49.8	4.108	2.720	12.76	19.2
B-4	302.3	101.1	49.6	4.138	2.730	13.23	19.9	B-14	302.5	100.8	49.9	4.149	2.727	12.37	18.5
B-5	302.6	100.7	49.2	4.049	2.701	12.21	18.8	B-15	302.5	100.9	49.6	4.125	2.725	11.72	17.7
B-6	303.6	101.1	49.4	4.092	2.699	12.21	18.6	B-16	301.0	100.8	49.9	4.127	2.726	12.66	18.9
B-7	302.6	101.0	49.2	4.066	2.704	12.23	18.8	B-17	302.5	102.0	49.4	4.158	2.728	13.36	20.1
B-8	302.7	101.0	49.6	4.147	2.734	13.87	20.9	B-18	302.5	101.0	49.1	4.057	2.704	11.34	17.5
B-9	302.6	100.9	49.4	4.073	2.700	12.80	19.5	B-19	301.5	102.1	48.9	4.096	2.721	13.99	21.5
B-10	302.6	101.0	49.7	4.152	2.734	13.13	19.7	B-20	302.5	100.8	49.9	4.153	2.729	12.27	18.3

Average and stand. dev.	Reference test:	Density: $\rho_{i,m} = 2.718 \pm 0.015$ t/m ³	Flex. str.: $R_{ti,m} = 20.0 \pm 1.2$ MPa
	After the frost cycles:	Density: $\rho_{i,m} = 2.724 \pm 0.009$ t/m ³	Flex. str.: $R_{tf,m} = 19.2 \pm 1.3$ MPa

Drop of flexural strength after the frost cycles:			
Minimum values	Reference test:	Flex. str.: $R_{ti,min} = 18.6$ MPa	=> $\Delta R_t = 5.9\%$
	After the frost cycles:	Flex. str.: $R_{tf,min} = 17.5$ MPa	
Class 1, designation F1, frost resistant			

Remarks:

Checked and approved by: Dr. M. Di Tommaso

