NATURAL STONE · CROATIAN LIMESTONE

Avorio

Laboratory test results for a light beige, fossiliferous dolomitic limestone from the island of Brač, Croatia.



138.9 MPa	12.8 MPa	2,547 kg/m³	1.70 %
Compressive strength EN 1926	Flexural strength EN 12372	Apparent density EN 1936	Water absorption EN 13755

PETROGRAPHIC NAME

Dolomitic biosparite (fossiliferous limestone) · calcitic dolomite

FROST RESISTANCE

Resistant · Class F1 (EN 1341 / EN 1342)

SLIP RESISTANCE

R10 (DIN 51130), honed surface

Physical and mechanical properties

Test series A, carried out by an independent materials testing laboratory to European (EN) standards. Values are means of 6–10 specimens per test; min / max and the lowest expected value are given where they were reported.

PROPERTY	STANDARD	RESULT	RANGE / REMARKS
DENSITY AND POROSITY			
Apparent (bulk) density	EN 1936	**2,547 kg/m³**	2,530 – 2,570 kg/m³
True density	EN 1936	**2,670 kg/m³**	2,640 – 2,700 kg/m³
Open porosity	EN 1936	**5.65 vol.-%**	4.18 – 7.19 vol.-%
Water absorption at atmospheric pressure	EN 13755	**1.70 %**	1.51 – 2.12 % (by mass)
STRENGTH			
Compressive strength	EN 1926	**138.9 MPa**	127.9 – 150.9 MPa · lowest expected value 123.0 MPa
Flexural strength under concentrated load	EN 12372	**12.8 MPa**	11.2 – 15.2 MPa · lowest expected value 10.0 MPa
DURABILITY			
Frost resistance, 48 freeze–thaw cycles	EN 12371	**0.09 % mass loss**	No visible cracks or chipping
Compressive strength after freeze–thaw	EN 1926	**135.0 MPa**	125.2 – 146.6 MPa · approx. 2.8 % below unweathered value
Flexural strength after freeze–thaw	EN 12372	**11.7 MPa**	10.2 – 13.9 MPa · lowest expected value 9.6 MPa
Freeze–thaw with de-icing salt, 25 cycles	TL Pflaster-StB 06	**0.04 % mass loss**	No visible cracks or chipping
Compressive strength after freeze–thaw with de-icing salt	EN 1926	**136.1 MPa**	126.2 – 150.9 MPa · required min. 40 MPa – met
SURFACE AND OTHER PROPERTIES			
Abrasion resistance (wide wheel)	EN 14157	**23.5 mm**	22.7 – 24.3 mm
Slip resistance, honed surface (C 120)	DIN 51130	**R10**	Mean acceptance angle 11.5°
Sound propagation velocity	EN 14579	**5.18 km/s**	4.78 – 5.58 km/s

Laboratory assessment (series A)

All values lie within the normal range for dense limestone, dolomite and marble (DIN 52100-2). Mass loss in the frost tests is very low and no cracks were observed; the criterion for compressive strength after freeze–thaw with de-icing salt is clearly met.

The measured values can be used for the declaration of performance within the scope of the CE mark for:

EN 12057 · Modular tiles · **EN 12058 · Slabs for floors & stairs** · **EN 1341 · External paving slabs** · **EN 1342 · Setts** · **EN 1469 · Cladding** · **Freeze–thaw class F1**

Additional test series

Test series B, independent laboratory, Croatian (HRN) standards. Ranges are min – max of the specimens tested.

PROPERTY	STANDARD	RESULT	RANGE / REMARKS
Compressive strength – dry	HRN B.B8.012	**112.2 MPa**	98.6 – 133.3 MPa
Compressive strength – water saturated	HRN B.B8.012	**107.2 MPa**	88.8 – 120.0 MPa
Compressive strength – after freezing	HRN B.B8.012	**105.5 MPa**	75.3 – 119.0 MPa
Flexural strength	HRN B.B8.017	**12.3 MPa**	9.3 – 15.0 MPa
Breaking load at dowel hole	EN 13364	**3.9 kN**	1.9 – 4.7 kN
Water absorption at atmospheric pressure	HRN B.B8.010	**1.31 %**	by mass
Apparent (bulk) density	HRN B.B8.032	**2,555 kg/m³**	
Density	HRN B.B8.032	**2,665 kg/m³**	Compactness 0.959
Total porosity	HRN B.B8.032	**4.13 vol.-%**	
Frost resistance, 25 cycles	HRN B.B8.001	**Resistant**	Mass loss 0.12 %
Resistance to salt crystallisation (Na_2SO_4), 5 cycles	HRN B.B8.002	**Resistant**	Mass loss 0.31 %
Abrasion resistance (Böhme)	HRN B.B8.015	**25.3 cm³/50 cm²**	
Total sulphur as SO_3 · chlorides as Cl^- · sulphide sulphur	HRN B.B8.042	**0.15 % · 0.0026 %**	Sulphide sulphur: none

Chemical composition

Series B, by mass (HRN B.B8.070)

COMPONENT	%
CaO – calcium oxide	**42.73**
MgO – magnesium oxide	**11.23**
Al_2O_3 – aluminium oxide	**0.16**
SO_3 – sulphur trioxide	**0.15**
Na_2O – sodium oxide	**0.05**
SiO_2 + insoluble residue	**0.04**
$Fe_2O_3 \cdot K_2O$	**0.00**
Loss on ignition (1000 °C)	**45.62**
Total	**99.98**
MINERAL COMPOSITION (CALCULATED)	
Dolomite, $CaCO_3 \cdot MgCO_3$	**51.36**
Calcite, $CaCO_3$	**48.01**

Petrography

Series A, EN 12407 / EN 12670

Classification: dolomitic biosparite (Folk) – a fossiliferous limestone, largely dolomitised; calcitic dolomite of organic origin; fossiliferous dolomitic wackestone (Dunham).

Appearance: light beige to light pinkish grey, homogeneous, fine to medium grained, with shell fragments (bioclasts) usually 0.5–3 mm. No layering.

Composition: bioclasts approx. 30 %, sparitic dolomite approx. 39 %, sparitic calcite approx. 19 %, micrite approx. 7 %, pores approx. 5 %.

Recommended uses

Exterior and interior wall cladding · interior and exterior flooring and paving · stairs, window sills and surrounds · ashlar, masonry and carved elements.