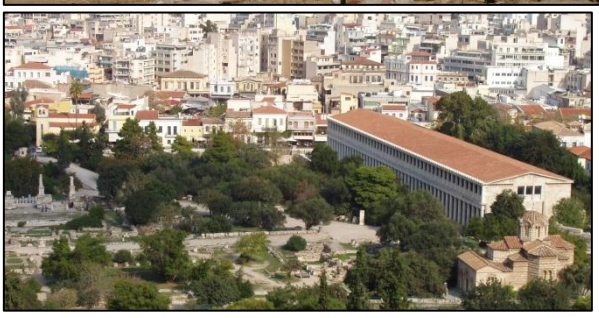
EUROLITHOS European Ornamental Stone Resources

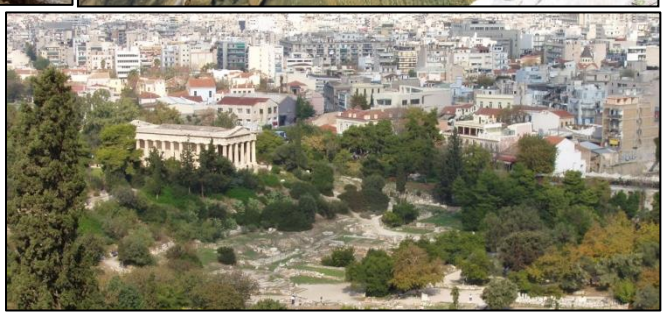




EuroLithosCountry Atlas Greece







EuroLithosAtlas

Ornamental stone resources in Greece

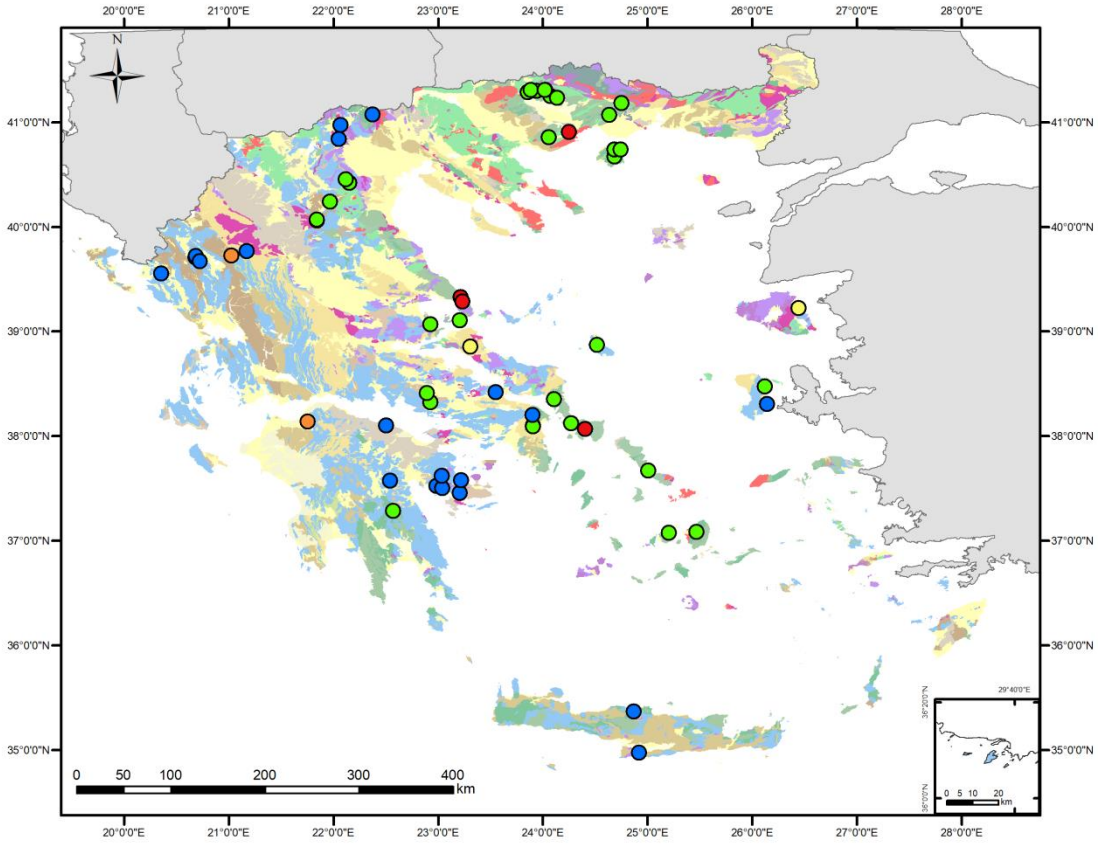
Thematic focus: Greece
Responsible partner: HSGME
Authors: Laskaridis Konstantinos, Arapakou Angeliki
Year: 2021

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Geology of Greece

Greece comprises a wide variety of geotectonic units, widely known as the Hellenides, which belong to the Alpine-Himalayan orogenetic system. They consist of two major groups of geotectonic units, the so-called Internal and External Hellenides. The External Hellenides, occupy the largest part of Western and Central Greece, and are dominated by Mesozoic sedimentary rocks (mostly limestones, dolomites, etc.). In contrast, the external Hellenides dominate the Eastern and Northern parts of Greece and are characterized by more complex geodynamic evolution reflected in their lithological variety. Ophiolitic rocks occur throughout Greece, with their most prominent outcrops located in NW Greece. Metamorphic and magmatic rocks occur mainly in the northern part as well as in the Aegean area, in the Rhodope and Attic-Cycladic Massifs, respectively.



LEGEND

SEDIMENTARY MATERIAL

- Clastic_sediment
- Diamicton
- Gravel
- Clastic sedimentary rock
- Conglomerate
- Sandstone
- Mudstone
- Claystone
- Siltstone
- Shale
- Organic rich sedimentary rock
- Limestone
- Biogenic silica sedimentary rock

IGNEOUS MATERIAL

- Pyroclastic rock
- Granitoid
- Fine grained igneous rock
- Ultramafic igneous rock

COMPOSITE GENESIS MATERIAL

- Gneiss
- Schist
- Glaucophane lawsonite epidote metamorphic rock
- Amphibolite
- Marble
- Migmatite

Commodity

- limestone
- marble
- miscellaneous dimension stones
- sandstone
- slate

INSPIRE-compliant, harmonized digital Lithological Map of Greece, at a scale of 1:1000000 (PHOTIADES A. & ZANANIRI I., IGME, 2016).

Ornamental stone resources in Greece

Ornamental stones deposits are scattered throughout the country. Marbles are the most important ornamental stones of Greece, which occur in a large number of deposits, many of them being known from ancient times (e.g. Pentelikon Mountain, Paros island, Thasos island, etc.). The Greek marbles are characterized by various types in respect to their grain-size, colours, textures, etc. The marble deposits are mostly located in the east and north part of mainland Greece and some of the Aegean islands.
Another group of frequently exploited ornamental stones in Greece, comprises various types of limestones, which also display a large morphological variety. The main production centres are located in NW Greece, the Peloponnese prefecture, and the islands of Evia, Crete and Chios. Slates (a term used to describe rocks of sedimentary and metamorphic origin, i.e. various types of schists) are produced in a few localities, e.g. Northern Greece, Pelion Mountain, and the northern part of Evia island.
Finally, other ornamental stones with limited production include miscellaneous dimension stones and clastic stones (commonly sandstone) extracted from a few localities in Greece.

Ornamental stone production

Greece, having a long tradition in quarrying various types of ornamental stones, has managed, today, to be among the 10 most important producing and exporting countries in the world despite increased competition. Stone quarrying takes place all over Greece, new reserves are gradually exploited and ornamental stones have become widely applicable industrial products. According to 2019 relevant data, annual production is in the order of $10^6 m^3$, from which 27% is exported. The majority of Greek marble exports is absorbed by China (about 50%-60% of the total marble exports). Marble and stone exports represent around 2% of the annual revenues of overall Greek exports (data refer to the period 2012-2019).
Calcitic marbles are mainly located in Attica, Central Greece and Aegean islands, dolomitic marbles in Eastern Macedonia and Thrace, limestones in Epirus, Western and Central Macedonia, Peloponnese and Crete, travertines in Attica, Peloponnese and Central Macedonia, sandstones in Epirus, schists and slates in Central Greece and Thessaly.

Use of ornamental stone and heritage values

Ornamental stone quarrying in Greece has started since ancient times. During the 5th century BC, intensive quarrying has been reported in large exploitation centers, such as: Penteli and Aghia Marina (Attica), Naxos, Paros and Thassos islands, all well-known for their white marbles; Tinos island and Hassabali (Larissa), for their green marbles; Styra and Karystos (Euboea), for “cipollino marbles”; Krokees (Peloponnese), famous for the greenish “krokeatis lithos”; and Skyros island, for multi coloured marbles. The first monuments of Greek sculpture appeared as early as 630 BC. Characteristic monuments are the temple of Zeus in Olympia and the temple of Apollo in Delphi (marble of Paros in the façade and porous-stone for the rest part of the construction). White “Pentelikon” marble is famous for being employed in the construction of historic monuments of art, such as the Parthenon on Athens Acropolis.The Erechtheum, the temple of Olympius Zeus, the statues of Aphrodite of Milos, Hermes of (the sculptor) Praxitelis, Niki of Samothraki etc. are also significant creations using Greek ornamental stones during the classic period. In the early 20th century, Greek stones became well known abroad, exported in Western Europe. The abrupt development of construction in urban centres and the high standard of living increased the demand in marble extraction. Consequently, new reserves all over Greece were exploited and ornamental stones became widely applicable industrial products.

Descriptions of ornamental stone resources

Ornamental stone resources in Greece are described below in the order shown in Tables 1, 2 and 3 based on their commodity and lithology.

Table 1: List of Greek Marbles

No.	Stone name	Commodity	Lithology
1	Akrotiri Chania Semi White	MARBLE	Calcitic Marble
2	Aliveri Grey		
3	Dionyssos Grey		
4	Dionyssos White		
5	Elounda Stone		
6	Lafkos Pink		
7	Naxos Crystallina White		
8	Nestos White		
9	Parnonas Semi White		
10	Paros Semi White		
11	Pteleos Pink		
12	Stenopos Semi White		
13	Syki Semi White		
14	Thassos Crystallina Semi White		
15	Tranovaltos Semi White		
16	Tranovaltos White		
17	Veria White		
18	Roditis Semi White		Calcitic - dolomitic marble
19	Skyros Semi White		
20	Thassos Limenas White		Dolomitic - calcitic marble
21	Karystos Schists Green		Cipollino marble
22	Karystos Schists Grey		
23	Styra Green		
24	Syki Slates		
25	"Granitis" Drama White		Dolomitic marble
26	Kokkinoghia Grey		
27	Kokkinoghia Pink		
28	Ochiro White		
29	Pirgi Drama White		
30	Platanotopos Yellowish White		
31	Thassos White		
32	Tsakalina Nevrokopi White		
33	Volakas Drama Semi White		
34	Volakas Drama White		
35	Evia Alabaster		Onyx marble

Table 2: List of Greek Limestones

N.	Stone name	Commodity	Lithology
36	"Alfa" Porous Limestone	Limestone	Bioclastic limestone
37	"Alfa" limestone		Biomicrite limestone
38	Ioannina Beige-Special		
39	Ioannina Beige-Trani		
40	Ioannina Beige-Vrachos		
41	Psatha Sitia "Maltezopetra"		
42	Ritsona Red		
43	Argolida Black		Dolomite
44	Didymon Beige		
45	Helikonas Pink		
46	Skyros Breccia		
47	Aghios Kyrillos Grey		Dolomitic limestone
48	Aloides Slate		
49	Candia Red		Limestone
50	Carnazeika Beige		
51	Edessa Black		
52	Ligourio Beige		
53	Fanari Trizinia Red		Pelmicrite limestone
54	Levadia Black		Sparitic limestone
55	Kapandriti Travertine		Travertine
56	Pitsa Travertine		
57	Skra travertine		

Table 3: List of Greek Sandstones, Slates and Miscellaneous ornamental stones

N.	Stone name	Commodity	Lithology
58	Demati Green	**Sandstone**	Calcitic grawacke
59	Achaia Sandstone		Lithic feldspar arenite
60	Paros Gneiss-Schist	**Slate**	Gneiss-Schist
61	Pilion Schist-Kalamaki		Mylonite
62	Pilion Schist-Neochori		
63	Eleftheroupolis Akrovouni Schist		Schist
64	Thymiana Chios Stone	**Miscellaneous ornamental stones**	Calcitic pelite
65	Mystegna Lesvos Ignimbrite		Ignimbrite
66	Tinos Green		Ophicalcite

MARBLES

MARBLES:

CALCITIC MARBLES

Akrotiri Chania Semi White



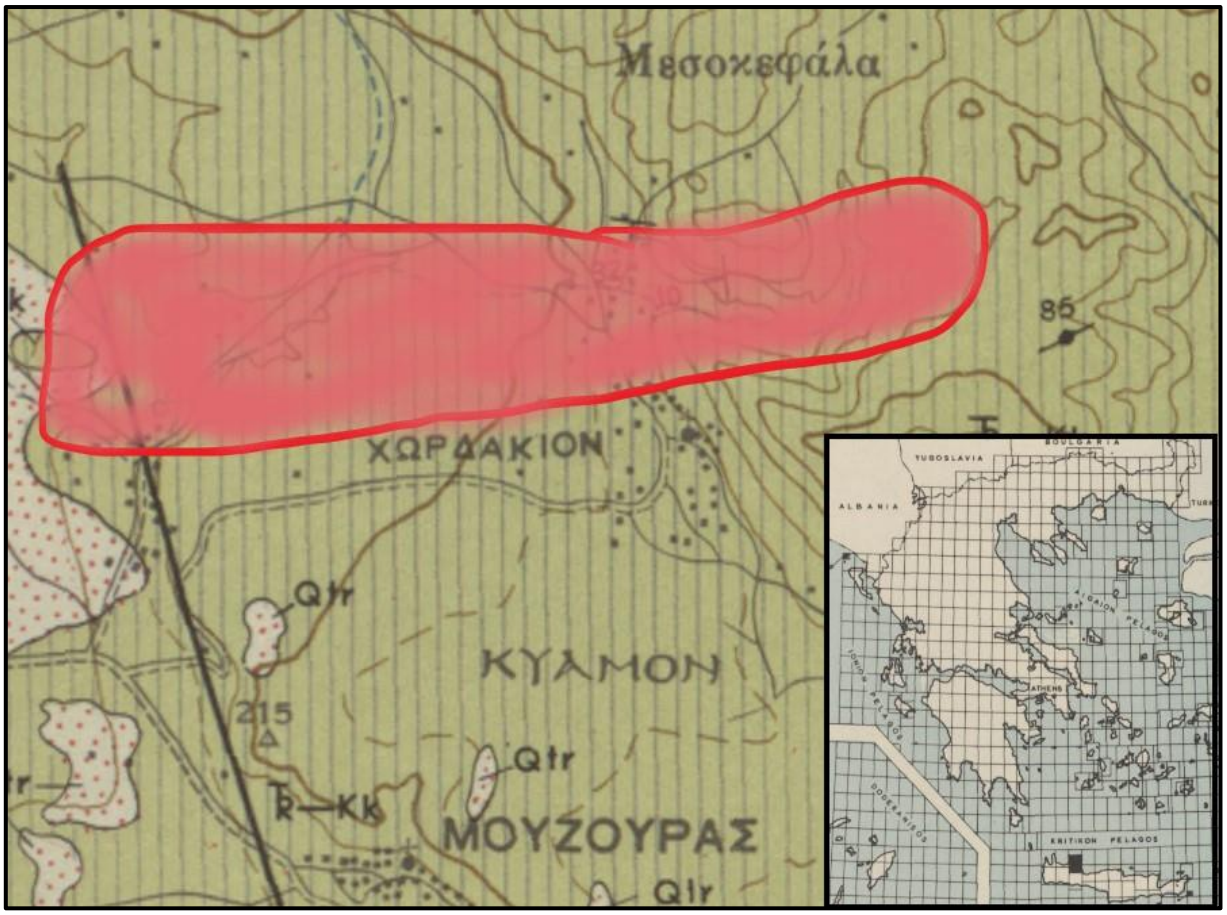
Scale 1:1

Short description: Medium grained calcitic marble in light grey colour with white veins.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Marble	Calcitic marble	Light-Grey	Greece	Crete	Chania	Akrotiri

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Geological setting



Geology: Akrotiri Chania Semi White (red marking) belongs to formations of Tripolis Zone, consisting of limestones, compact, white-grey to bluish, microcrystalline to aphanitic usually with rudist fragments, sometimes breccias, at places dolomitized, strongly karstified. They may include lower members of Jurassic to Triassic age, not proven, though, paleontologically.
(Source: Geological Map of Greece 1:50000, Khania Sheet)

Production: The quarry area is in Akrotiri, on the northern side of the island of Crete.

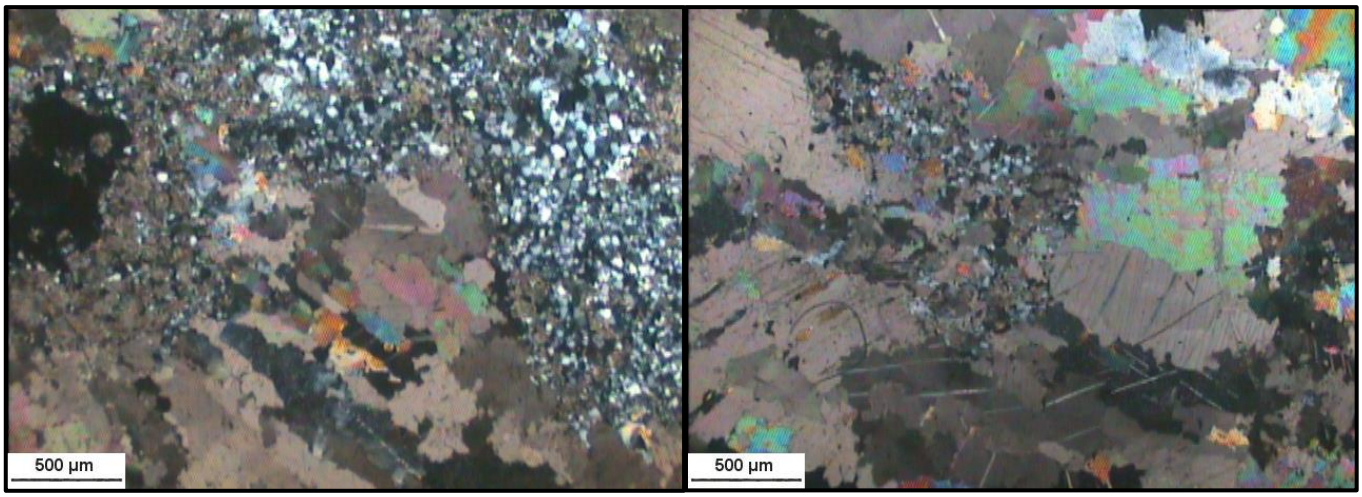
Geological age: Triassic - Cretaceous

Geological unit: Tripolis Zone

Application, use and heritage

Description: Akrotiri Chania Semi White is suitable for interior and exterior uses, such as on wall and floor coverings, fireplaces, kitchens**,** public areas and for many renovation applications**.**

Petrography



Description: Photomicrograph of thin section, showing medium grained textures consisting of allotriomorphic to hypidiomorphic calcite crystals. The white colour is attributed to the presense of quartz or calcite of small particle size.

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Calcite (%)	Quartz (%)	Dolomite (%)	Clay minerals (%)			
95	4	1	AM			

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2670	1,1	0,2	88	11,0

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
12,0	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
-	19	-	-	-	-

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			4	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
<0,05	0,95	<0,05	<0,05	<0,05	54,35	1,05	0,30	<0,05	-	-	42,70

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
24	36	208	4,0	29	13	56	32
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
225	0,0	1600	55	4,0	175	0,0	6,0
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
12	3,0	0,0	4,0	6,0	27		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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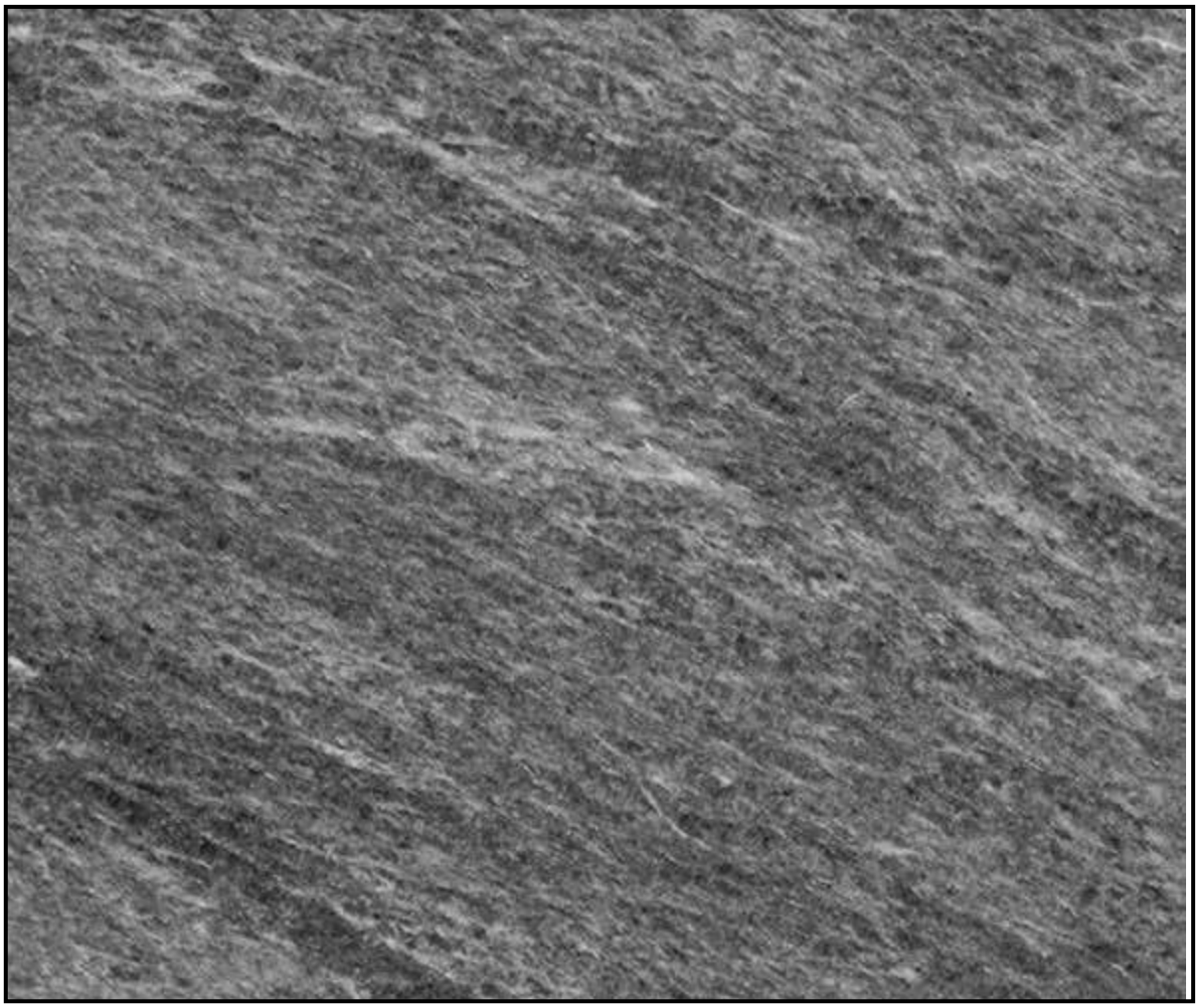
Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
Non-commercial directory		
Commercial directory		
Scientific publication		
Other publication		

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Aliveri Grey



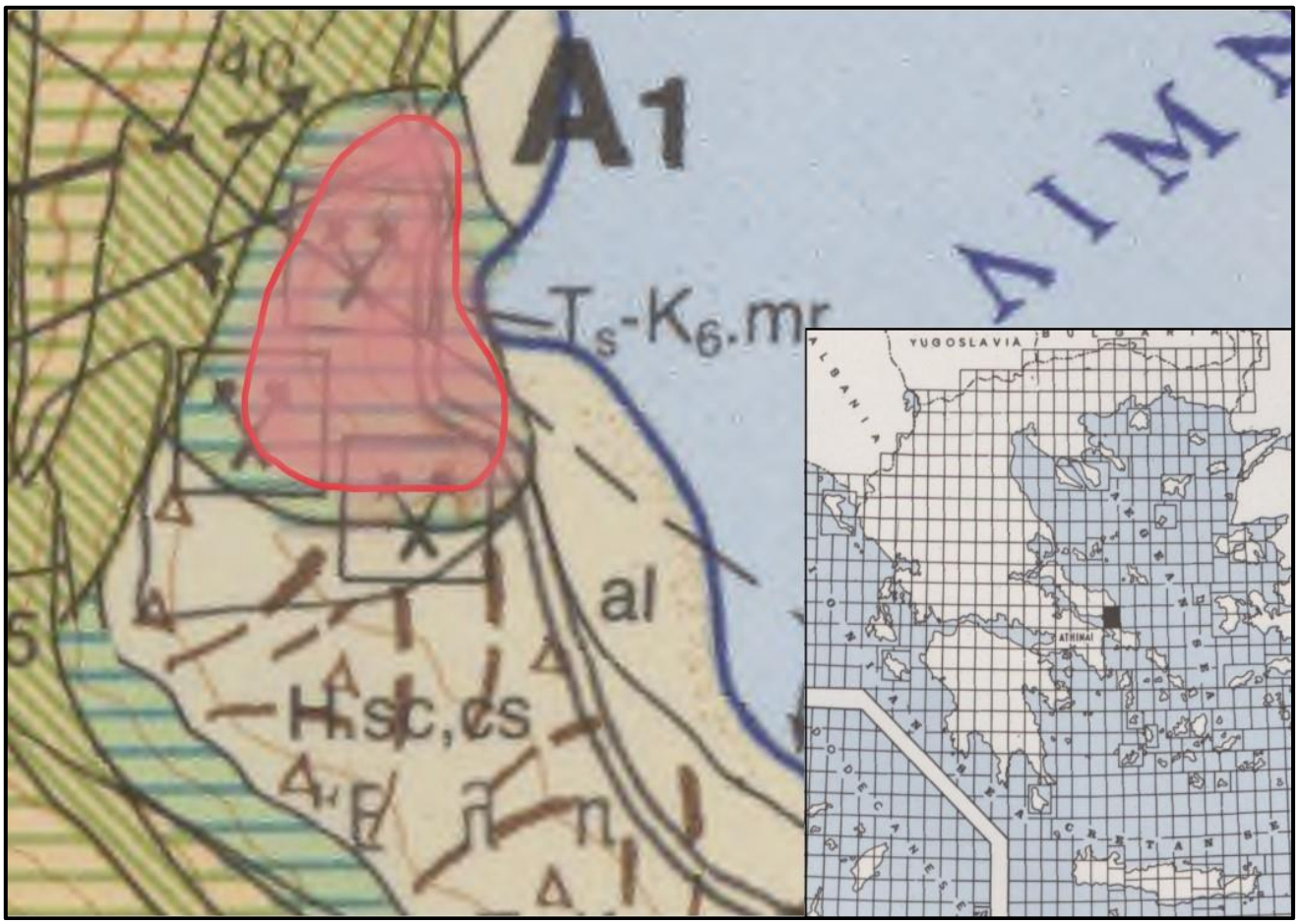
Scale 1:1

Short description: Medium to fine-grained, grey, calcitic marble with a network of off white veins to grey-brown agglomerates.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Marble	Calcitic marble	Grey	Greece	Central Greece/Evia	Kymi-Aliveri	Dystos

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Geological setting



Geology: Alivery Grey (red marking) belongs to marbles of autochthonous unit of Almyropotamos – Attiki. They occupy the area between Aghios Georgios-Styra bay and Distos lake underlying the upper Cenomanian – middle Eocene marbles of Almyropotamos series. In this area, these marbles form the core of a great anticline with axis plunging SSW-wards, resulting in the appearance of the deeper stratigraphic horizons of the Almyropotamos series towards S.S.E. (area of Aghios Georgios bay). They are marbles coarse-crystalline, medium to thick-bedded, ight-coloured, grey to whitish, locally with thin intercalations of mainly muscovite and quartz schists.
(Source: Geological Map of Greece 1:50000, Aliveri Sheet).

Production: The most important quarry area is near Lake Dystos, at the southern edge of central Evia.

Geological age: Upper Triassic – Upper Cenomanian

Geological unit: Autochthonous Unit of Almyropotamos – Attiki

Application, use and heritage

Description: Aliveri Grey can be applied to many construction works, such as wall cladding, interior and exterior flooring, stairs, paving, bathrooms and it is acceptable to all processing that can get a marble.



Ermou street, Athens: Paving with Aliveri Grey.



Interior flooring with Aliveri Grey.

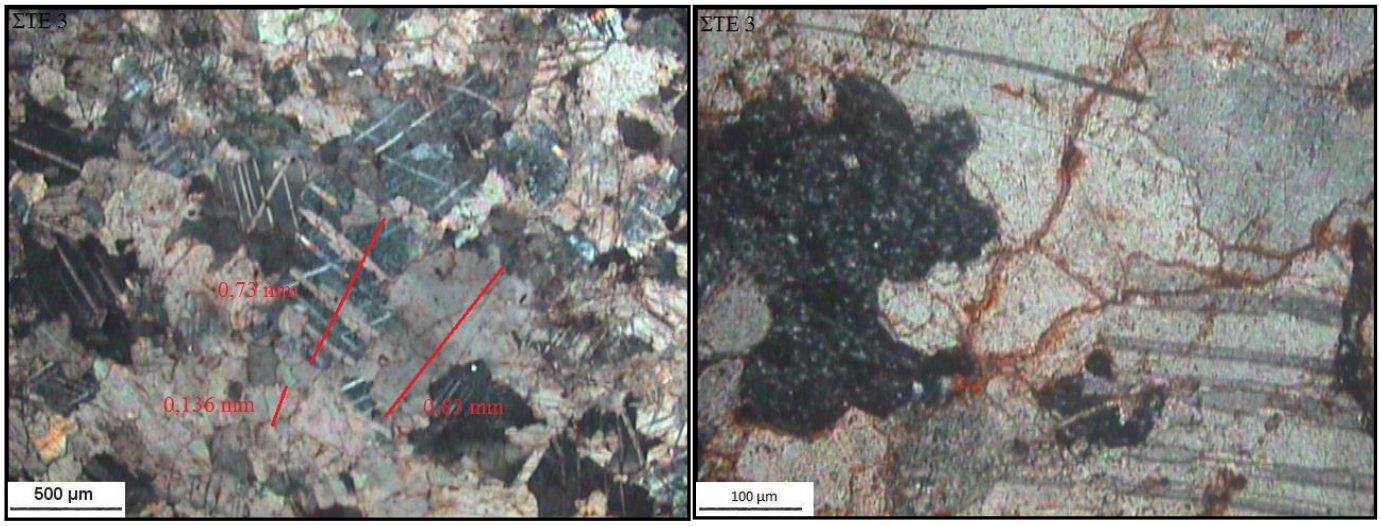
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Building of Ethniki Hellenic General Insurance Company: Exterior flooring, stairs and cladding with Aliveri Grey.

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Petrography



Description: Photomicrograph of thin section, showing hypidiomorphic calcite crystals and dolomite veins or agglomerates. The texture is almost xenoblastic, recrystallization processes have taken place and oxides are along grain boundaries.

Source of information: Hellenic Survey of Geology and Mineral Exploration

Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Calcite (%)	Dolimite (%)	Quartz (%)	Albite (%)	Opaque minerals (%)		
96	2	2	AM	AM		

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2710	0,5	0,1	95	14,8

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
13,8	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
-	21	-	-	2150	3

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			3	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
0,40	0,00	0,08	-	0,80	55,40	0,39	0,10	0,00	-	-	43,80

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
1,0	17	21	2,5	19	6,5	16	5,0
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
340	0,3	96	9,3	0,0	1,4	0,0	0,0
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
51	1,5	2,8	1,1	0,6	0,8		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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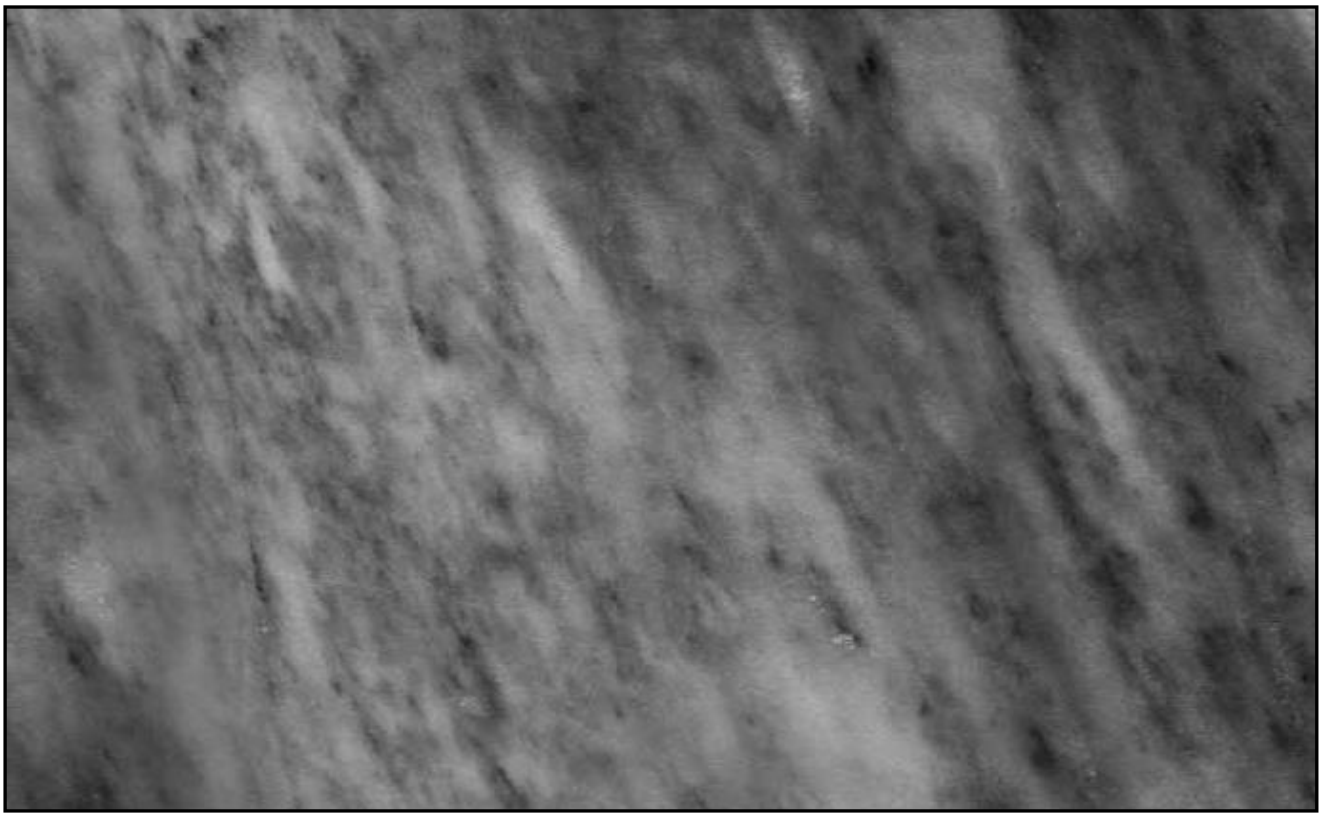
Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
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Scientific publication		
Other publication		

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Dionyssos Grey



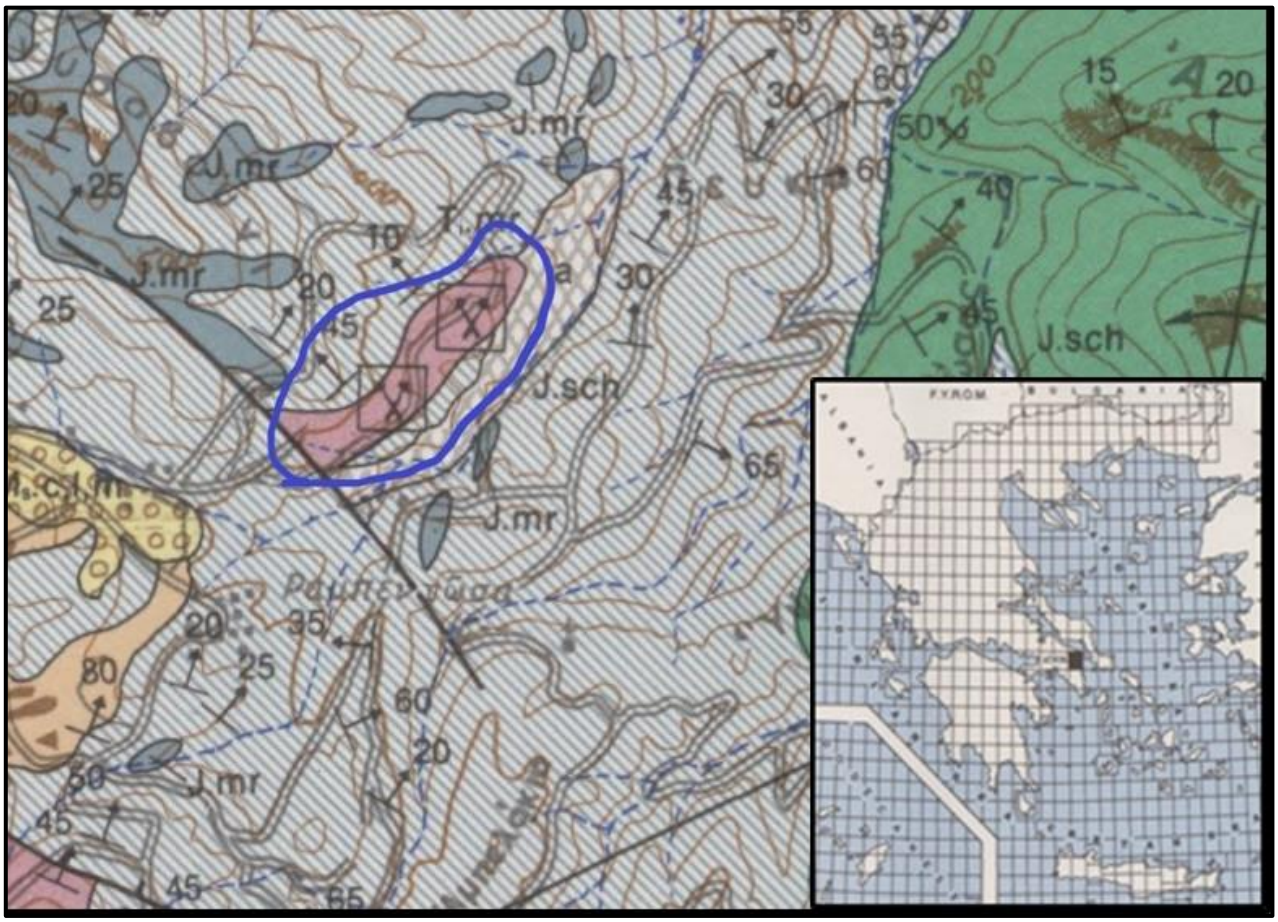
Scale 1:1

Short description: Medium to fine-grained calcitic marble with ash alternations and white or off-white bands.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Marble	Cacitic marble	Grey	Greece	Attica	Dionyssos	Dionyssos

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Geological setting



Geology: Penteli marbles occur in Almyropotamos – Attiki autochthonous unit of formations that belongs to the huge platform of the Gavrovo – Tripolis zone.
(Source: Geological Map of Greece 1:50000, Kifissia Sheet)

Production: Dionyssos marble has been quarried at the Dionyssovouni site, Dionyssos, Attica, more than 100 years.

Geological age: Neopaleozoic – L.M. Triassic
Geological unit: Penteli marbles

Application, use and heritage

Description: The marble of Dionyssos can be applied to many construction works, cladding, floors, stairs, bathrooms and it is acceptable to all processing that can get a marble.



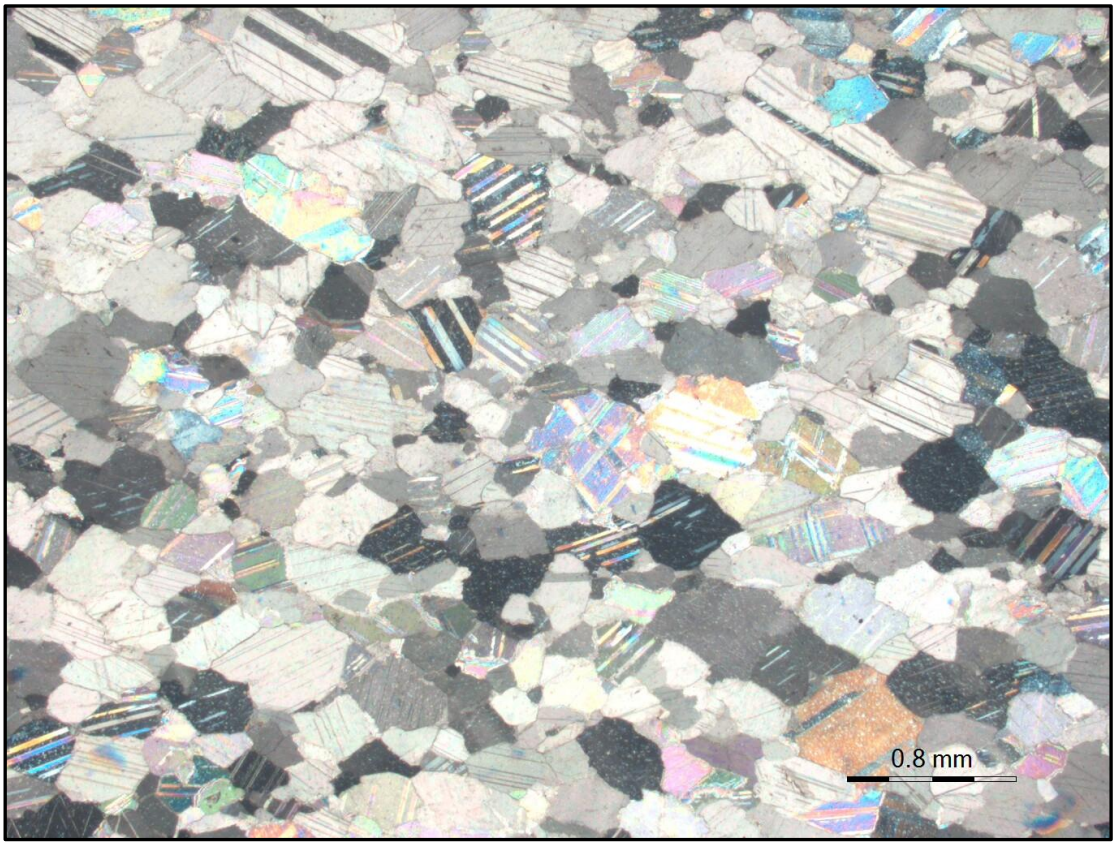




Archaeological Museum of Olympia: Restoration of the external area. The original building was re-purposed and since 2004 has been a museum about the history of the original Olympic games.

(Source: *Hellenic Republic - Ministry of Culture and Sports* and *Wikipedia*)

Petrography



Description: Photomicrograph of thin section, showing calcite crystals and dolomite microveins. Tectonic stress occurs in calcite crystals.

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Calcite (%)	Quartz (%)	Muscovite (%)	Dolomite (%)	Iron Oxides (%)		
91	4	3	2	AM		

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2710	0,3	0,1	114	18,2

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa
-	-		

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
18,6	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
-	20	-	-	2000	3

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			4	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
1,20	0,50	0,05	-	1,20	52,40	0,35	0,17	<0,02	-	-	43,30

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
0,2	21	30	1,3	12	0,8	7,0	0,0
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
283	0,0	0,0	1,3	0,0	0,0	0,0	0,0
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
2,0	2,7	1,8	0,0	0,3	0,2		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
Non-commercial directory	Hellenic Republic Ministry of Culture and Sports	https://www.culture.gov.gr/el/service/SitePages/view.aspx?iID=1514#prettyPhoto[Gallery]/2/
	Wikipedia	https://de.wikipedia.org/wiki/Arch%C3%A4ologisches_Museum_Olympia
Commercial directory		
Scientific publication		
Other publication		

Compiled by:	**Hellenic Survey of Geology and Mineral Exploration (H.S.G.M.E.)** https://www.eagme.gr/	

Dionyssos White

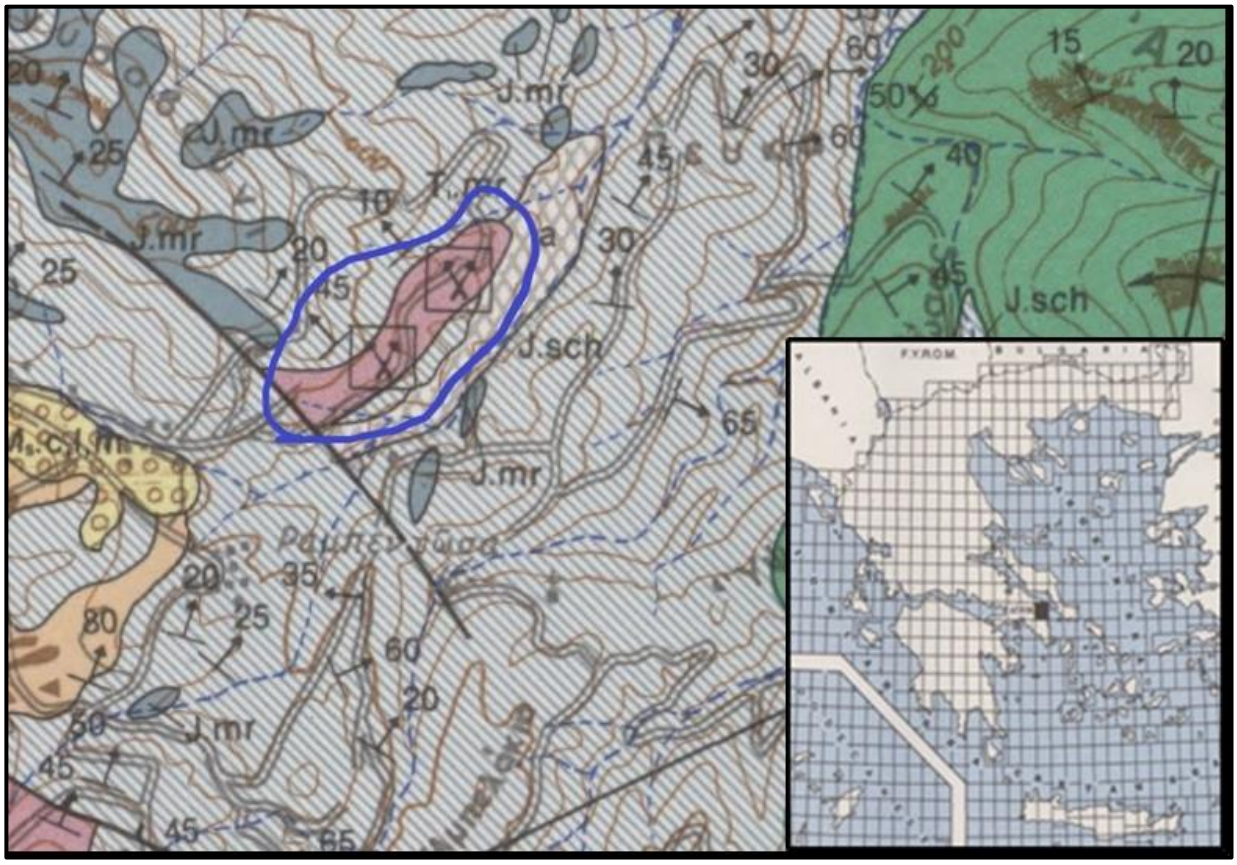


Scale 1:1

Short description: Medium to fine-grained marble characterized by white background colouration with light grey or green banding.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Marble	Calcitic marble	White	Greece	Attica	Dionyssos	Dionyssos

Geological setting



Geology: Penteli marbles (blue curve) occur in Almyropotamos – Attiki autochthonous unit of formations that belongs to the huge platform of the Gavrovo – Tripolis zone.

(Source: Geological Map of Greece 1:50000, Kifissia Sheet)

Production: Dionyssos marble has been quarried at the Dionyssovouni site, Dionyssos, Attica, more than 100 years.

Geological age: Neopaleozoic – L.M. Triassic
Geological unit: Penteli marbles

Application, use and heritage

Description: Dionyssos marble has the same chemical composition and texture as the Pentelic marble renowned since antiquity. Pentelic marble was quarried during the "Golden Age" of Pericles (5th century B.C. in Athens) and supplied thousands of cubic metres of material used to construct the Athens Acropolis monuments and in the creation of all the great Classical, Hellenistic and Roman statues. In the late 1970s, quarrying activity stopped on the southwestern part of the Pentelicon mountain. The marble of Dionyssos can be applied in fireplaces, bathrooms, stairs, floors, swimming pools, works of art. Dionyssos marble is acceptable to all processing that can get a marble.



The Megaron Athens Concert Hall (1991). Dionyssos marble has been used exclusively for the Hall's exterior cladding.

(Photo: wikipedia)



Restoration of the Acropolis monuments including the Parthenon. Restoration interventions in the classical buildings of the Acropolis started in the 1970s intending mainly to the protection and preservation of the monuments. The failures of previous restorations had caused extensive damages and fractures and cracks in the marbles; moreover, air pollution necessitated the removal of the sculptures from the monuments and their safekeeping in a protected environment. Until today the programmes completed are the restoration of the Erechtheion, the Propylaia and the temple of Athena Nike, while the works of restoring the Parthenon and the Acropolis Wall are still in progress.

(Source: Acropolis Restoration Service)

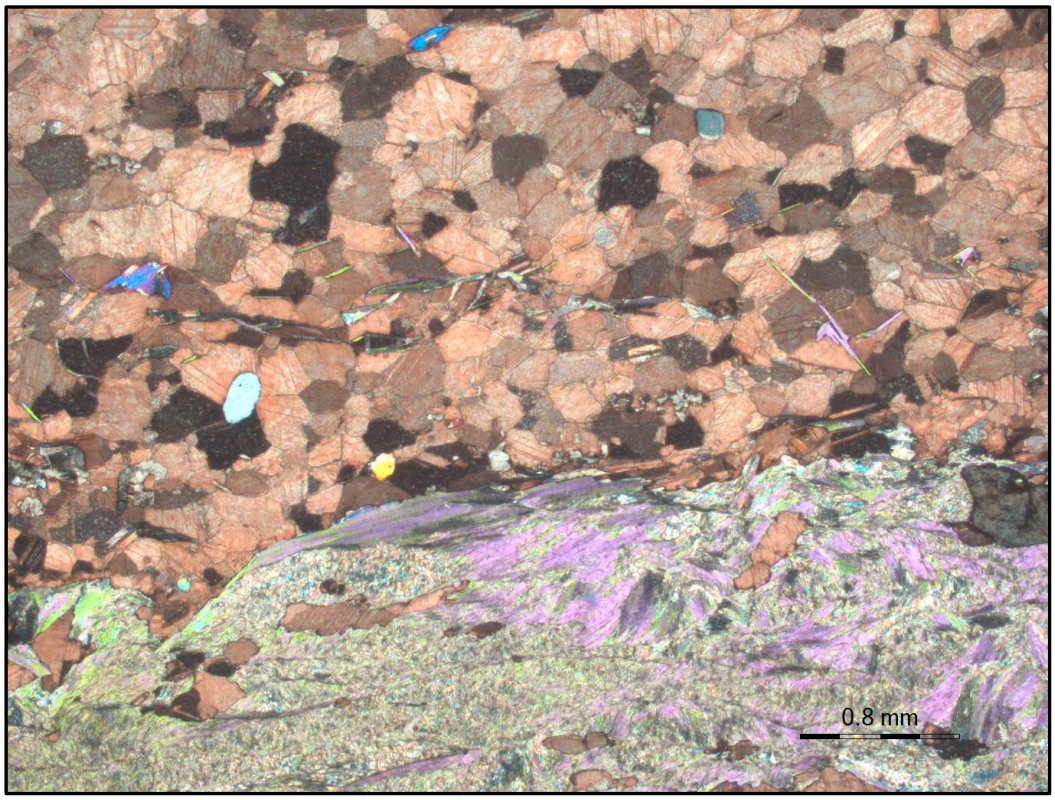


Hotel Grande Bretagne: Cladding with dionyssos marble.

(Photo: wikipedia)

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Petrography



Description: Photomicrograph of thin section, showing calcite crystals and dolomite microaggregates or microveins. The characteristic veins, which cross the rock mass, consist of exfoliated muscovite, chlorite and minimal titanium.

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Calcite (%)	Muscovite (%)	Quartz (%)	Chlorite (%)	Dolomite (%)	Titanite (%)	Opaque minerals (%)
92	4	2	1	1	AM	AM

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2720	0,5	0,1	97	18,9

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa
-	-		

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
16,1	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
-	21	-	-	1900	3

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			6	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
2,95	1,60	0,30	-	1,30	50,90	0,14	0,53	0,05	-	-	41,40

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
0,8	16	64	1,6	10	29,5	29	2,3
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
134	0,2	85	1,8	0,0	10,8	0,0	0,0
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
23,1	3,6	9,1	0,5	1,4	0,7	-	-
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
-	-	-	-	-	-	-	-
Tl (ppm)							
-							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	www.eagme.gr
Non-commercial directory	Wikipedia	https://el.wikipedia.org/wiki/%CE%9C%CE%AD%CE%B3%CE%B1%CF%81%CE%BF_%CE%9C%CE%BF%CF%85%CF%83%CE%B9%CE%BA%CE%AE%CF%82_%CE%91%CE%B8%CE%B7%CE%BD%CF%8E%CE%BD#/media/%CE%91%CF%81%CF%87%CE%B5%CE%AF%CE%BF:Athens_Concert_Hall_by_Nea_Peloponnisos.jpg https://de.wikipedia.org/wiki/Hotel_Grande_Bretagne#/media/Datei:Hotel_Grande_Bretagne_Balkone.jpg
Commercial directory		
Scientific publication		
Other publication	Acropolis Restoration Service	https://www.ysma.gr/en/monuments/parthenon/ https://www.ysma.gr/en/the-service/fields-work/restoration/

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Elounda Stone

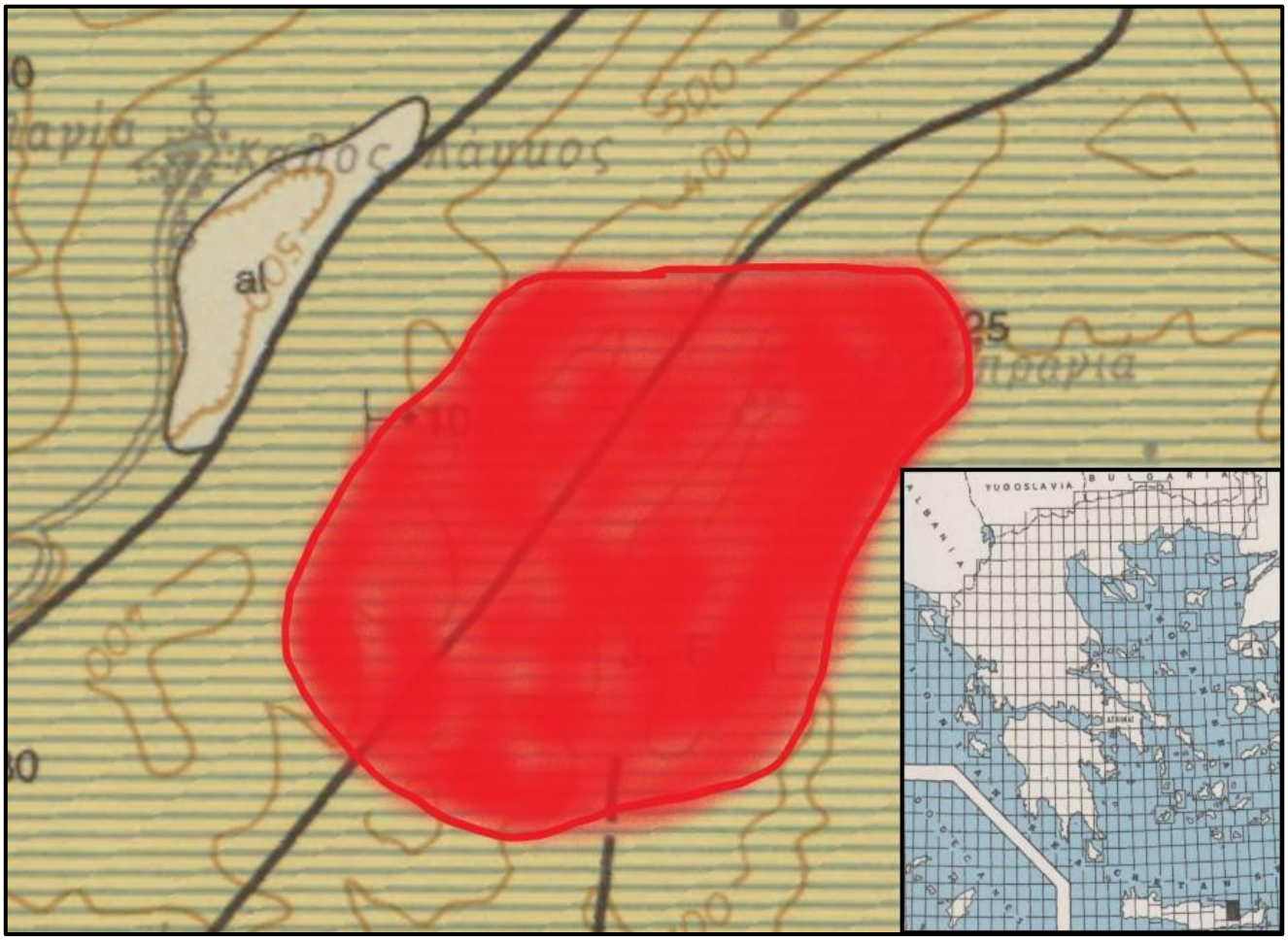


Scale 1:1

Short description: Fine-grained, black calcitic marble with sparse yellowish banded veins. The yellowish colour is due to quartz agglomerates.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Marble	Calcitic marble	Black	Greece	Crete	Agios Nikolaos	Elounda

Geological setting



Geology: Elounda Stone (red marking) belongs to the Autochthonous series of Crete, consisting of "Platy limestones" (Plattenkalk), crystalline limestones and locally marbles, medium to coarse crystalline, grey to black-grey, well-bedded in banks, a few cm up to 1m thick.

(Source: Geological Map of Greece 1:50000, Ayios Nikolaos Sheet)

Production: The quarry area is near Elounda town, on the northern coast of the island of Crete.

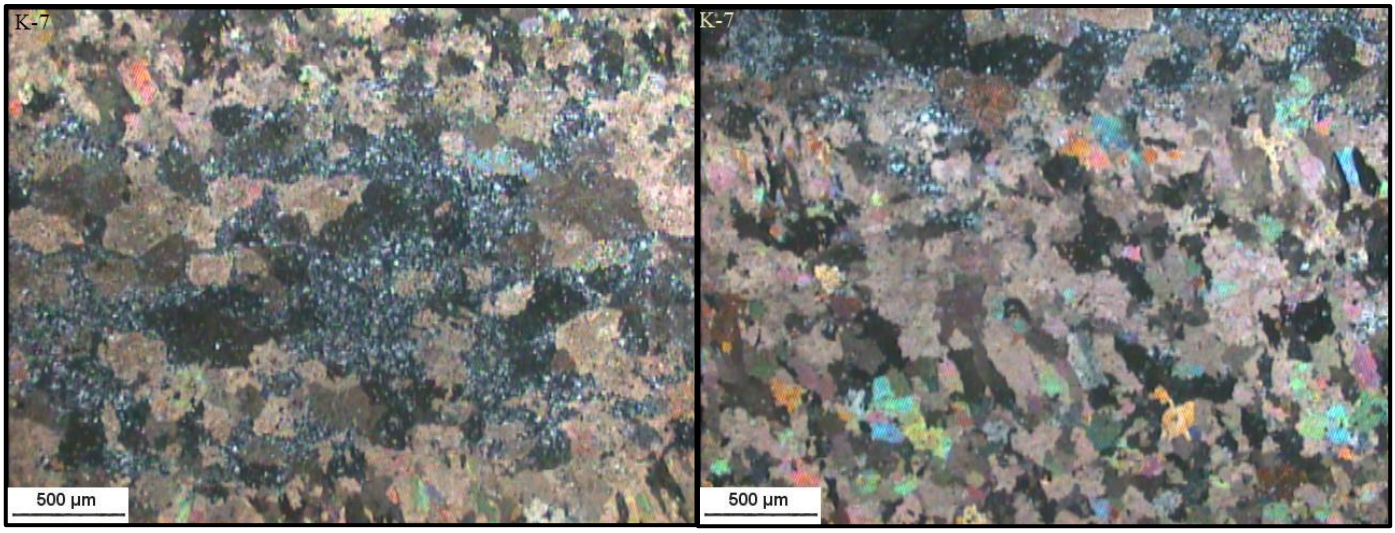
Geological age: Middle Jurassic - Eocene

Geological unit: Autochthonous Series of Crete

Application, use and heritage

Description: Elounda stone is suitable for various interior and exterior uses and applications, such as wall cladding, floor covering, stairs, kitchens, fireplaces, bathrooms.

Petrography



Description: Photomicrograph of thin section, showing scattered quartz agglomerates and elongated and oriented calcite crystals, exhibited undulose extinction and twinning, as a result of tectonic processes.

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Calcite (%)	Quartz (%)	Dolomite (%)	Mica (Sericite) (%)	Clay minerals (%) (%)	Iron Oxides – Hydroxides (%)	
89	10	1	AM	AM	AM	

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2700	0,3	0,1	126	25,6

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
26,6	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
-	17	-	-	-	-

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			2	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
18,60	0,95	0,55	0,05	0,35	43,40	1,10	0,50	<0,05	-	-	34,50

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
9,0	7,0	488	5,0	14	14	24	3,0
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
232	0,0	63	4,0	0,0	8,0	0,0	0,0
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
19	10	1,0	1,0	2,0	1,0		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
Non-commercial directory		
Commercial directory		
Scientific publication		
Other publication		

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Lafkos Pink

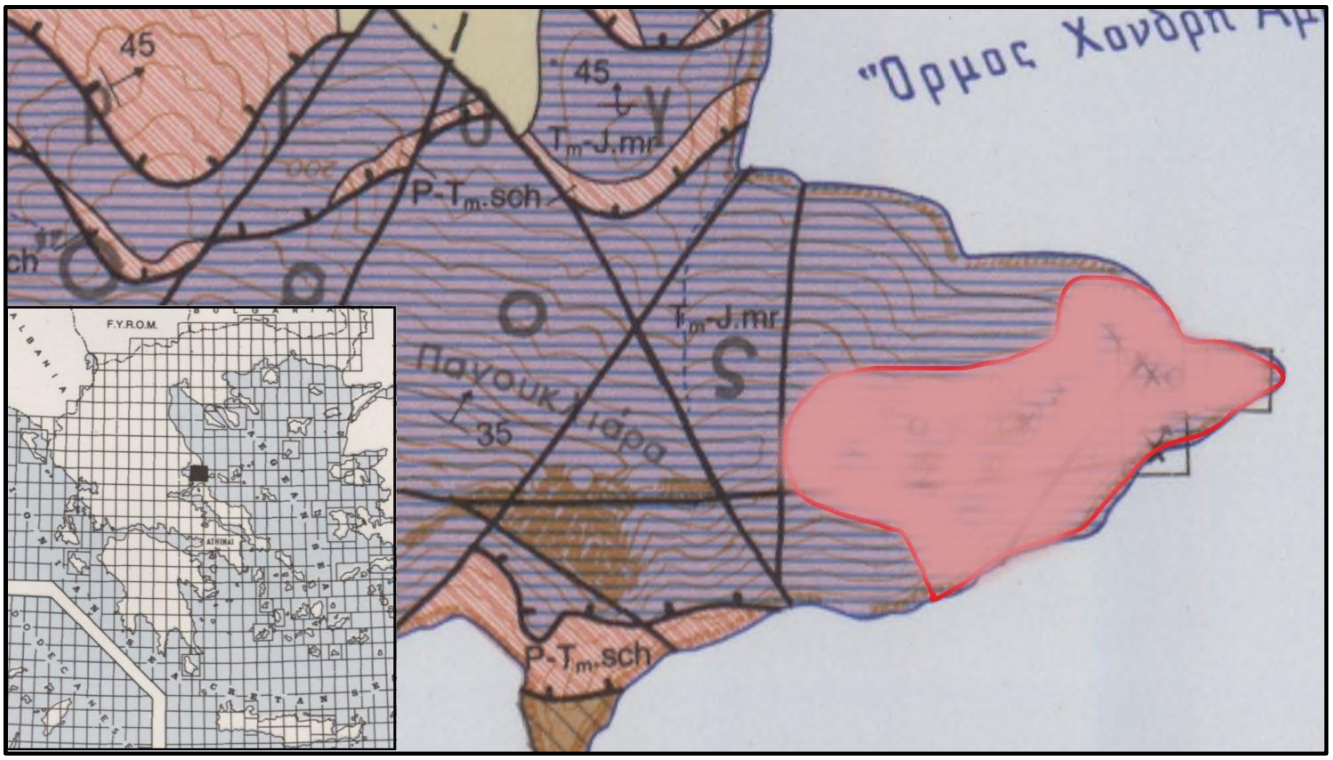


Scale 1:1

Short description: Fine-grained pink calcitic marble with white banded veins.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Marble	Calcitic marble	Pink	Greece	Thessalia	Volos	Lafkos

Geological setting



Geology: Lafkos pink (red marking) is marble, belonging to the Trikeri Unit, series of strongly tectonized carbonate rocks (marbles and less crystalline dolomites) overlying the Neopaleozoic-middle Triassic formations. Their colour presents great variety, mainly in lower members, from white, whitish to pinkish-white and greyish which prevails in the upper members. In places, they are karstified, while locally, (western part of Tissaeon) they are bituminous. They are mainly fine-grained with a low proportion of dolomite and very few admixtures od iron-hydroxides.
(Source: Geological Map of Greece 1:50000, Argalasti Sheet)

Production: The quarry area is in South Pelion, near Lafkos village.

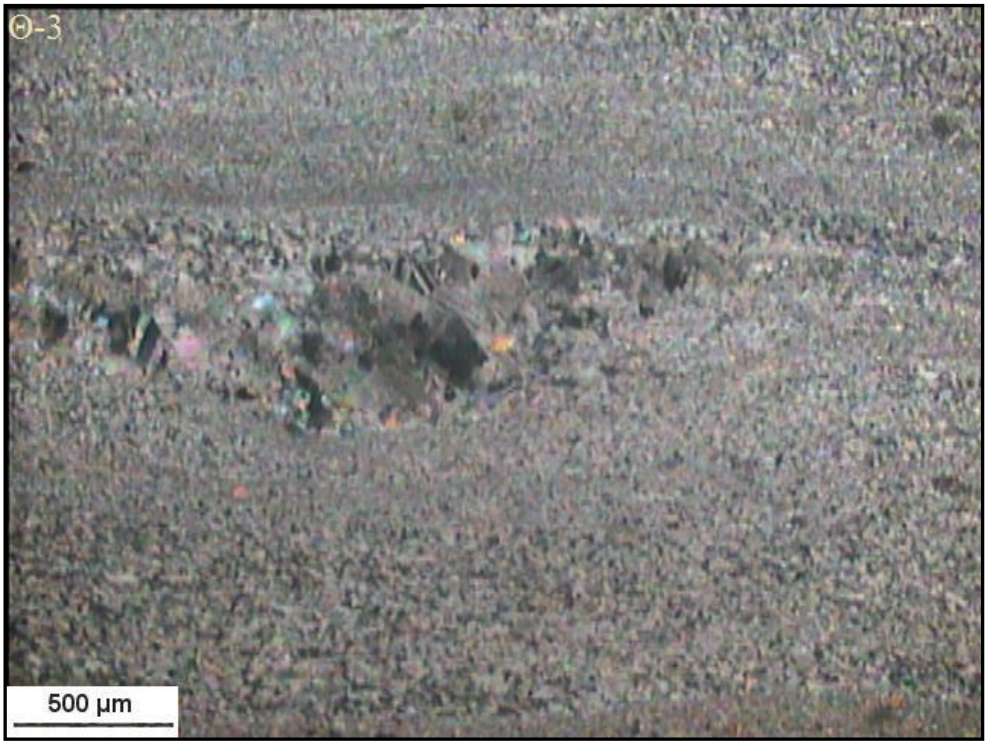
Geological age: Middle Triassic - Jurassic

Geological unit: Trikeri Unit

Application, use and heritage

Description: Lafkos pink can be applied to many construction works, for interior and exterior uses, such as wall cladding, floor coverings, stairs, bathrooms and it is acceptable to all processing that can get a marble.

Petrography



Description: Photomicrograph of thin section, showing calcite crystals which are hypidiomorphic, oriented and lightly elongated. The white banded veins are due to the residual dolomite, while the pink colour is due to iron oxides.

Source of information: Hellenic Survey of Geology and Mineral Exploration

Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Calcite (%)	**Dolomite (%)**	**Opaque minerals (%)**				
95	5	AM				

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2700	0,3	0,1	113	25,6

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
21,9	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
-	25	-	-	2200	3

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			3	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
<0,05	<0,05	0,05	<0,05	0,05	55,05	0,60	0,10	<0,05	-	-	43,30

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
2,0	537	62	5,0	237	9,0	21	3,0
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
110	<1,0	71	9,0	<1,0	2,0	<1,0	<1,0
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
3,0	1,0	<1,0	1,0	<1,0	1,0		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
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Naxos Crystallina White



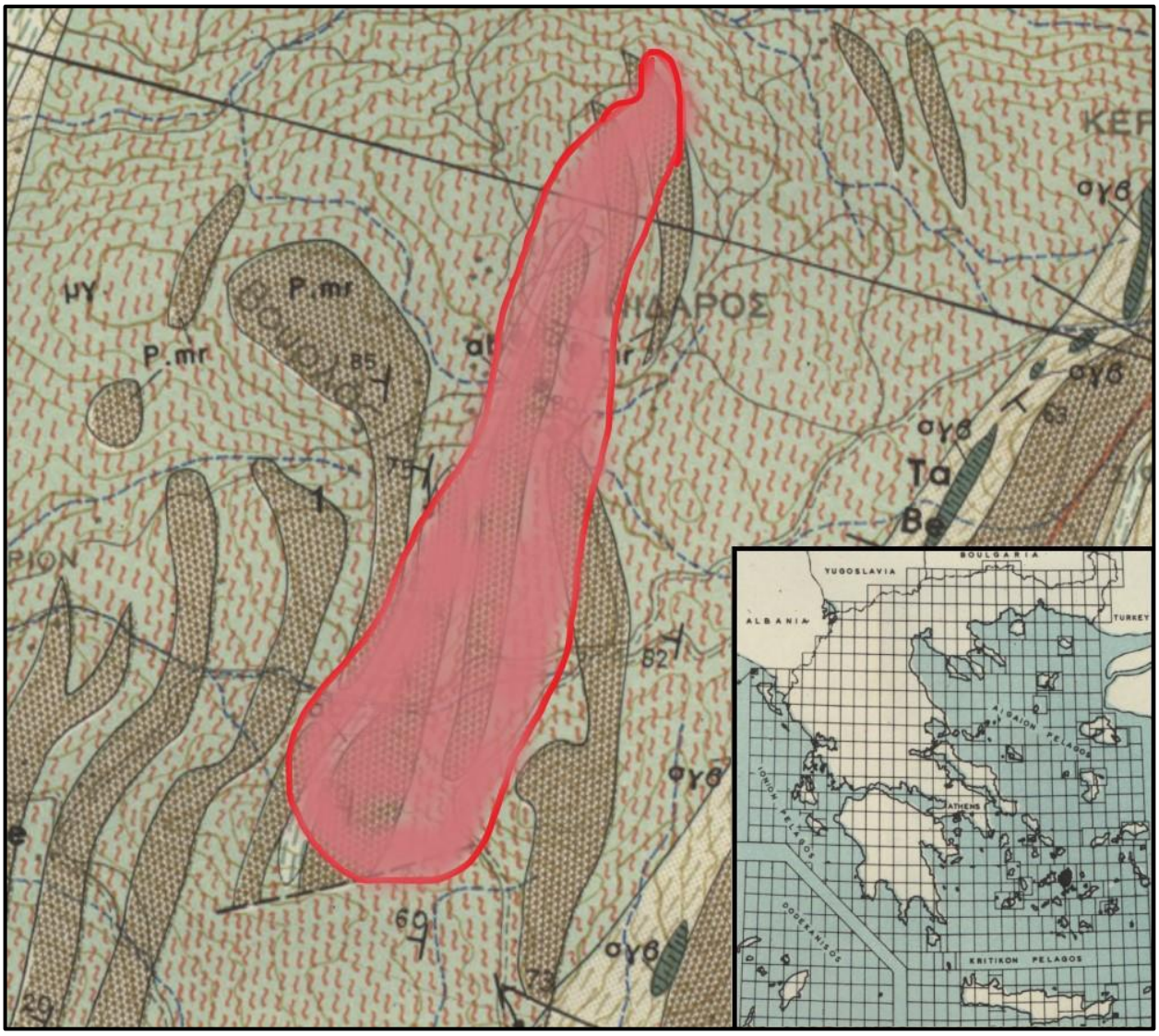
Scale 1:1

Short description: White coarse-grained calcitic marble with large crystals.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Marble	Calcitic marble	White	Greece	South Aegean	Naxos	Naxos

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Geological setting



Geology: Naxos Crystallina White (red marking) belongs to the marbles of metamorphic complex, coarsely crystalline and white, containing intercalations of carbonate schists, amphibolites and biotite-hornblende gneisses. In the stratigraphically higher parts of the metamorphic sequence the marbles are finer grained. All the marbles exhibit rather rapid lateral changes in thickness and composition, and most of them, apart from those in the migmatite, contain numerous occurences of emery or diasporite which often seem to be concentrated in certain horizons.
(Source: Geological Map of Greece 1:50000, Island Naxos)

Production: The most important quarry area is near Kinidaros village in Naxos Island.

Geological age: Pre-Permian

Geological unit: Metamorphic Complex

Application, use and heritage

Description: Naxos Crystallina marble shines in the sun and testifies to the long history of Naxos island. Naxos marble is durable and less prone to leak stains due to its low porosity. It is used for various interior and exterior decorations, such as tiles, building facades, floors, stairs and works of art. It is also used for the restoration of Archaeological Monuments.



Restoration of the Tholos in the Sanctuary of Asklipios Epidaurus.

(Source: http://odysseus.culture.gr/h/3/eh351.jsp?obj_id=2374)



Restoration of the monuments of Carthaea: It was conducted by the Greek Ministry of Culture through the Committee for the "Conservation and Restoration of ancient Karthaia on Keos" in the years 2002-2008 and 2011-2015. The projects have been financed by the European Union. Work has been carried out on the temples of Apollo and Athena, on the Propylon, the Building D, the theater, and on their immediate surroundings.

(Source: Wikipedia)



Restoration of the Ancient Sanctuary of Apollo and Demeter at Fyroulas, Sagri, Naxos.

(Source: https://www.naxos.gr/the-ancient-sanctuary-of-apollo-and-demeter-at-gyroulas-sagri/?lang=en)

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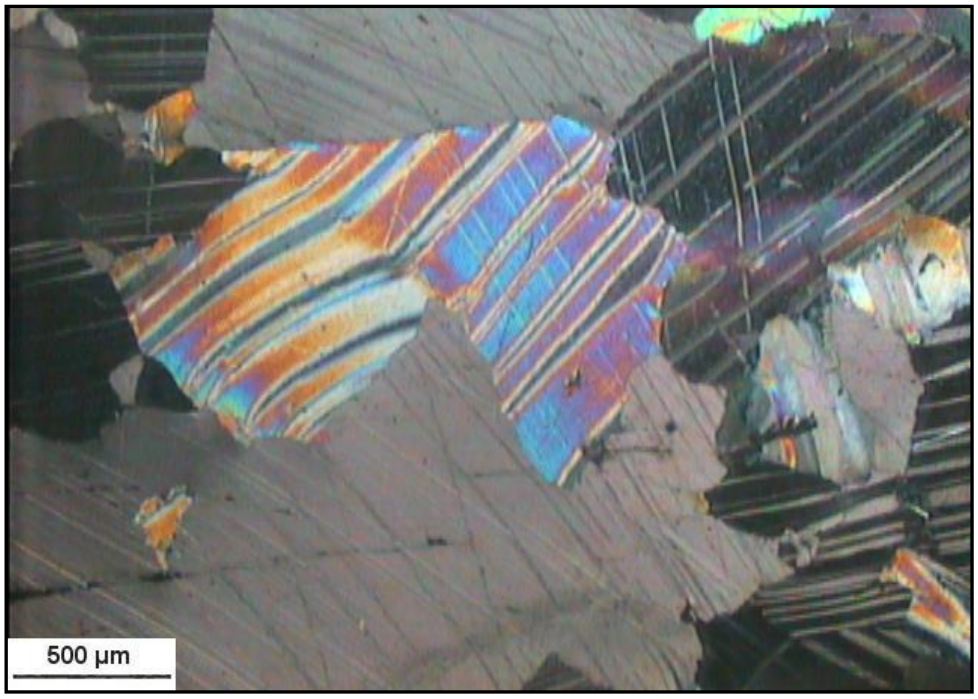


The **Kouros of Apollonas**, also called the **Colossus of Dionysus**, is a 10.7 metre tall unfinished statue of Naxian marble with a weight of around 80 tonnes. It is located in an ancient quarry near Apollonas, a small town in the northern part of Naxos, one of the Cycladic Islands in the Aegean Sea. The statue is a kouros dating from Archaic period of Ancient Greece, around the turn of the seventh and sixth centuries BC.

(Source: https://en.wikipedia.org/wiki/Kouros_of_Apollonas)

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Petrography



Description: Photomicrograph of thin section, showing hypidiomorphic calcite crystals, triple junction grain boundary contacts and “curved borders”. Geniculate twinning is also illustrated, as a result of tectonic processes.

Source of information: Hellenic Survey of Geology and Mineral Exploration

Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Calcite (%)						
100						

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2710	0,3	0,1	86	9,5

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa
-	-		

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
8,3	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
-	17	-	-	1500	3

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			4	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
<0,05	<0,05	<0,05	<0,05	0,25	54,80	1,10	0,27	<0,05	-	-	43,05

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
Non-commercial directory	ΟΔΥΣΣΕΥΣ Ministry of culture and Sports	http://odysseus.culture.gr/h/2/gh251.jsp?obj_id=14321 http://odysseus.culture.gr/h/3/eh351.jsp?obj_id=2374
	Wikipedia	https://el.wikipedia.org/wiki/%CE%9A%CE%B1%CF%81%CE%B8%CE%B1%CE%AF%CE%B1#/media/%CE%91%CF%81%CF%87%CE%B5%CE%AF%CE%BF:Karthaia_upper_plateau.JPG https://en.wikipedia.org/wiki/Kouros_of_Apollonas
Commercial directory		
Scientific publication		
Other publication	Naxos and Small Cyclades	https://www.naxos.gr/the-ancient-sanctuary-of-apollo-and-demeter-at-gyroulas-sagri/?lang=en

Compiled by:	**Hellenic Survey of Geology and Mineral Exploration (H.S.G.M.E.)** https://www.eagme.gr/	

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Nestos White



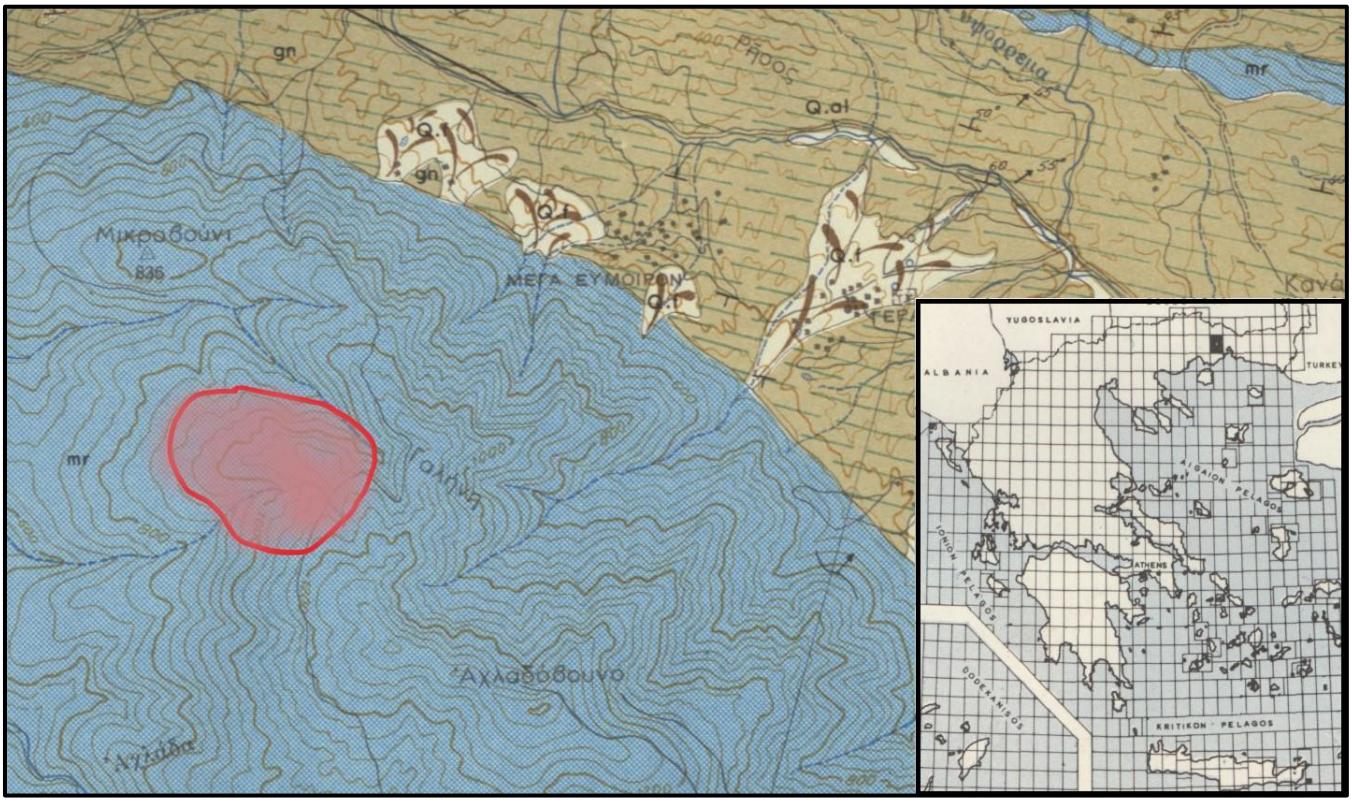
Scale 1:1

Short description: White, fine-grained to medium grained, calcitic marble with off-white or ash-grey veins.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Marble	Calcitic marble	White	Greece	East Macedonia and Thrace	Kavala	Komnina

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Geological setting



Geology: Nestos White (red marking) are white to light grey coloured, poorly bedded, massive marbles, predominate; originally they were taken as reef limestones. Besides calcite, only very small amounts of mica occur, locally. The grain size is 0,5mm or larger. Near the contacts with schists and gneisses the marbles get darker grey colours. Here, the percentage of minerals, such as muscovite, quartz, albite and graphite, increase. The grey marbles are well to thin-bedded. Alternating and interfingerring with amphibolitic rocks, schists and gneisses, is common.
(Source: Geological Map of Greece 1:50000, Xanthi Sheet)

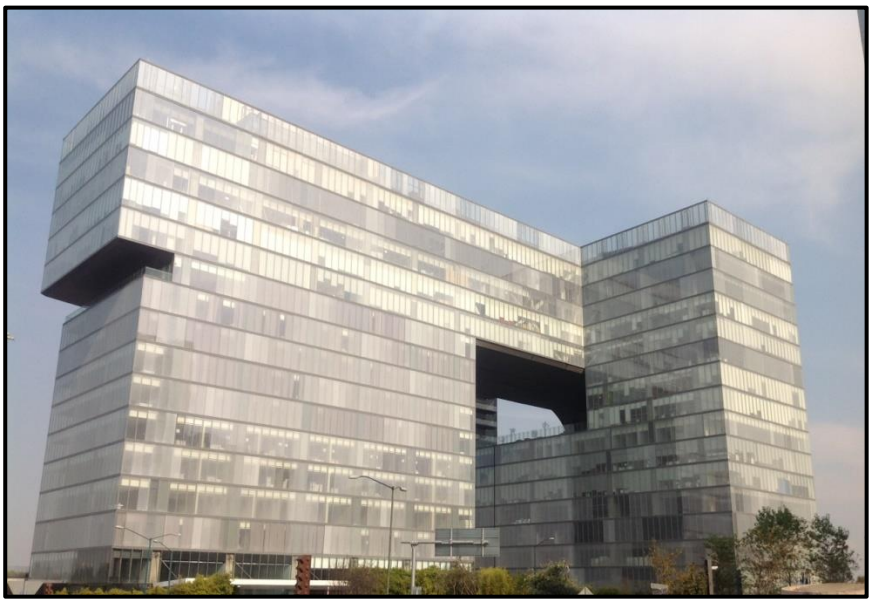
Production: The most important quarry area is near the villages of Komnina and Stavroupolis.

Geological age: -

Geological unit: Metamorphic Rocks - Marbles

Application, use and heritage

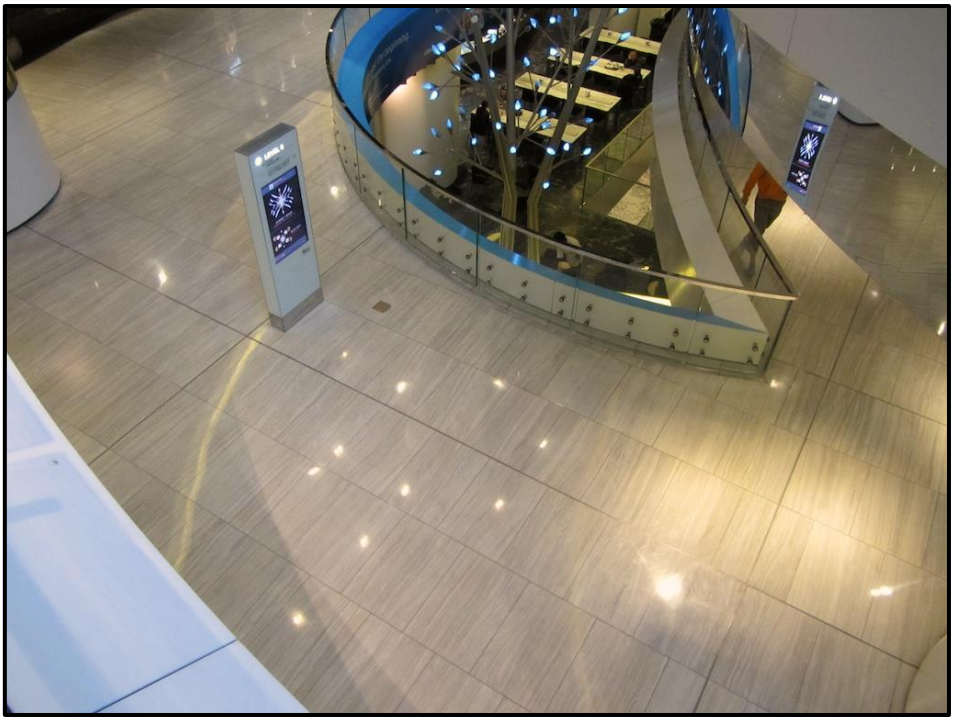
Description: Nestos White is suitable for exterior and interior uses, wall cladding, floor coverings, bathrooms, fireplaces**,** kitchens**,** public areas and for many renovation applications**.**





Hilton SAMARA HOTEL Mexico City: Various applications with Nestos White

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Westfield Mall Australia: Flooring with Nestos White

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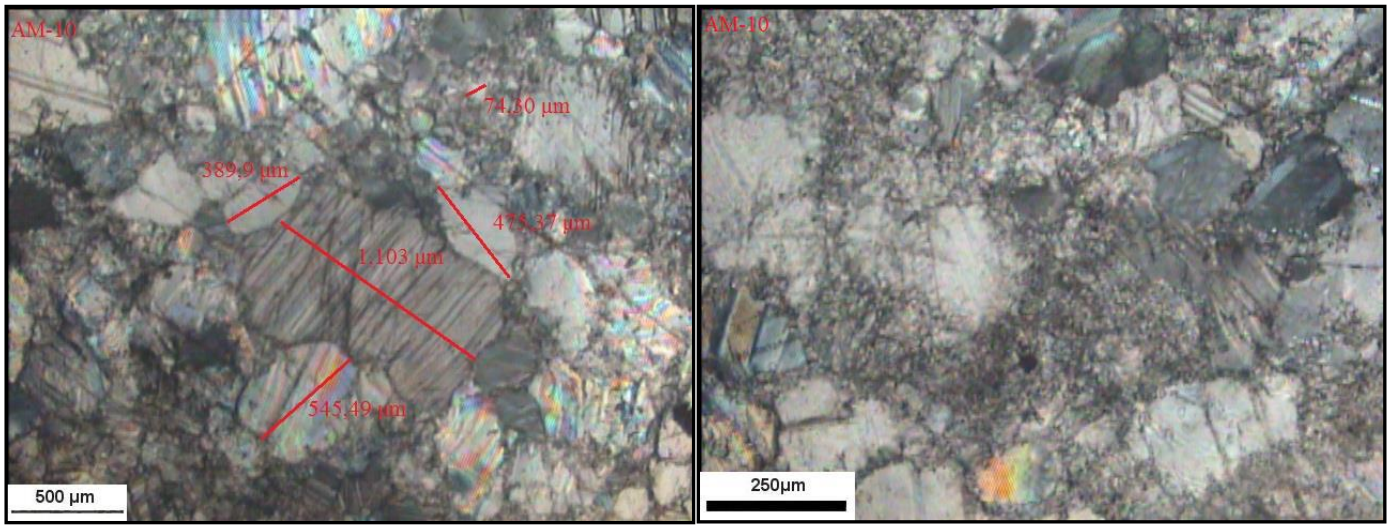




Williams Prive Island, Miami: Flooring with Nestos White

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Petrography



Description: Photomicrographs of thin sections, showing the size of calcite crystals, ranging from 0,069mm to 1,103mm, and the fine-grained texture (fractured material) due to tectonic fracturing.

Source of information: Hellenic Survey of Geology and Mineral Exploration

Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Calcite (%)	Opaque (%)	Clay minerals (%)	Apatite (%)	Fluorite (%)	Sphalerite (%)	
100	AM	AM	AM	AM	AM	

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2700	0,6	0,2	112	16,3

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa
-	-		

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
16,7	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
-	27	-	-	2100	3

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			3	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
0,10	<0,10	<0,10	<0,10	0,05	52,60	3,80	0,90	<0,05	-	-	42,80

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
0,6	25	7,0	1,2	9,0	3,5	20	2,0
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
170	1,2	35	5,2	1,0	0,6	<0,1	0,2
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
9,0	2,0	0,3	0,8	0,4	13		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
Non-commercial directory		
Commercial directory		
Scientific publication		
Other publication		

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Parnonas Semi White

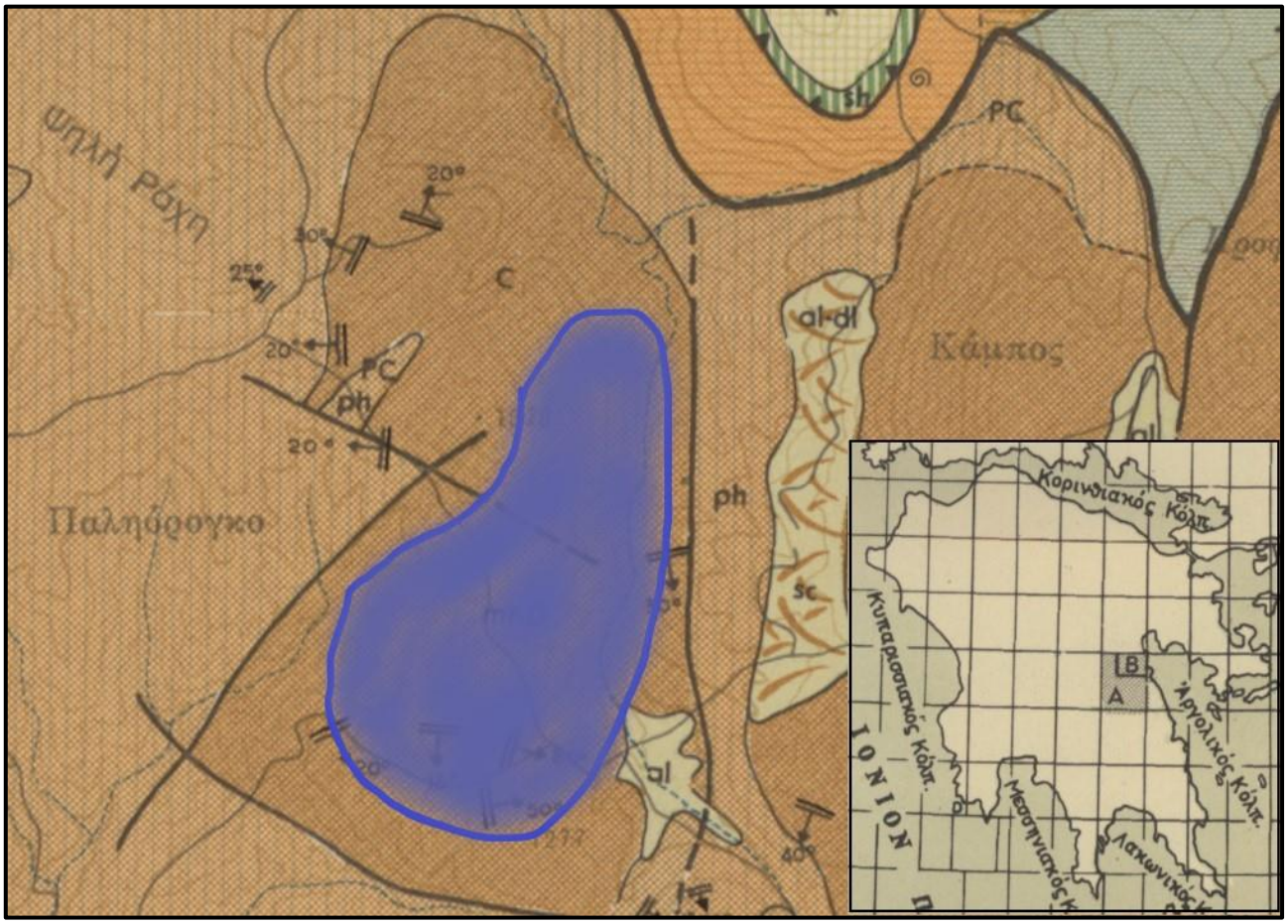


Scale 1:1

Short description: Fine-grained, semi white calcitic marble with grey veins.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Marble	Calcitic marble	Semi white	Greece	Peloponnese	Tripoli	Tripoli

Geological setting



Geology: Parnonas Semi white (blue marking) belongs to the metamorphosed basement of the Tripolis Zone, containing marbles, often sacharoid dolomitic, white, grey, dark grey, black, of strong odor on breaking and dolomites. Thin bedded, also thin bedded to thin platy, with nodules of white cherts and thin layers of them of a thickness up to 20cm in frequent alternations to the last.
(Source: Geological Map of Greece 1:50000, Astros Sheet)

Production: The most important quarry area is near Varvitsa village, in Peloponnese Region of Greece.

Geological age: Carboniferous

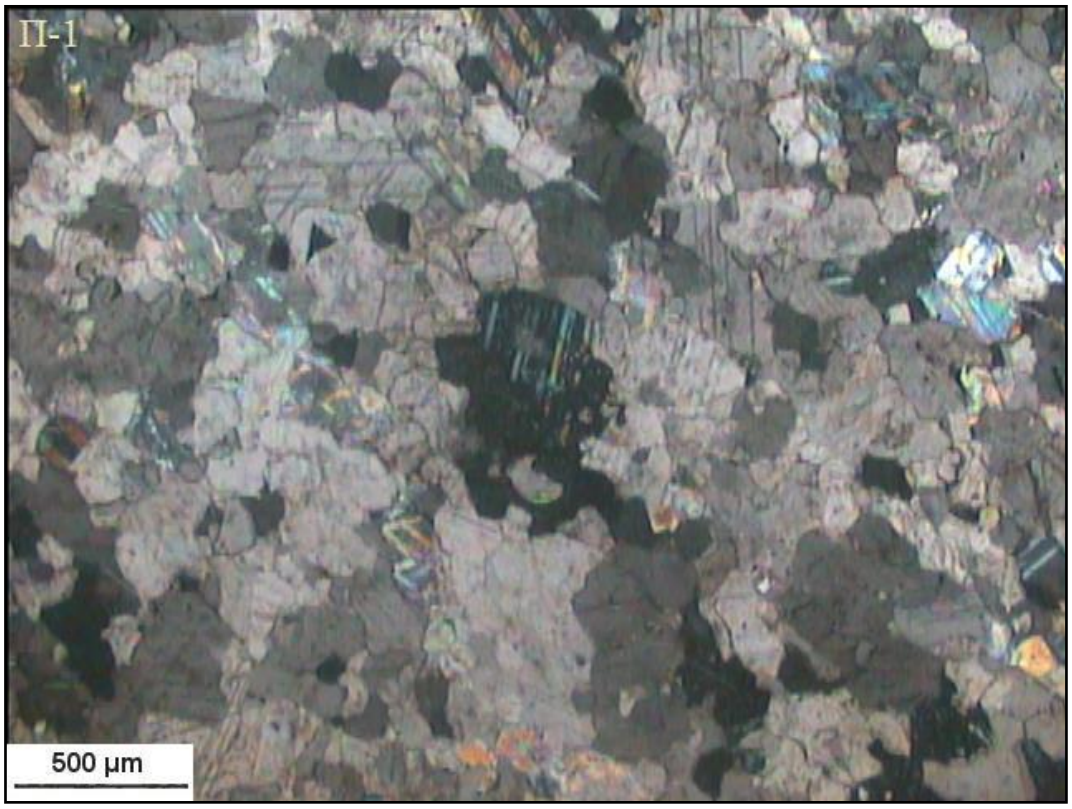
Geological unit: Metamorphosed Basement of the Tripolis Zone

Application, use and heritage

Description: Parnonas Semi White is an ideal marble for both interior and exterior uses with great mechanical properties and it is acceptable to all processing that can get a marble.

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Petrography



Description: Photomicrograph of thin section, showing calcite crystals which are in places hypidiomorphic to allotriomorphic and agglomerates of dolomite.

Source of information: Hellenic Survey of Geology and Mineral Exploration

Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Calcite (%)	Dolomite (%)					
99,8	0,2					

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2710	0,4	0,2	102	12,6

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
12,6	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
-	27	-	-	1950	3

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			5	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
<0,05	<0,05	<0,05	<0,05	0,55	54,60	0,64	0,10	<0,05	-	-	43,00

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
<1,0	20	23	3,0	17	7,0	24	5,0
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
127	<1,0	86	8,0	<1,0	1,0	<1,0	1,0
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
4,0	1,0	1,0	6,0	1,0	2,0		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
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Paros Semi White



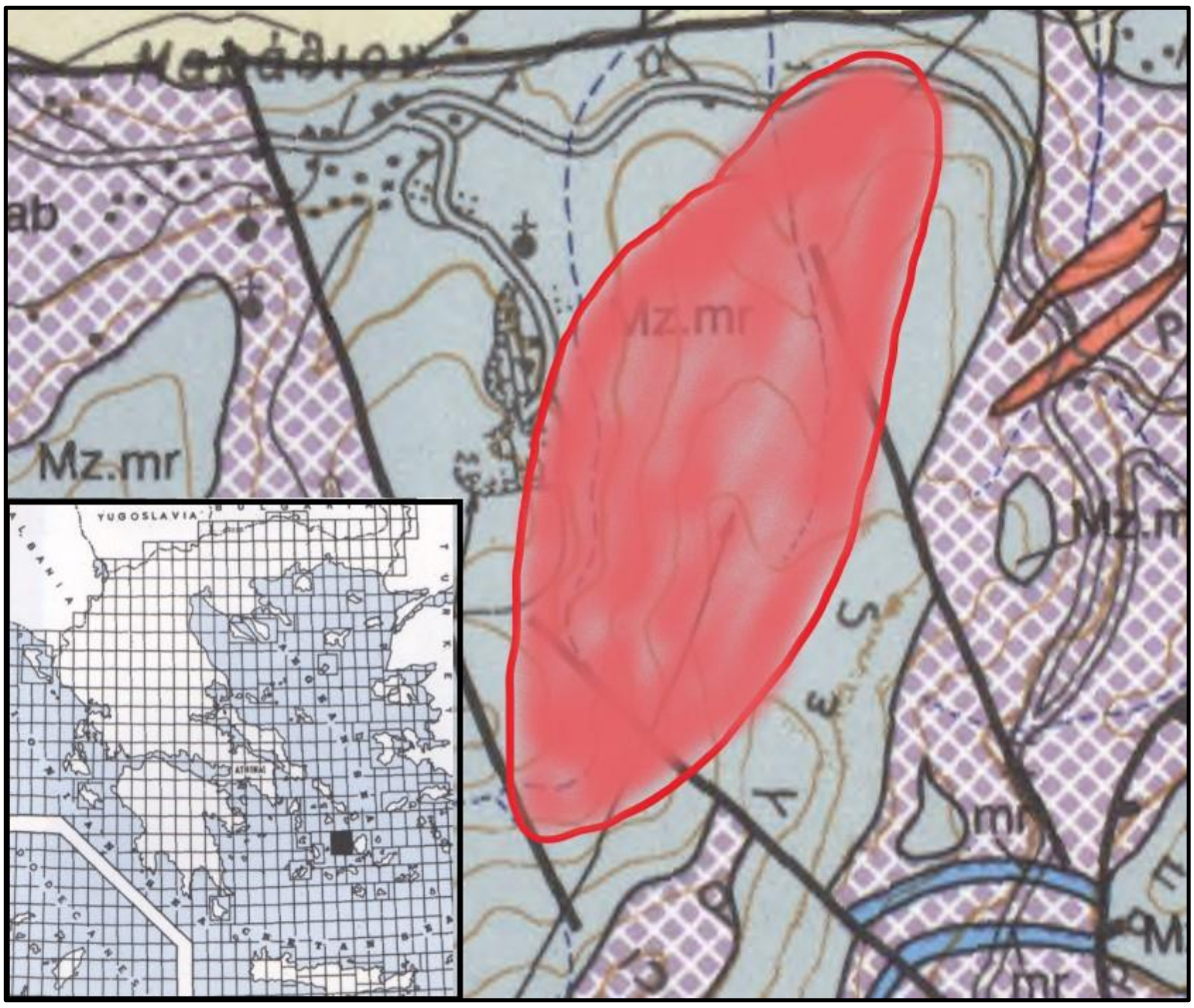
Scale 1:1

Short description: Medium-grained, semi white calcitic marble with grey parallel veins.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Marble	Calcitic marble	Semi white	Greece	South Aegean	Paros	Marathi

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Geological setting



Geology: Paros Semi White (red marking) belongs to the formations of Marathi Unit, consisting of marbles, usually white, coarse-crystalline with some siliceous layers and some intercalations of dolomitic marbles. At Aghios Georgios area some emery deposits occur. The intercalations of mica, amphibole, calc-schists occur locally.
(Source: Geological Map of Greece 1:50000, Paros Island)

Production: The quarry area is near Marathi village, in the northern part of Paros Island.

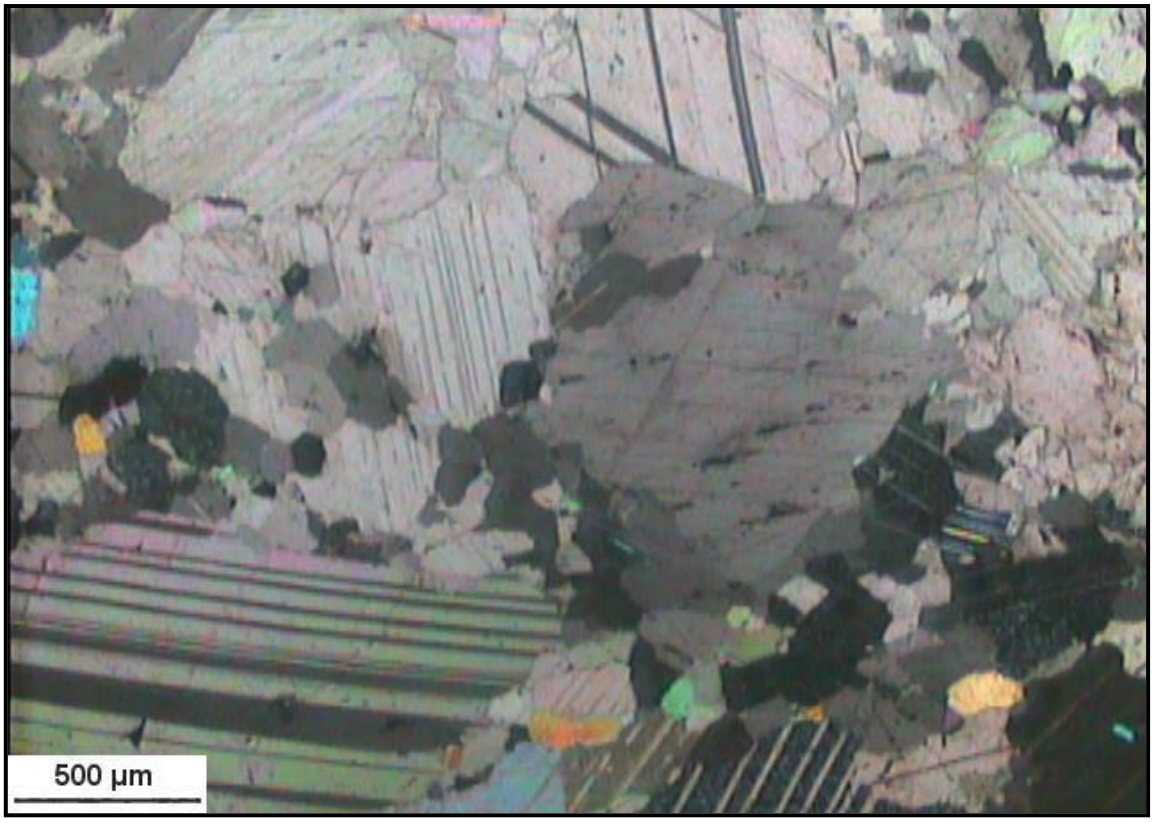
Geological age: Triassic in part
Geological unit: Marathi Unit

Application, use and heritage

Description: Paros Semi White is suitable for interior and exterior uses, such as on wall and floor coverings, fireplaces, kitchens, public areas and for many renovation applications.

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Petrography



Description: Photomicrograph of thin section, showing a hypidiomorphic heterogranular texture, crystals with undulatory extinction, as a result of tectonic processes and presence of muscovite.

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Calcite (%)	Mica (%)	Quartz (%)	Apatite (%)	Opaque minerals (%)		
95	3	2	AM	AM		

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2710	0,4	0,1	112	13,4

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa
-	-		

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
12,2	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
-	15	-	-	2100	3

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			4	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
<0,05	<0,05	<0,05	<0,05	0,50	54,95	1,33	0,30	<0,05	-	-	42,88

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
2,0	4,0	39	3,0	6,0	2,0	9,0	2,0
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
126	0,0	47	3,0	0,0	2,0	0,0	0,0
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
19	2,0	1,0	1,0	0,0	1,0		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
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Pteleos Pink

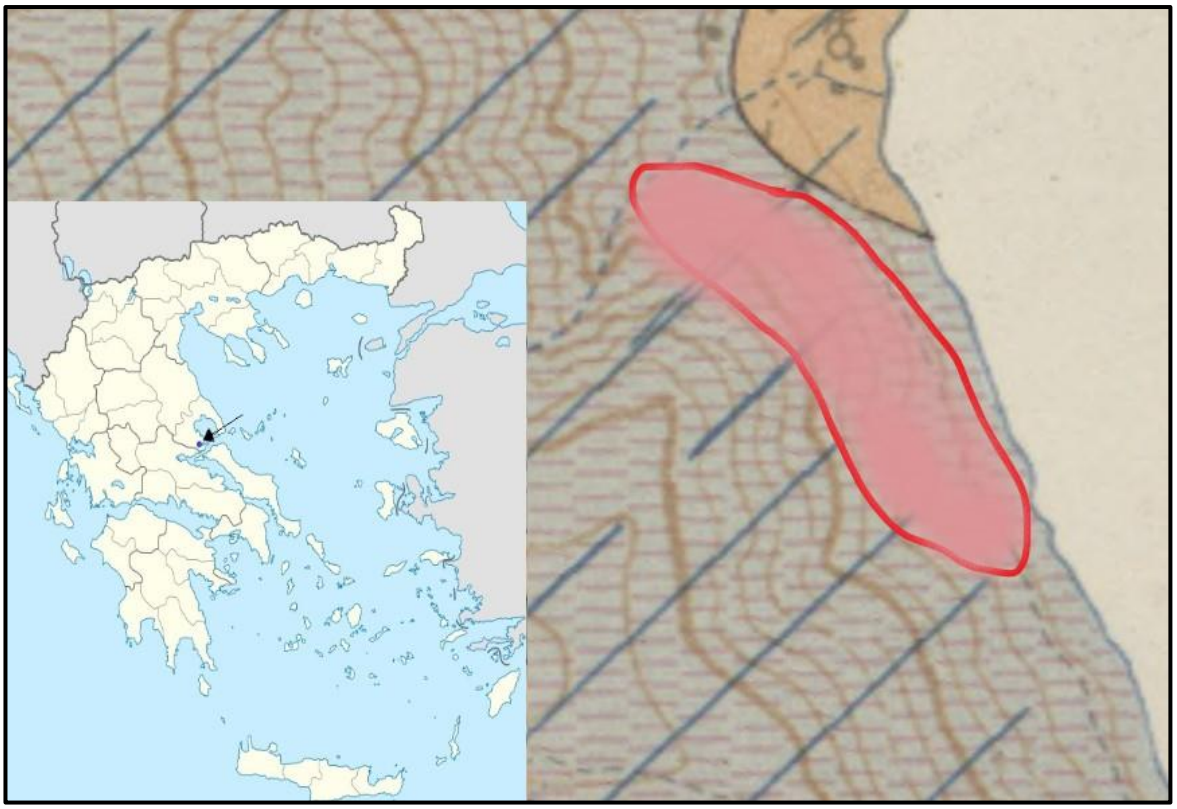


Scale 1:1

Short description: Fine-grained, pink calcitic marble with greenish and red-yellow veins.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Marble	Calcitic marble	Pink	Greece	Thessalia	Almyros	Pteleos

Geological setting



Geology: Pteleos pink (red marking) is marble formed by the alteration of dolomites and limestones.
(Source: Geological Map of Greece 1:50000, Almyros Sheet).

Production: The quarry area is near Pteleos village in the southern part of Magnesia.

Geological age: Middle Triassic - Jurassic

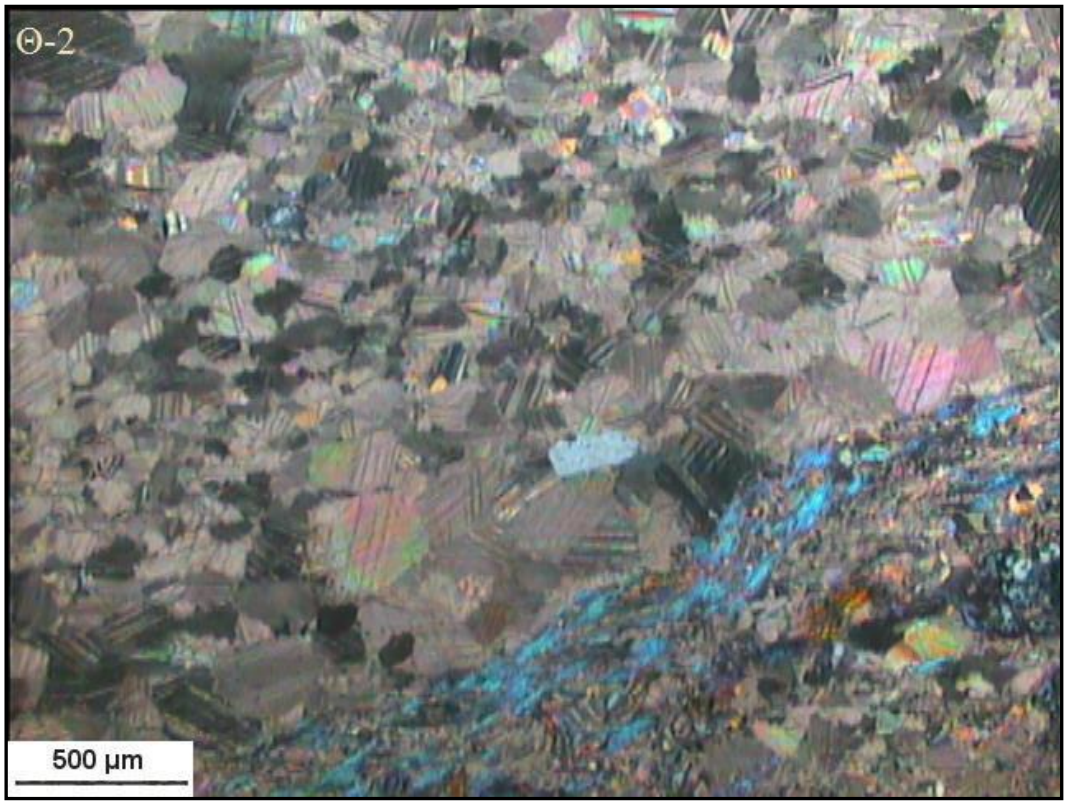
Geological unit: Dolomite and limestone metamorphic to marbles with fossils

Application, use and heritage

Description: Pteleos pink can be applied to many construction works, for interior and exterior uses, such as wall cladding, floor coverings, stairs, bathrooms and it is acceptable to all processing that can get a marble.

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Petrography



Description: Photomicrograph of thin section, showing crystals of calcite which are hypidiomorphic, slightly elongated and oriented. The green colour is due to muscovite, epidote and opaque minerals. The pink colour is due to iron oxides.

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Calcite (%)	Muscovite (%)	Epidote (%)	Dolomite (%)	Quartz (%)	Titanite (%)	Opaque minerals (%)
81	16	2	1	AM	AM	AM

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2750	0,4	0,1	121	20,1

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
20,3	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
-	26	-	-	2450	3

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			4	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
3,1	2,35	0,8	<0,05	0,8	51,05	0,55	0,50	<0,05	-	-	40,22

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
15	21	52	4,0	18	4,0	37	4,0
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
159	<1,0	63	5,0	<1,0	18	<1,0	1,0
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
7,0	4,0	3,0	1,0	1,0	1,0		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
Non-commercial directory		
Commercial directory		
Scientific publication		
Other publication		

Compiled by:	**Hellenic Survey of Geology and Mineral Exploration (H.S.G.M.E.)** https://www.eagme.gr/	

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Stenopos Semi White



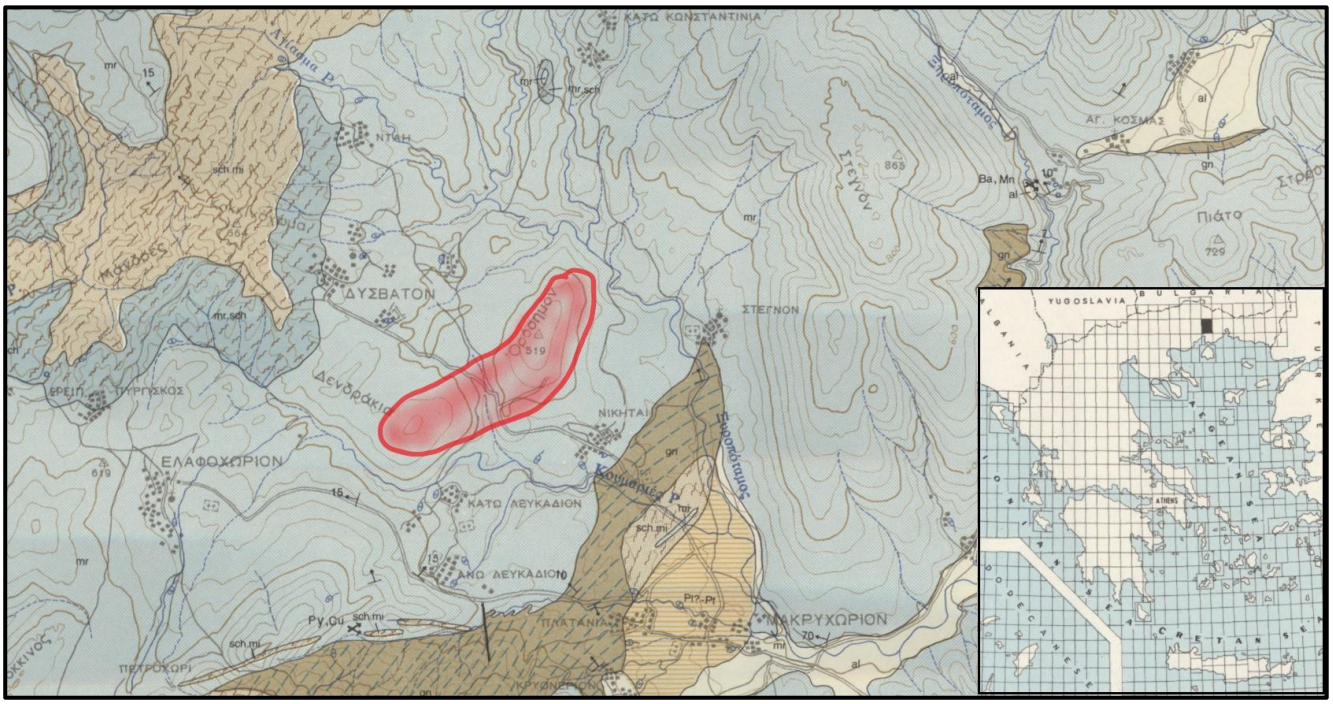
Scale 1:1

Short description: Medium grained, semi white calcitic marble with large calcite crystals.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Marble	Calcitic marble	Semi White	Greece	East Macedonia and Thrace	Kavala	Stenopos

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Geological setting



Geology: Stenopos Semi White (red marking) is a metamorphic rock. It belongs to poorly bedded or massive, white marbles of great thickness (thought to be former reef limestones). The massive marbles are locally interfingerring with well bedded grey marbles, micaschists or gneisses.
(Source: Geological Map of Greece 1:50000, Lekani Sheet).

Production: The quarry area is near the area of Stenopos, which belongs to the Kavala regional unit.

Geological age: -

Geological unit: Metamorphic Rocks - Marbles

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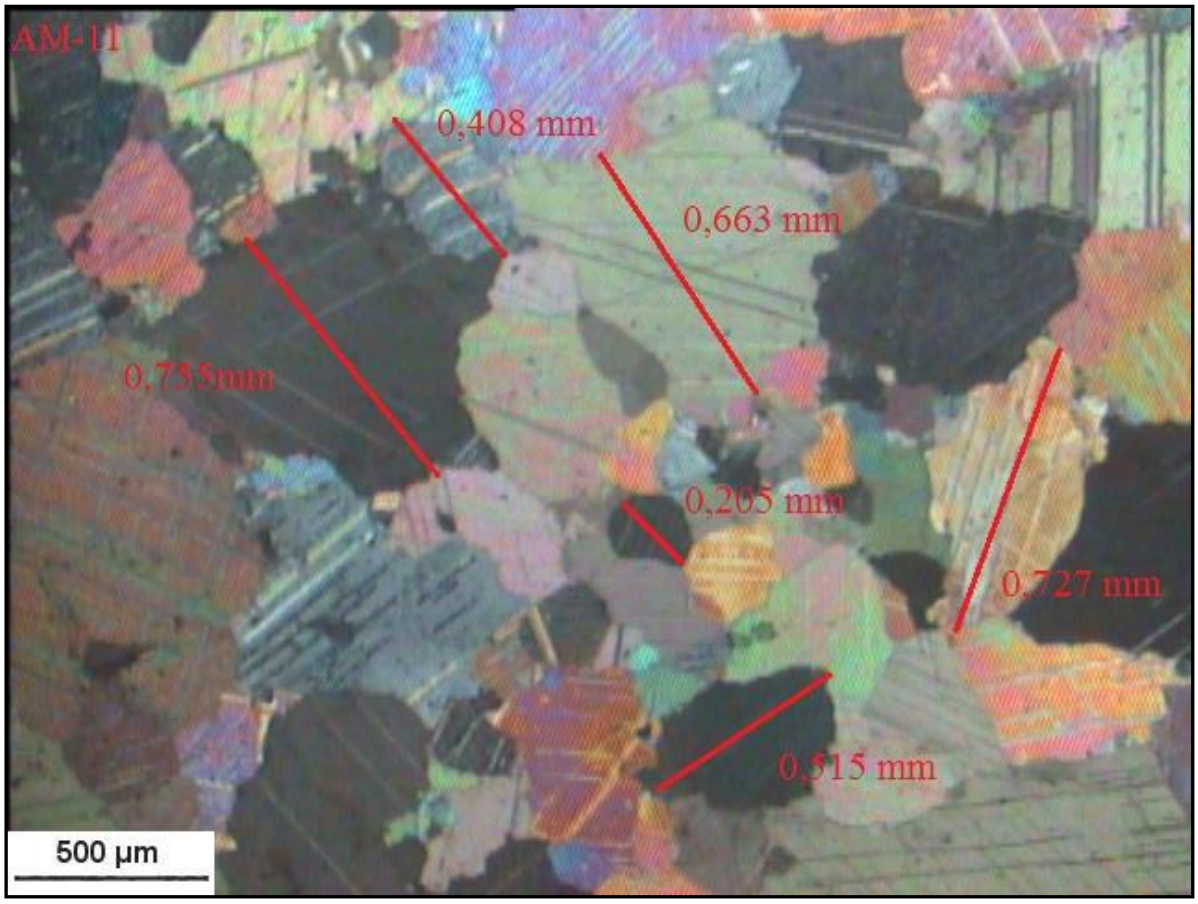
Application, use and heritage

Description: The most common uses of the Stenopos Semi White marble is on wall and floor coverings, fireplaces**,** kitchens**,** stairs, public areas, paving and for many renovation applications**.**



Lithos Laboratory (H.S.G.M.E.): Flooring with Stenopos Semi White marble.

Petrography



Description: Photomicrograph of thin section, showing calcite crystals in sizes ranging from 0,205mm to 0,755mm, illustrating triple junction grain boundary contacts and “curved borders”.

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Calcite (%)	Dolomite (%)	Opaque minerals (%)				
100	AM	AM				

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2700	0,3	0,1	99	11,5

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa
-	-		

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
10,7	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
-	31	-	-	1650	3

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			4	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
0,25	<0,10	<0,10	<0,10	0,60	54,30	0,11	0,04	<0,05	-	-	42,90

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
0,4	4,7	13	1,8	9,0	6,0	11	2,0
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
95	1,5	40	4,0	1,5	1,0	0,1	0,5
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
37	5,0	0,5	1,0	0,7	1,0		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
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Other publication		

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Syki Semi White

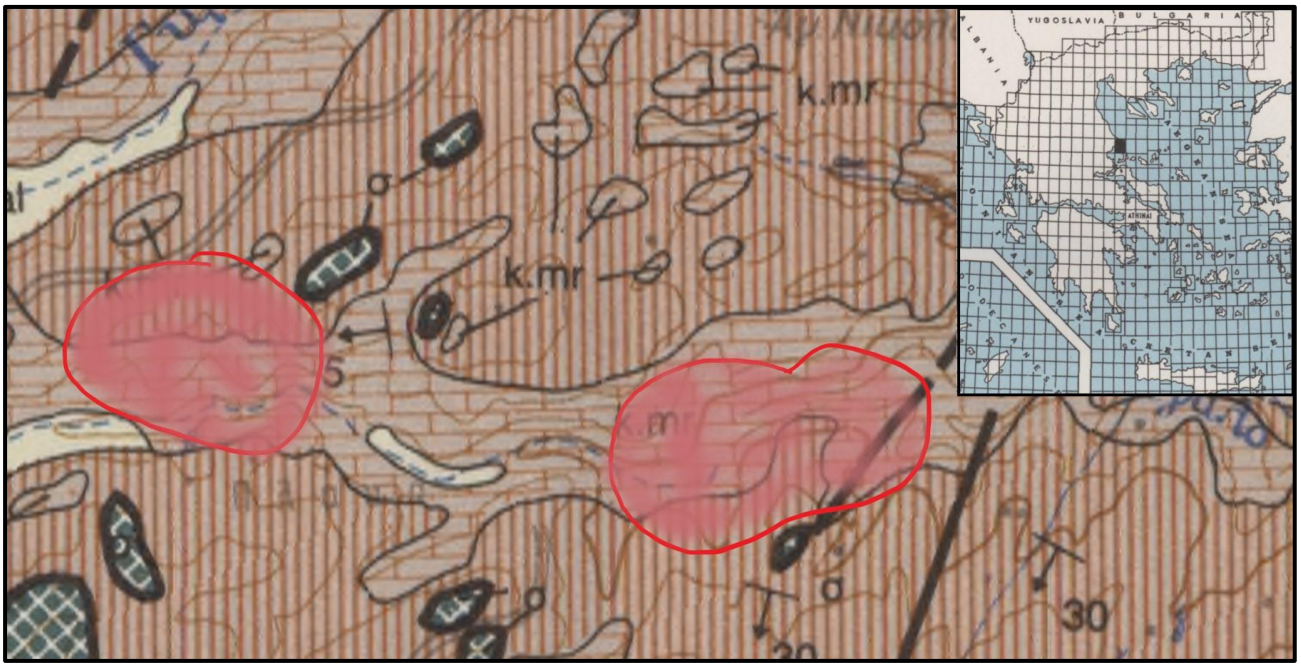


Scale 1:1

Short description: Fine-grained, semi white calcitic marble with grey brown bands and white parallel veins.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Marble	Calcitic marble	Semi-White	Greece	Thessalia	Volos	Syki

Geological setting



Geology: Syki Semi White (red markings) is marble belonging to formations of Pelagonian Zone, containing mica schists with crystalline limestone – marble intercalations. Amphibole – epidote – chlorite schists.

(Source: Geological Map of Greece 1:50000, Zagora Syki Sheet).

Production: The most important quarry area is near the village of Syki, in South Pelion.

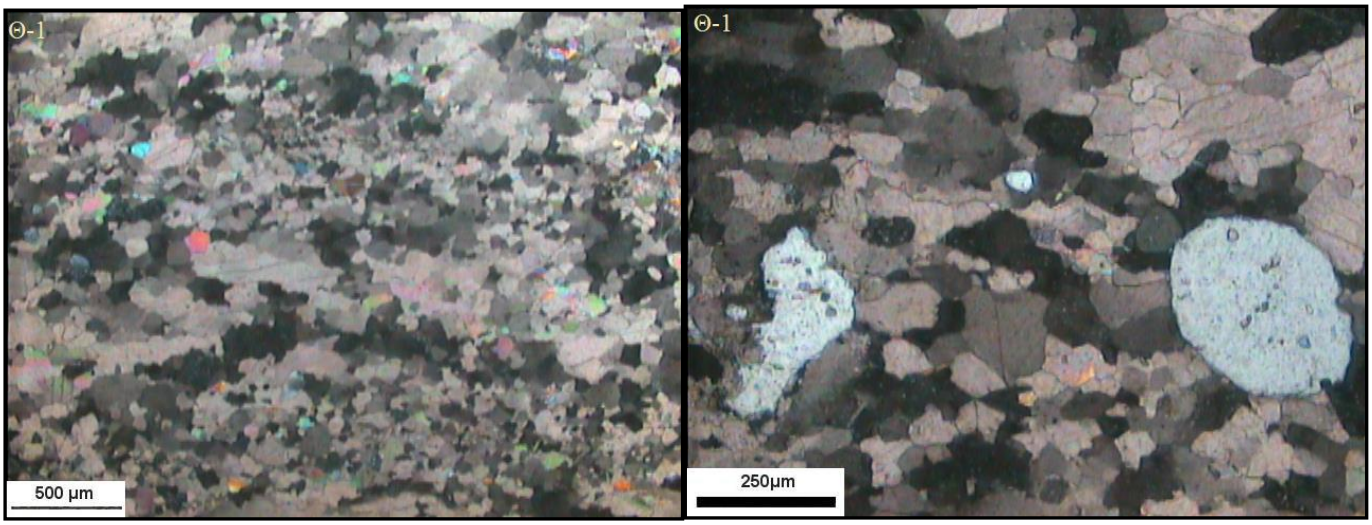
Geological age: -

Geological unit: Pelagonian Zone – Basic and ultrabasic rocks

Application, use and heritage

Description: Syki Semi White can be applied to many construction works, for interior and exterior uses, such as wall cladding, floor coverings, stairs, bathrooms and it is acceptable to all processing that can get a marble.

Petrography



Description: Photomicrograph of thin section, showing calcite crystals, hypidiomorphic and in places allotriomorphic, the agglomeration of dolomite and the presence of quartz.

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Calcite (%)	Dolomite (%)	Muscovite (%)	Quartz (%)	Opaque minerals (%)	Clay minerals (%)	
96	4	AM	AM	AM	AM	

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2700	0,6	0,2	60	15,9

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
16,3	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
-	22	-	-	1850	3

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			3	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
<0,05	<0,05	<0,05	<0,05	0,69	54,90	0,34	0,05	<0,05	-	-	43,35

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
1,0	5,0	25	2,0	10	4,0	17	3,0
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
94	<1,0	40	3,0	<1,0	2,0	<1,0	<1,0
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
<1,0	5,0	<1,0	1,0	80	48		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
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Scientific publication		
Other publication		

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Thassos Crystallina Semi White



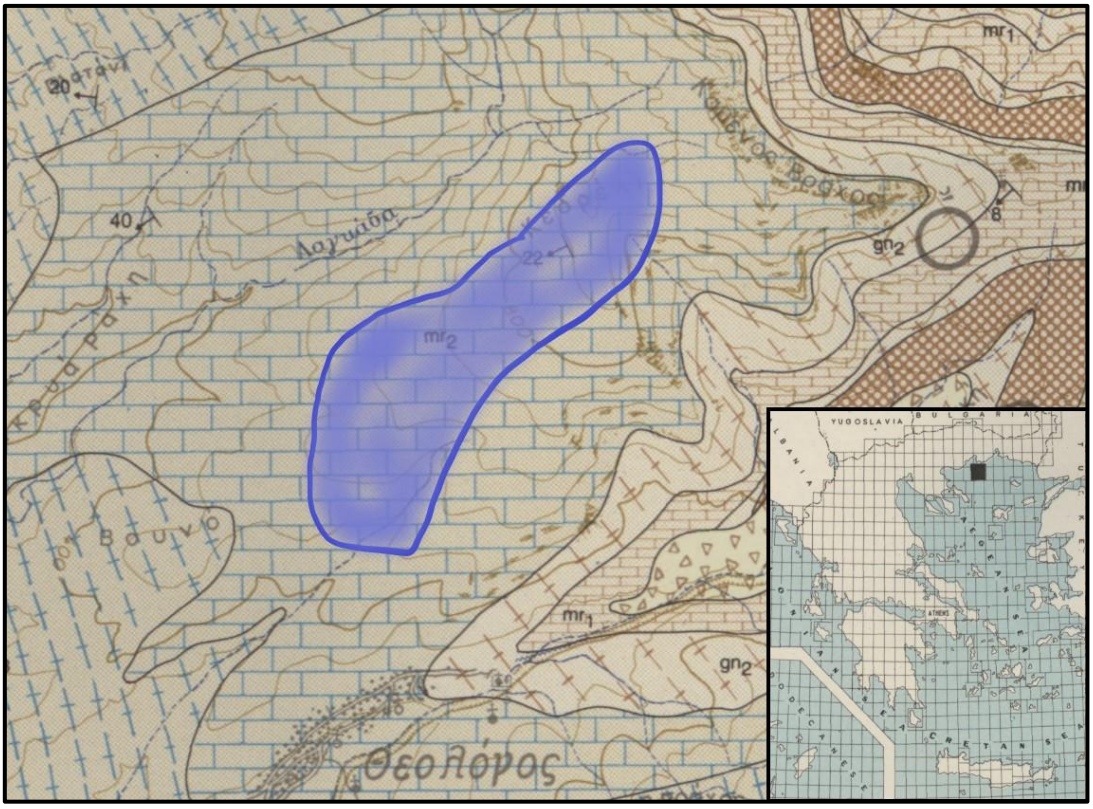
Scale 1:1

Short description: Medium grained semi white calcitic marble with large calcite crystals.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Marble	Calcitic marble	Semi White	Greece	East Macedonia and Thrace	Thassos	Theologos

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Geological setting



Geology: Thassos Crystallina Semi White (blue curve) is a metamorphic rock belonging to the carbonate marbles of Rhodope Mass area, which is part of the region of East Macedonia and Thrace.
(Source: Geological Map of Greece 1:50000, Thassos Sheet).

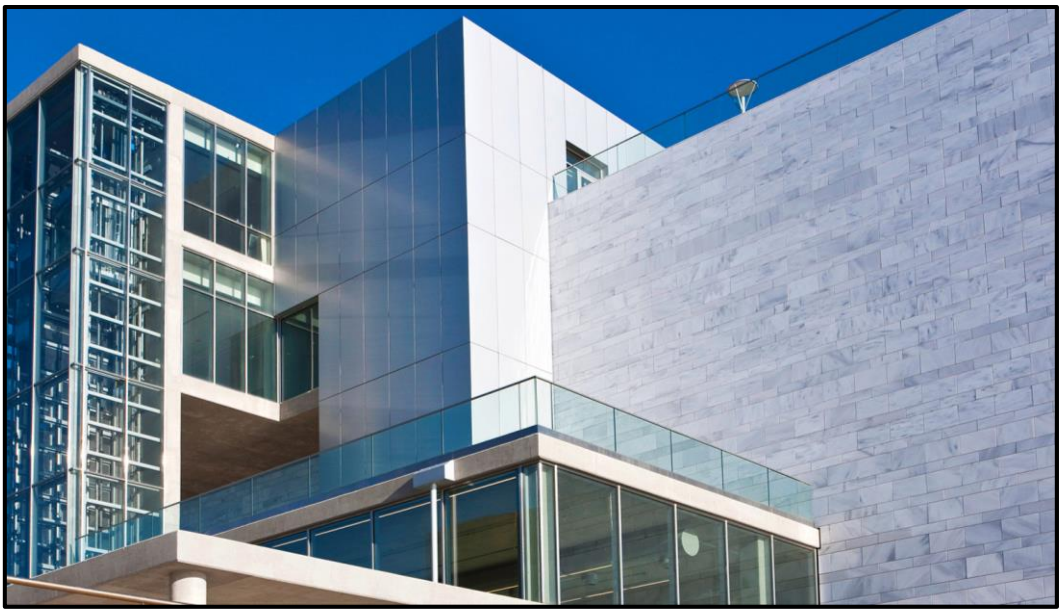
Production: The most important quarry area is near the village of Theologos, in the central part of the island of Thasos.

Geological age: -
Geological unit: Metamorphic system

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Application, use and heritage

Description: Thassos Crystallina Semi White marble has been used in various construction projects. It provides a high reflection of sunlight and holds its cool temperature, making it perfect suitable for claddings in warmer regions. Being a marble with high strength properties, it is suitable for interior and exterior use, wall cladding, flooring, stairs, and other design projects.



Thessaloniki Concert Hall: External Cladding finished in October 2010.

(photo: http://www.tch.gr/)



Pavement recreation with Thassos Crystallina Semi White marble.

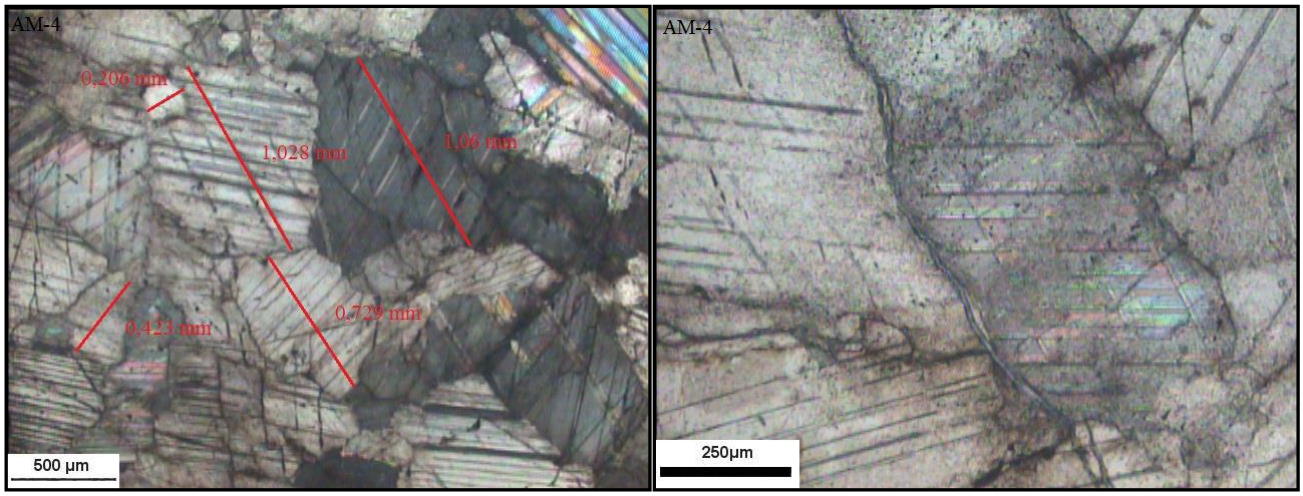




Alyki Ancient Quarries of Thassos Crystallina Semi White marble.

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Petrography



Description: Photomicrograph of thin section, showing calcite crystals and veins filled with calcite of sencondary origin.

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Calcite (%)	**Apatite (%)**	**Sphalerite (%)**				
100	AM	AM				

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2710	0,2	0,1	71	10,6

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa
-	-		

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
7,9	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
-	20	-	-	1400	3

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			5	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
<0,10	<0,10	<0,10	<0,10	0,60	51,80	3,90	0,18	<0,05	-	-	42,70

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
0,3	27	25	2,0	12	3,0	24	2,7
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
170	0,7	46	5,5	0,2	18	<0,1	0,2
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
18	3,5	0,5	1,1	3,0	4,7		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
Non-commercial directory		
Commercial directory		
Scientific publication		
Other publication	Thessaloniki Concert Hall	http://www.tch.gr/

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Tranovaltos Semi White



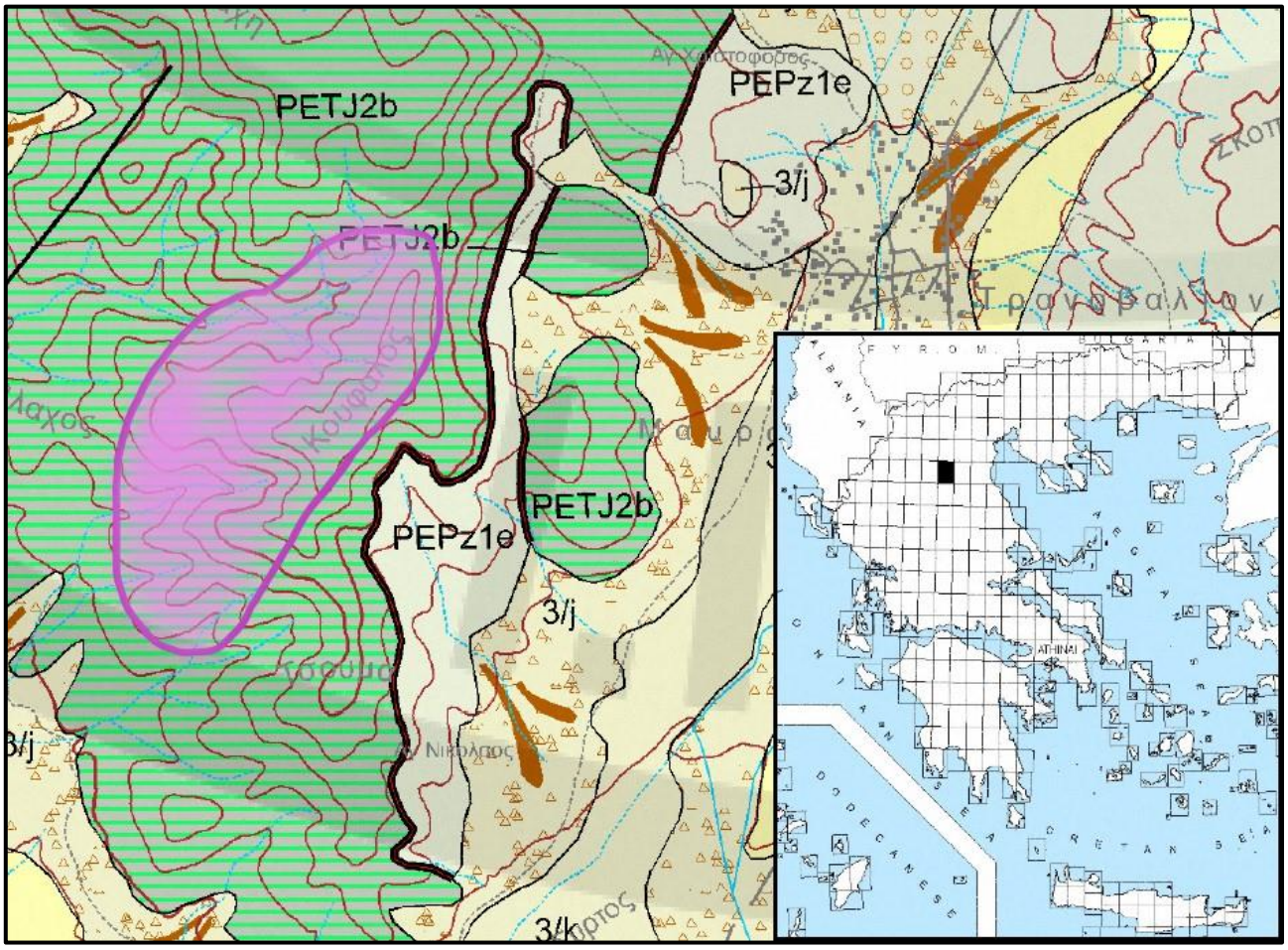
Scale 1:1

Short description: Fine-grained semi white calcitic marble with agglomerates and grey coloured banded veins.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Marble	Calcitic marble	Semi white	Greece	West Macedonia	Servia–Velventos	Tranovaltos

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Geological setting



Geology: Tranovaltos Semi White (pink marking) belongs to the rocks of the Pelagonian Zone. They are limestones crystalline, light grey to white, medium to thick-bedded, passing towards the base into dark grey and thin-bedded, in places dolomitized. Towards the top they become thin-layered with silicate intercalations passing into laminar cherts.
(Source: Geological Map of Greece 1:50000, Livaderon Sheet)

Production: The most important quarry areas is near the Tranovaltos village in the Kozani regional unit.

Geological age: Middle Triassic – Lower Jurassic
Geological unit: Limestones crystalline

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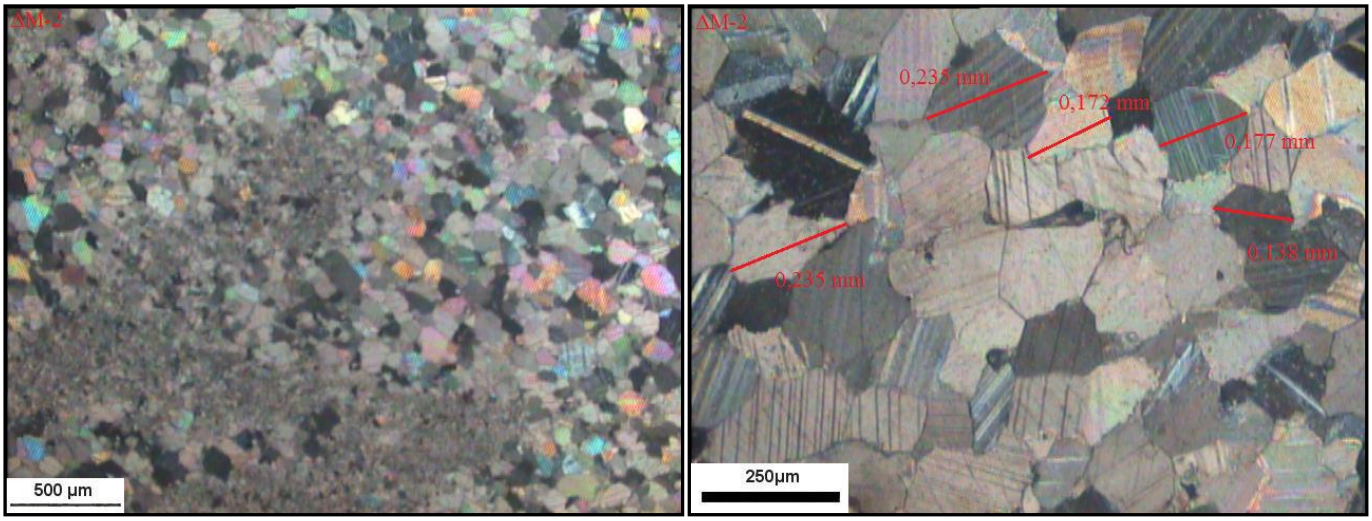
Application, use and heritage

Description: Tranovaltos Semi White marble is suitable for interior and exterior uses, such as on wall and floor coverings**,** fireplaces**,** kitchens, stairs, public areas, for sculptures, space dividers and designs for walls, items for churches.



Application of Tranovaltos Semi White marble in stairs.

Petrography



Description: Photomicrograph of thin section, showing the hypidiomorphic to allotriomorphic calcite crystals, and agglomerates or banded veins of fine-grained dolomite.

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Calcite (%)	Dolomite (%)	Opaque minerals (%)				
85	15	AM				

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2720	0,2	0,1	114	22,4

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
14,9	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
-	22	-	-	2300	3

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			5	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
0,15	0,05	0,08	<0,05	1,20	55,45	0,35	0,05	<0,05	-	-	42,15

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
0,6	9,0	16	1,6	10	3,3	29	1,0
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
140	0,1	32	7,0	<0,1	13	<0,1	0,4
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
28	1,0	0,1	0,5	0,4	0,9		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
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Other publication		

Compiled by:	**Hellenic Survey of Geology and Mineral Exploration (H.S.G.M.E.)** https://www.eagme.gr/	

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Tranovaltos White



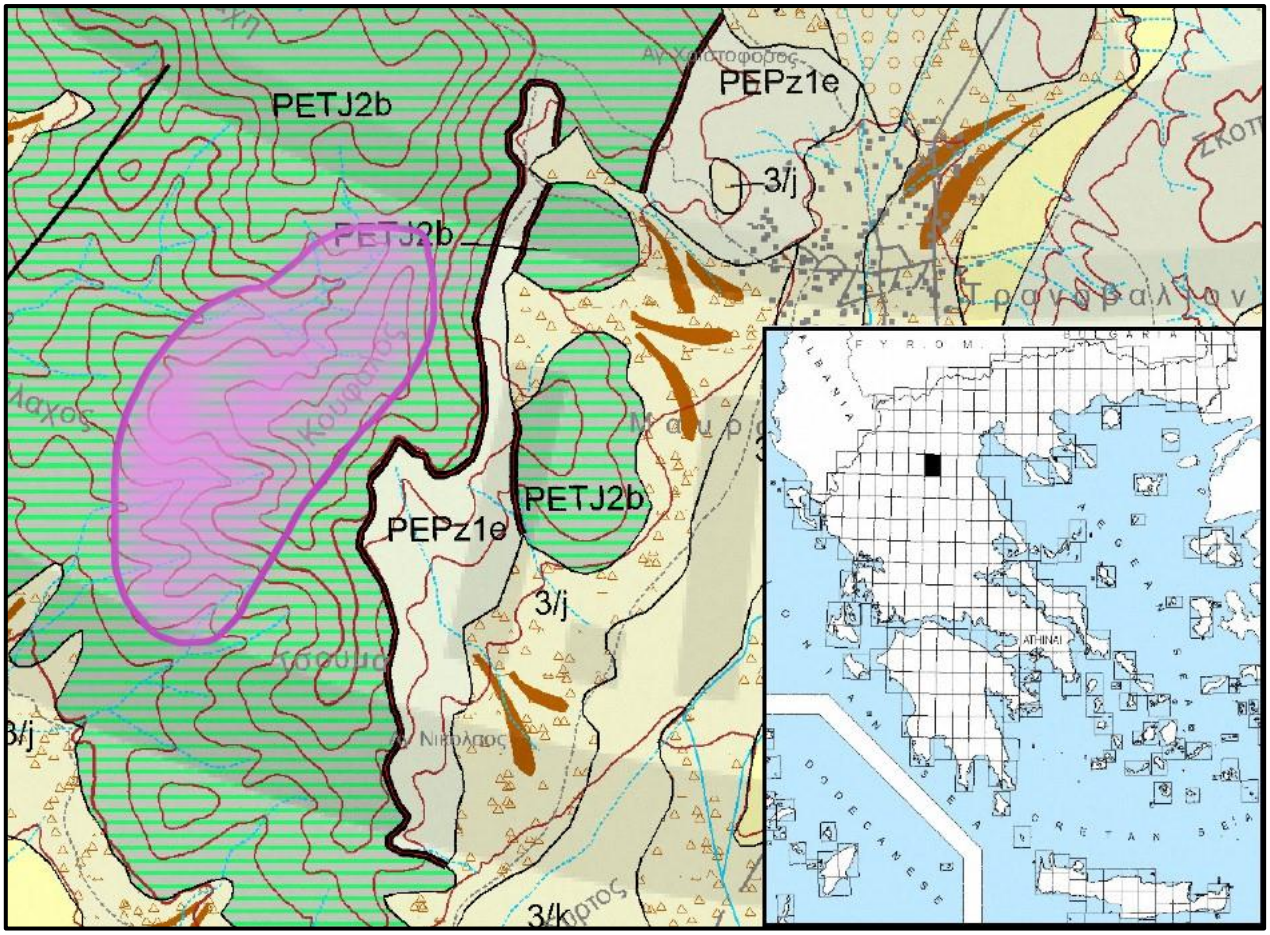
Scale 1:1

Short description: Fine-grained white calcitic marble with yellow white banded veins.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Marble	Calcitic marble	White	Greece	West Macedonia	Servia–Velventos	Tranovaltos

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Geological setting



Geology: Tranovaltos White (purple marking) belongs to the rocks of the Pelagonian Zone. They are limestones crystalline, light grey to white, medium to thick-bedded, passing towards the base into dark grey and thin-bedded, in places dolomitized. Towards the top they become thin-layered with silicate intercalations passing into laminar cherts.
(Source: Geological Map of Greece 1:50000, Livaderon Sheet)

Production: The most important quarry areas is near the Tranovaltos village in the Kozani regional unit.

Geological age: Middle Triassic – Lower Jurassic

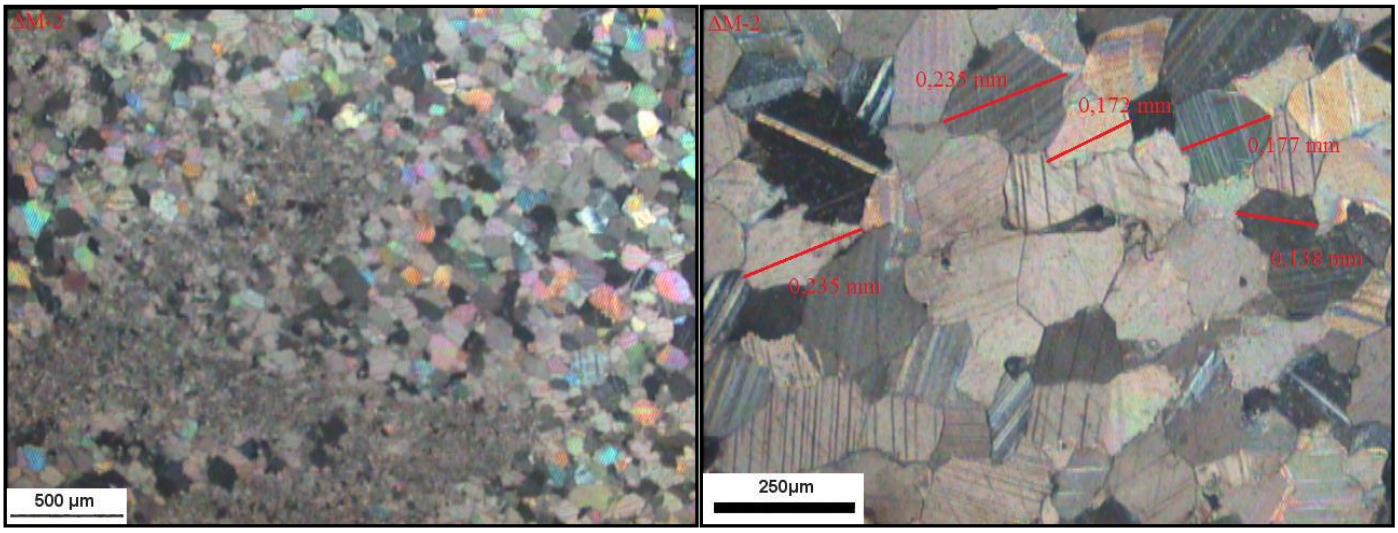
Geological unit: Limestones crystalline

Application, use and heritage

Description: Tranovaltos White marble is suitable for interior and exterior uses, such as on wall and floor coverings**,** fireplaces**,** kitchens**,** public areas and for many renovation applications**.**

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Petrography



Description: Photomicrograph of thin section, showing the hypidiomorphic calcite and dolomitization of calcite crystals.

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Calcite (%)	Dolomite (%)	Opaque minerals (%)				
95	5	AM				

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2720	0,2	0,1	107	18,0

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
10,0	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
-	20	-	-	2000	3

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			5	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
0,30	0,10	0,08	<0,05	0,80	54,50	0,35	0,09	<0,05	-	-	42,45

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
1,2	13	23	1,6	12	4,0	24	1,2
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
135	0,2	32	6,0	<0,1	2,0	<0,1	0,4
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
29	1,5	0,9	0,7	0,2	0,7		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
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Veria White



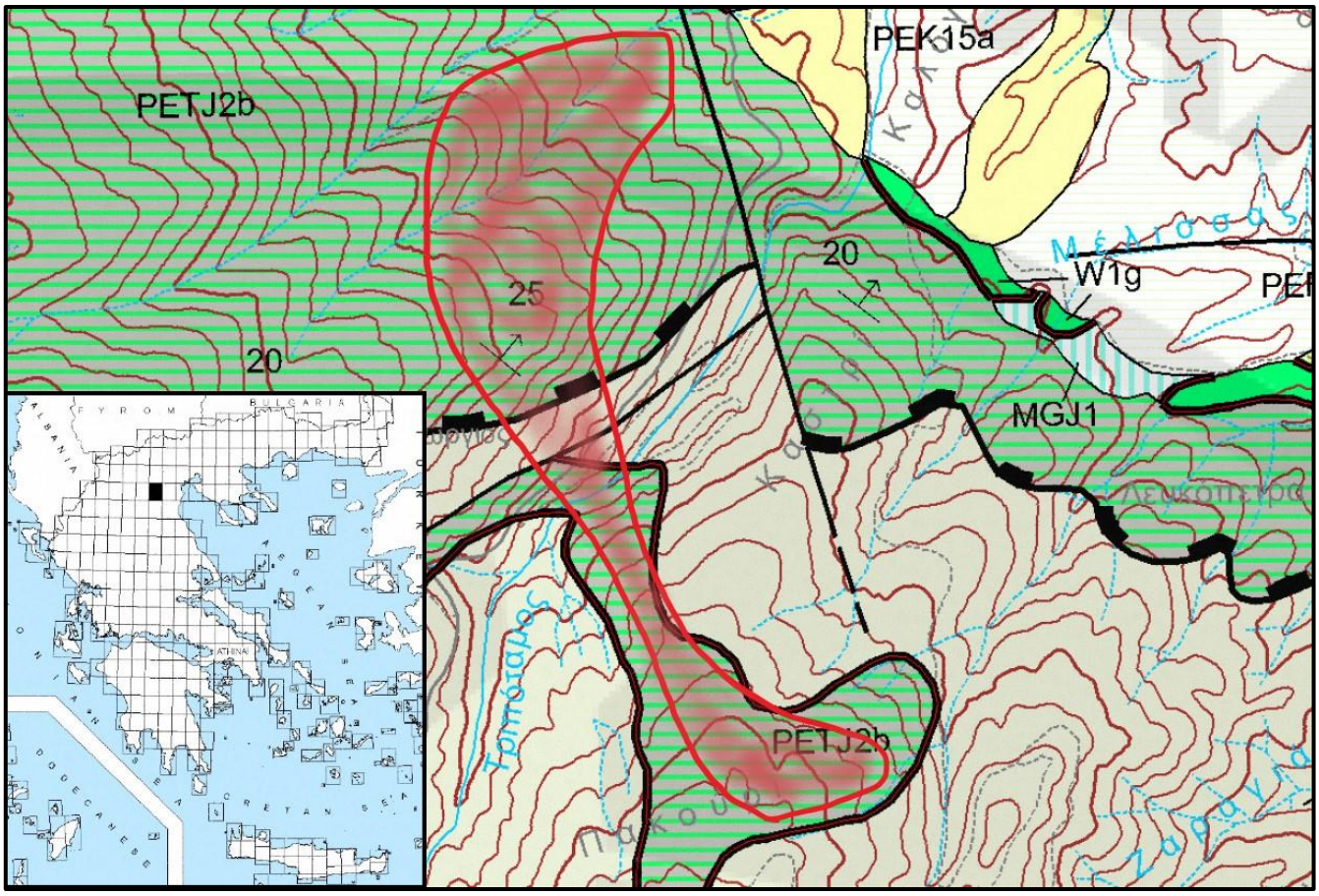
Scale 1:1

Short description: Medium-grained, white calcitic marble with white or off-white banded veins.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Marble	Calcitic marble	White	Greece	Central Macedonia	Veria	Kastania

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Geological setting



Geology: Veria White (red marking) belongs to formations of Pelagonian Zone, containing limestones crystalline, light gray to white, medium to thick-bedded, locally turning towards the base into dark gray and thin-bedded, in places. Towards the top they become thin-laminated with silex layers passing into laminar cherts.

(Source: Geological Map of Greece 1:50000, Velvendos Sheet)

Production: The quarry area is near Kastania and Lefkopetra villages, in Veroia regional unit.

Geological age: Middle Triassic – Lower Jurassic

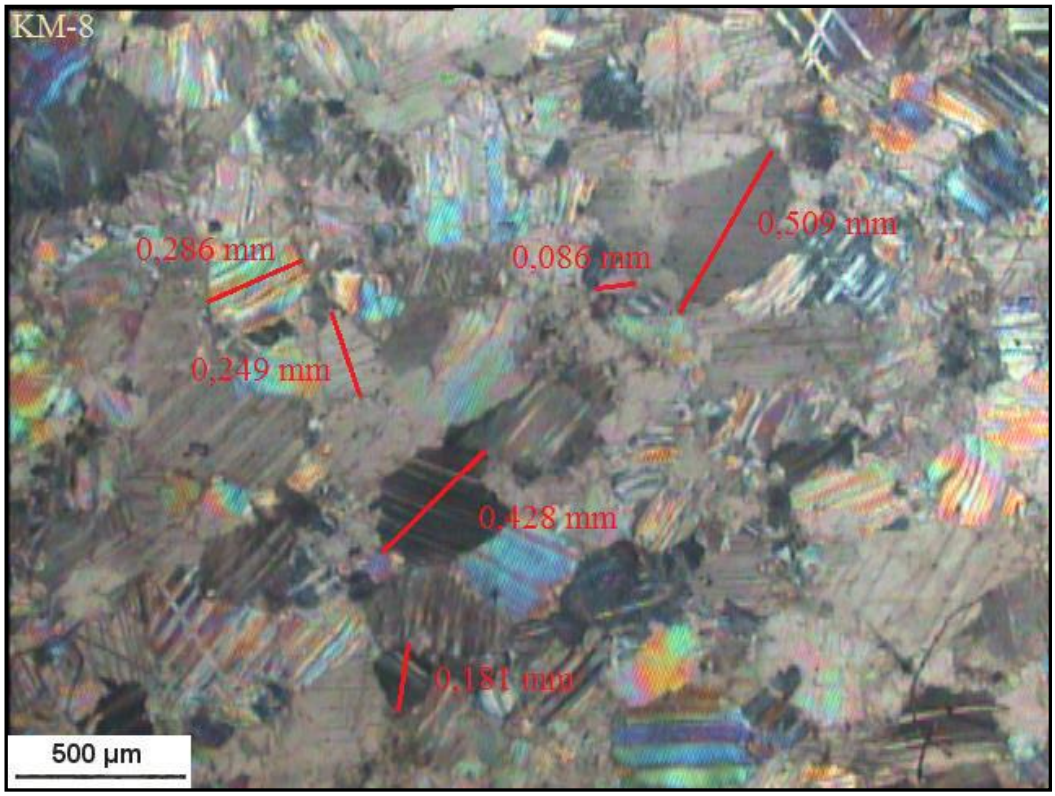
Geological unit: Pelagonian Zone

Application, use and heritage

Description: Veria White marble can be applied to many construction works, such as cladding, floors, stairs, bathrooms and it is acceptable to all processing that can get a marble.

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Petrography



Description: Photomicrograph of thin section, showing the hypidiomorphic calcite and the dolomitization of some calcite crystals. The fragmentation of crystals and the undulatory extinction of calcite occurred as a result of deformation of the rock.

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Calcite (%)	Dolomite (%)	Opaque minerals (%)				
99	1	AM				

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2710	0,2	0,1	99	21,1

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
21,2	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
-	22	-	-	2300	3

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			4	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
0,10	<0,05	<0,05	<0,05	0,45	54,80	0,36	0,05	<0,05	-	-	43,47

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
0,5	12	28	1,5	10	3,0	20	1,0
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
130	1,0	30	5,0	<0,1	1,0	<0,1	0,3
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
37	3,0	1,0	0,5	0,2	0,7		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
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MARBLES:

CALCITIC - DOLOMITIC MARBLES

Roditis Semi White



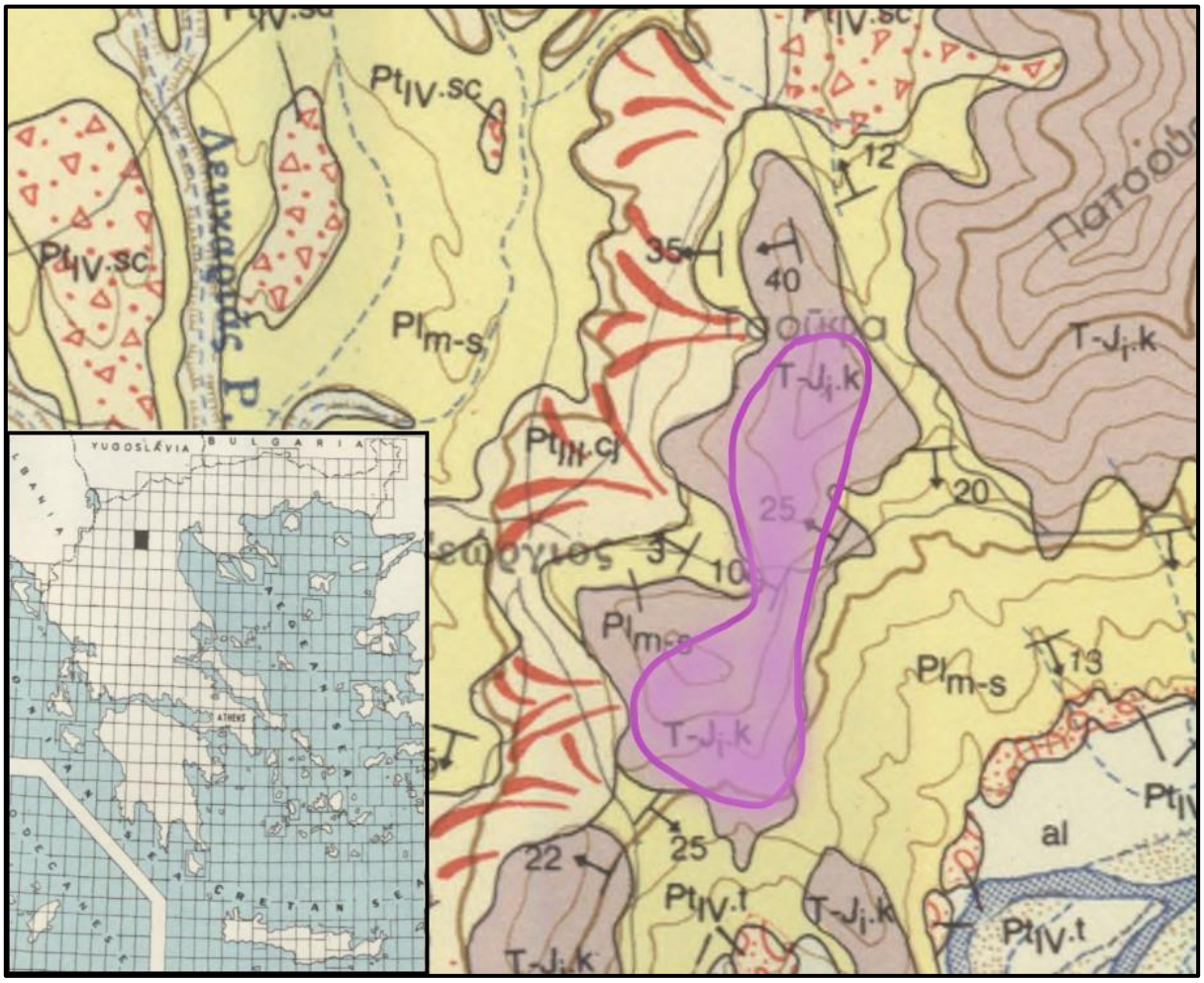
Scale 1:1

Short description: Medium to fine-grained, semi white marble that can be similar to “pseudobreccia” with light grey gravels.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Marble	Calcitic dolomitic marble	Semi White	Greece	West Macedonia	Kozani	Roditis

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Geological setting



Geology: Roditis Semi White (pink marking) belongs to the formations of Pelagonian Zone of Kozani area. The specific rocks are limestones of variable recrystallization and dolomitic limestones.
(Source: Geological Map of Greece 1:50000, Kozani Sheet)

Production: The quarry area is near Roditis village in the Kozani regional unit.

Geological age: Triassic – Lower Jurassic

Geological unit: Formations of Pelagonian Zone of Kozani

Application, use and heritage

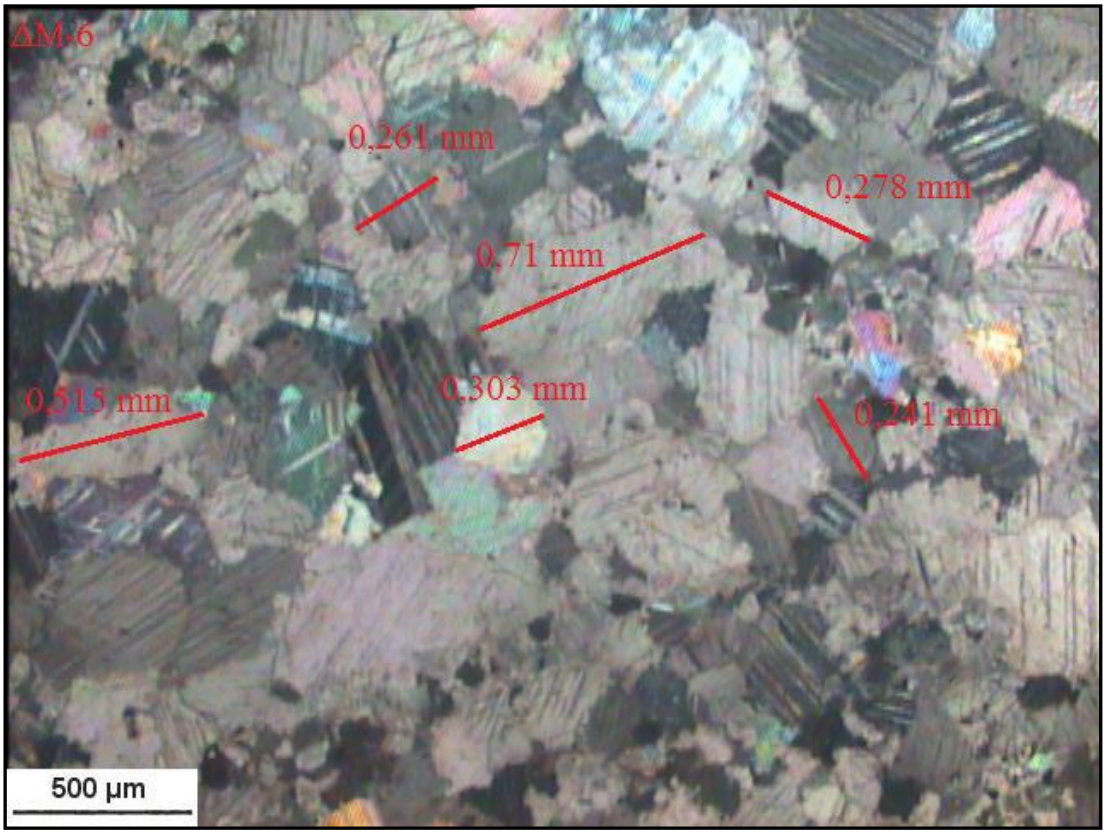
Description: Roditis Semi White can be applied to many construction works, for interior and exterior uses, such as wall cladding, floor coverings, stairs, bathrooms and it is acceptable to all processing that can get a marble.



Various applications of Roditis Semi White.

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Petrography



Description: Photomicrograph of thin section, showing the hypidiomorphic to allotriomorphic calcite crystals, dolomite crystals scattered or oriented in specific directions.

Source of information: Hellenic Survey of Geology and Mineral Exploration

Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Calcite (%)	Dolomite (%)	Opaque minerals (%)	Quartz (%)			
80	20	AM	AM			

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2750	0,4	0,2	157	17,7

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
15,7	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
-	21	-	-	2500	3

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			3	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
0,25	0,07	0,05	<0,05	4,90	49,65	0,40	0,06	<0,05	-	-	42,85

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
1,0	10	8,0	1,8	11	4,2	23	2,0
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
110	0,5	52	8,0	<0,1	1,0	<0,1	0,3
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
29	1,0	0,1	0,7	0,3	0,4		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
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Scientific publication		
Other publication		

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Skyros Semi White

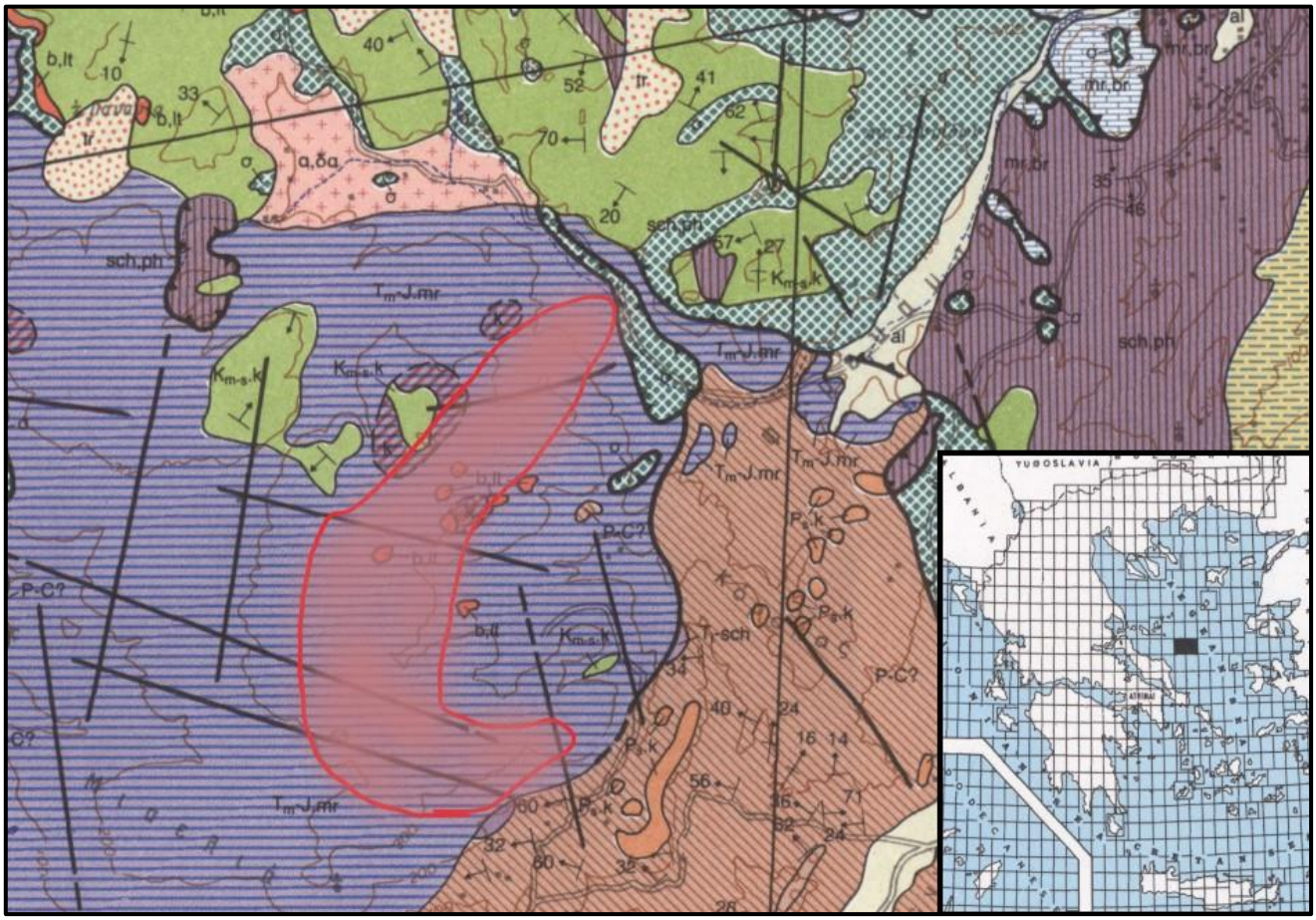


Scale 1:1

Short description: Medium to fine-grained, semi white marble with dense network of white and mainly light yellow veins. The off white veins are due to the presence of dolomite while the light yellow ones are possibly due to copper oxides.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Marble	Calcitic – Dolomitic marble	Semi white	Greece	Central Greece	Skyros	Skyros

Geological setting



Geology: Skyros Semi White belongs to Calcite – dolomite marbles of Eohellenic Tectonic Nappe. Calcite – dolomite marbles are coarse – to fine-grained, thick – bedded with colour variety.

(Source: Geological Map of Greece 1:50000, Skyros Island)

Production: The most important quarry area is almost in the north to central part of Skyros Island.

Geological age: Middle Triassic - Jurassic

Geological unit: Eohellenic Tectonic Nappe

Application, use and heritage

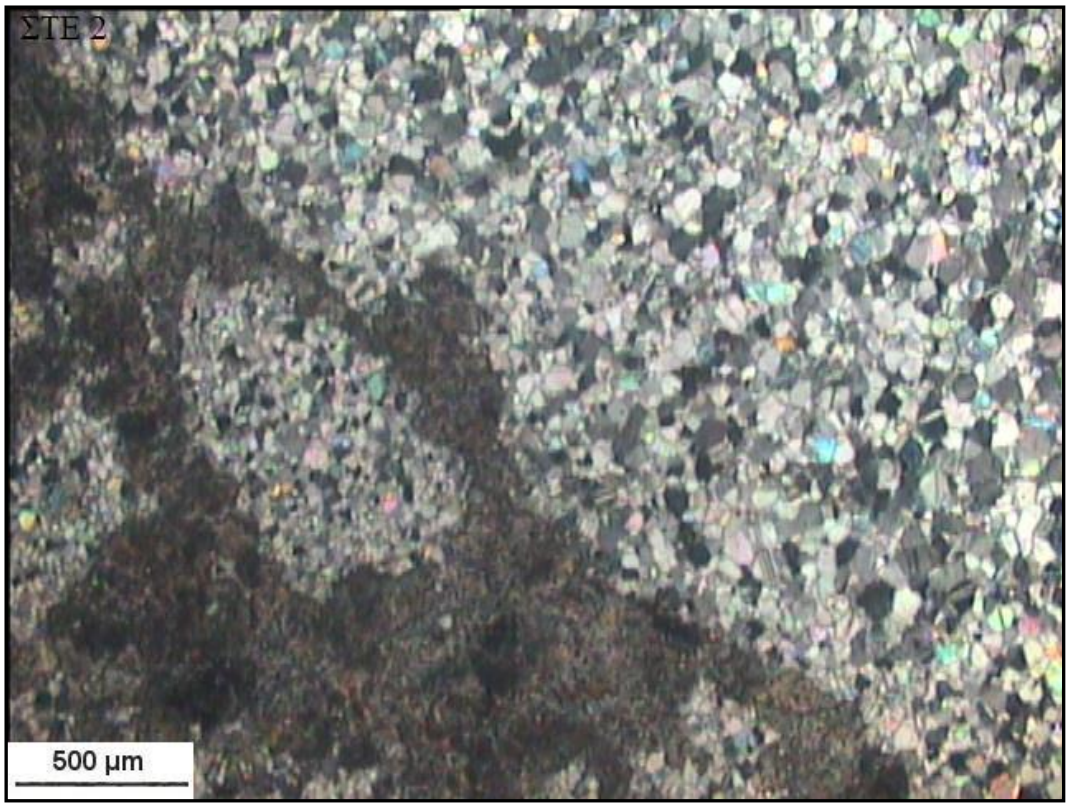
Description: Skyros semi white is suitable for various interior and exterior uses and applications, such as wall cladding, floor covering, stairs, kitchens, fireplaces.



Internal flooring with Skyros semi white.

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Petrography



Description: Photomicrograph of thin section, showing the granoblastic texture of calcite with dolomite veins. Calcite crystals are hypidiomorphic, while dolomite occurs in veins and agglomerates.

Source of information: Hellenic Survey of Geology and Mineral Exploration

Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Calcite (%)	**Dolomite (%)**	**Quartz (%)**				
79	20	1				

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2830	1,0	0,3	187	10,9

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa
-	-		

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
11,3	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
-	12	-	-	-	-

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			2	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
0,40	0,04	0,10	-	4,06	51,25	0,27	0,09	0,00	-	-	44,45

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
3,5	21	35	2,0	20	12	15	2,3
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
95	0,5	57	6,0	0,7	21	0,0	0,4
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
38	1,1	4,5	0,7	0,7	0,7		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
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Thassos Limenas White



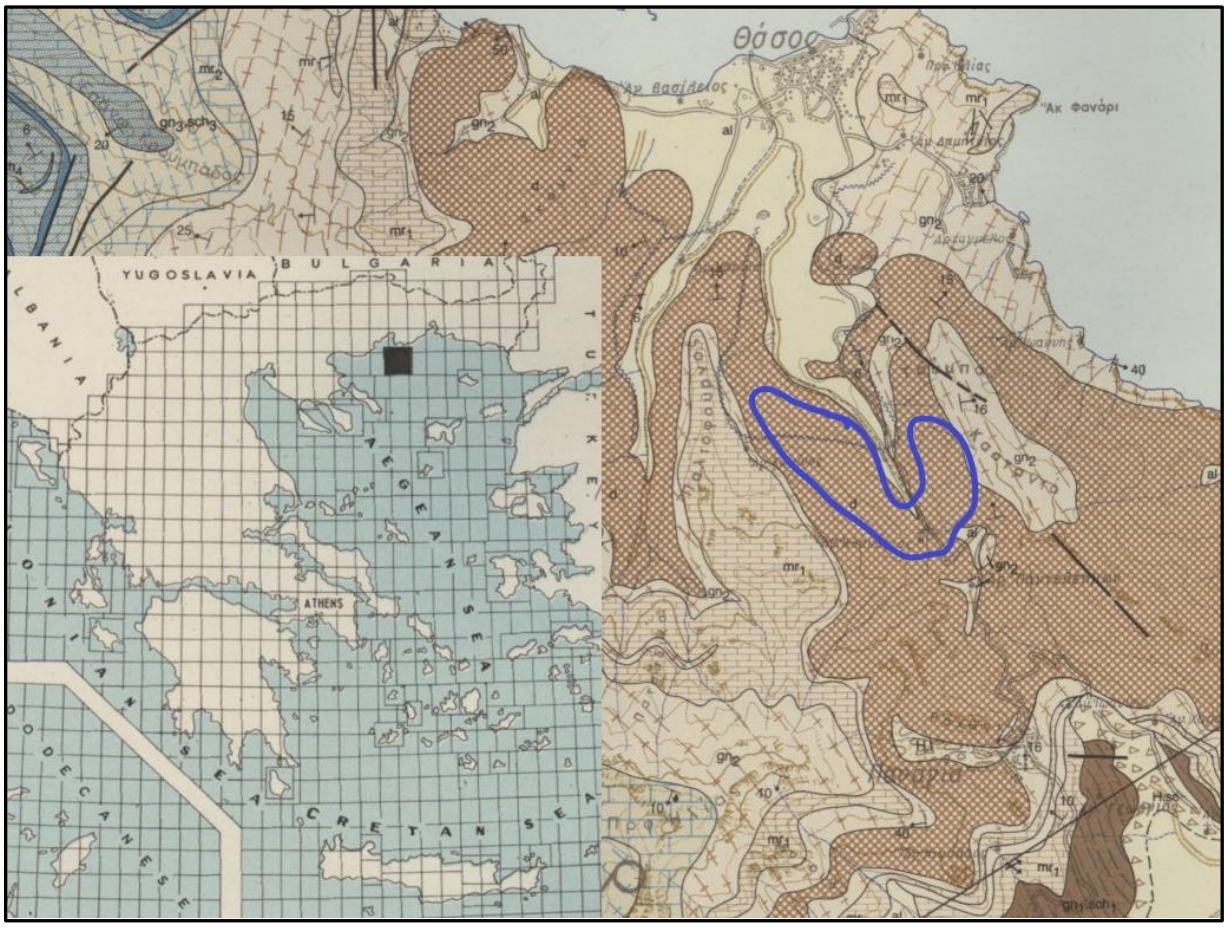
Scale 1:1

Short description: Medium grained crystallic dolomitic marble with semi white crystal veins on its sparkling white background.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Marble	Dolomitic-calcitic marble	White	Greece	East Macedonia and Thrace	Thasos	Limenas

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Geological setting



Geology: Thassos Limenas White (blue curve) is a metamorphic rock belonging to the carbonate marbles of Rhodope Mass area, which is part of the region of East Macedonia and Thrace.

(Source: Geological Map of Greece 1:50000, Thassos Sheet).

Production: The most important quarry area is near the town Limenas Thasou on the island of Thasos in northern Greece.

Geological age: -
Geological unit: Metamorphic system - Potamia Series

Application, use and heritage

Description: Thassos Limenas White marble is known for many centuries all over the world for its pure sparkling whiteness, used in various construction projects. It provides a high reflection of sunlight and holds its cool temperature, making it perfect suitable for claddings in warmer regions. It is a marble with high strength properties, suitable for interior and exterior use, wall cladding, flooring, stairs, and other design projects.





County Court-Athens: Cladding with Thassos Limenas White.



Building of the German Embassy in Athens: Wall cladding with Thassos Limenas marble.

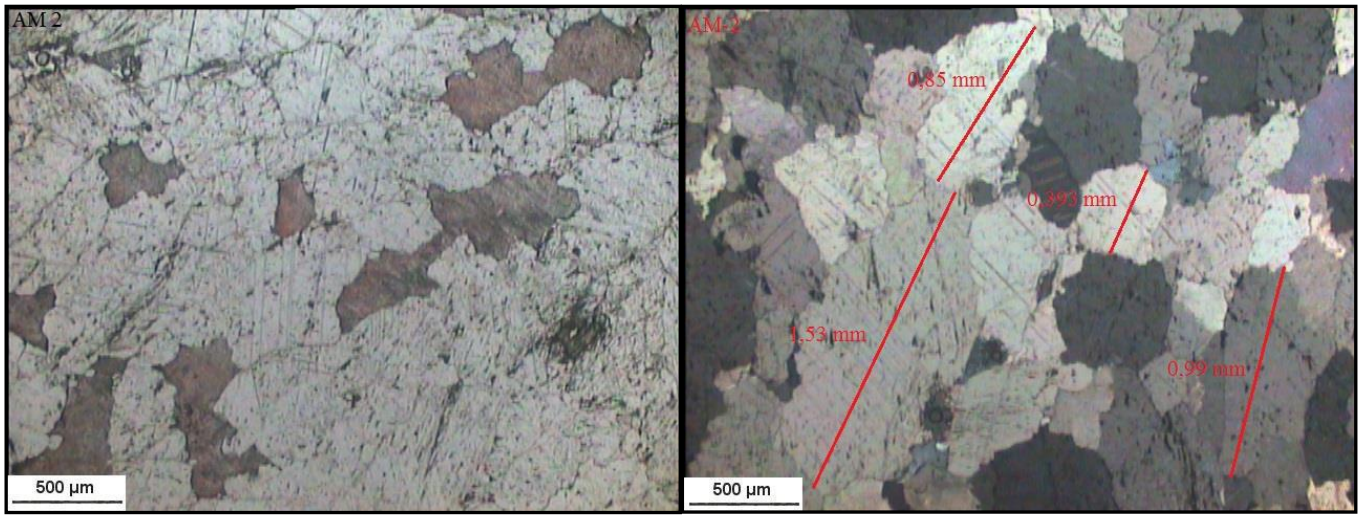




Hilton Hotel Athens: Wall cladding with Thassos Limenas marble.

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Petrography



Description: Photomicrograph of thin section, showing scattered calcite crystals.

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Dolomite (%)	**Calcite (%)**	**Muscovite (%)**	**Apatite (%)**			
88	12	AM	AM			

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2840	0,5	0,1	148	15,9

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa
-	-		

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
13,2	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
-	21	-	-	1900	3

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			3	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
<0,10	<0,10	<0,10	<0,10	18,05	32,90	0,97	0,18	<0,05	-	-	46,00

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
2,0	25	40	3,0	9,0	3,0	17	1,3
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
70	1,0	10	4,0	1,3	0,3	<0,1	0,1
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
6,5	2,7	0,2	0,1	1,2	0,6		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
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MARBLES:

CIPOLLINO MARBLES

“Karystos” Schists Green

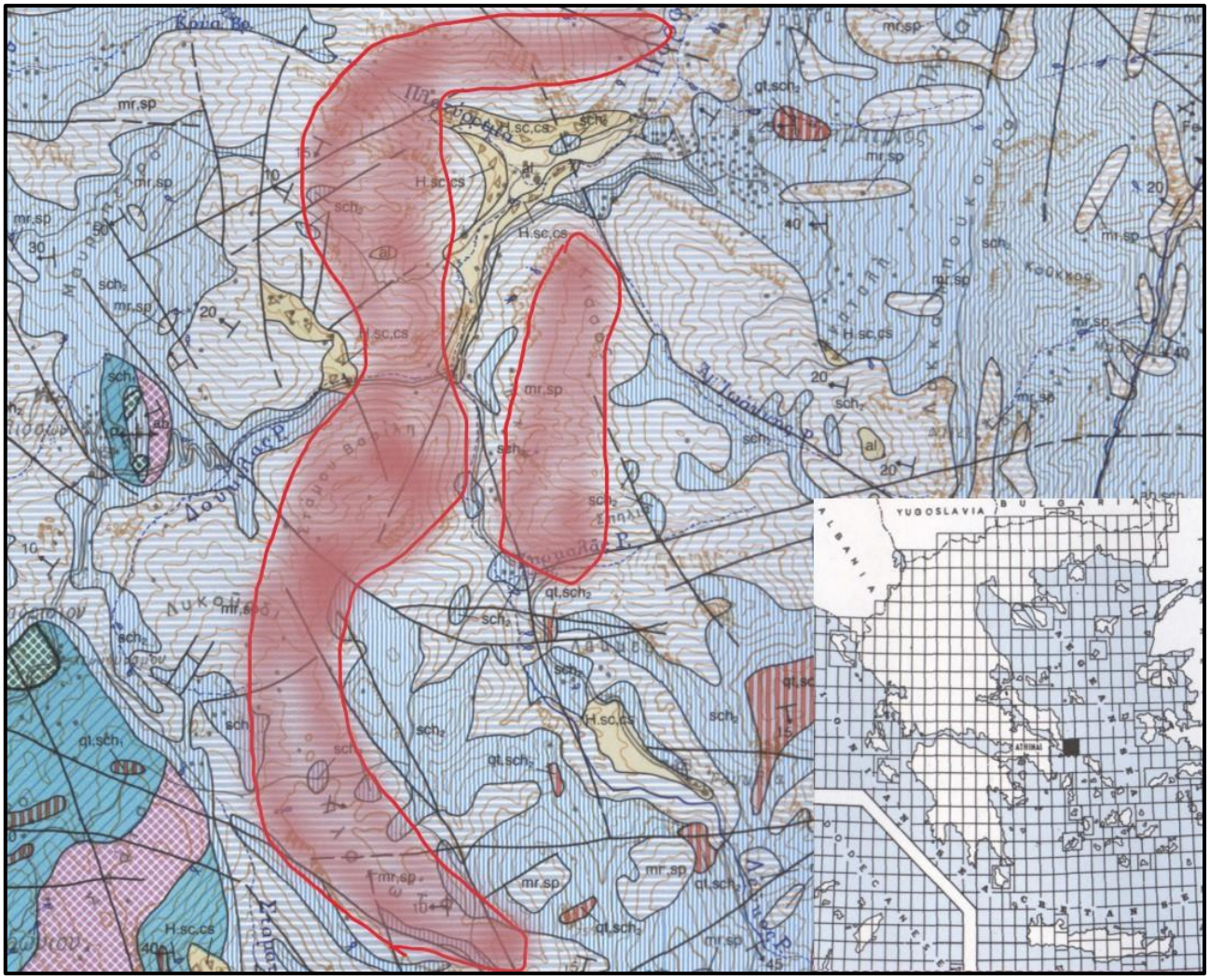


Scale 1:1

Short description: Coarse grained marble with green and off-green veins, classified as cipollino marble.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Marble	Cipollino marble	Green	Greece	Central Greece	Karystos	Agios Dimitrios Marmari Paradisi

Geological setting



Geology: Karystos Schists (red marking) belong to marbles and cipolins of Atticocycladic Massif. They are mainly thin-bedded and locally thick-bedded, to micro- to medium-crystalline marbles of grey, grey-black and black colours. Great participation of muscovite is often observed resulting in cipolins-marbles or / and cipolins. Chlorite also participates locally in significant proportion, turning them into green cipolins which have intensely exploited ever since the ancient times. The thin – bedded and even the medium bedded marbles and cipolins are highly exploited producing the well-known "Karystos plates".
(Source: Geological Map of Greece 1:50000, Karistos-Platanistos Sheet)

Production: The most important quarry area is near the villages of Agios Dimitrios, Marmari, Paradisi, in South Evia.

Geological age: Neogene – Middle – Upper Miocene

Geological unit: Atticocycladic Massif – Neohellenic Tectonic Nappe

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Application, use and heritage

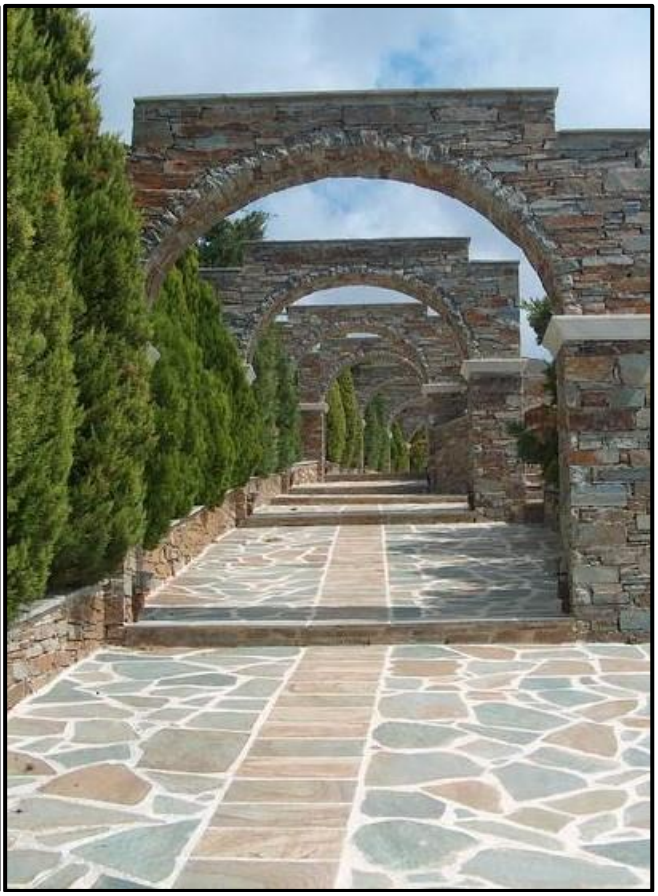
Description: Karystos schists are durable materials, ideal for paving of roads and footpaths, the construction of floors (indoor and especially outdoor). They are also used for the construction of stone houses, masonry, coverings of walls and roofs, etc.



The **dragon houses** are some large, ruined buildings found in the south of Evia Island in Greece. They are dated before 700 BC. They were built with massive stone blocks without mortar and large stone slabs for the roofs. The Dragon House on Mount Ochi, north of Karystos is the most famous and well preserved.

(Source: *«ΚΑΡΥΣΤΙΑ ΛΙΘΟΣ» ΕΝΑ ΔΙΑΧΡΟΝΙΚΟ ΔΟΜΙΚΟ ΥΛΙΚΟ,* Ελληνική Γεώσφαιρα, *Περιοδική Έκδοση Ι.Γ.Μ.Ε.,* Απρίλιος 2009, Τεύχος 6)



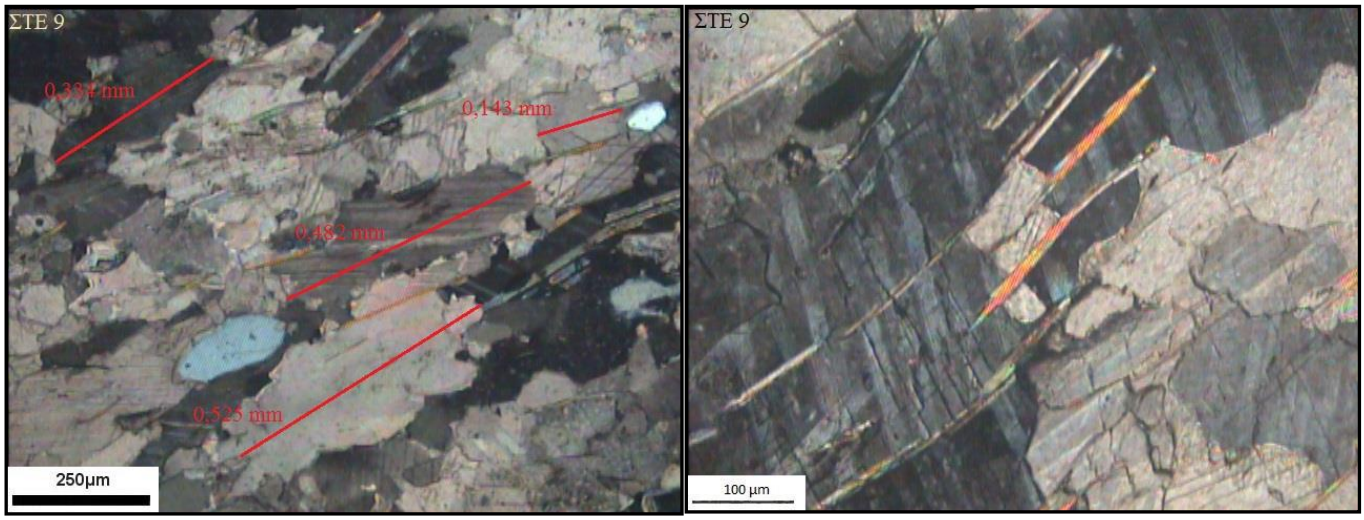




Various applications of Karystos Schists

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Petrography



Description: Crystalline marble with coloured veins of muscovite and quartz. It has a well-developed schistosity, consisting of alternating layers of hypidiomorphic calcite crystals. The predominant green colour is attributed to the relatively high amounts of muscovite, chlorite, epidote and titanite.

Source of information: Hellenic Survey of Geology and Mineral Exploration

Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Calcite (%)	Muscovite (%)	Chlorite (%)	Albite (%)	Quartz (%)	Opaque minerals (%)	Titanite (%)
75	10	9	7	3	AM	AM

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2710	0,3	0,1	-	25,6

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa
-	-		

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
24,4	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
20,5	-	-	-	-	-

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			5	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
4,20	0,84	0,61	-	0,80	52,15	0,32	0,29	0,05	-	-	41,10

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
6,0	26	425	4,5	26	40	28	1,5
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
430	0,5	75	10	0,3	8,0	<0,1	<0,1
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
14	4,0	1,0	0,5	0,3	0,9		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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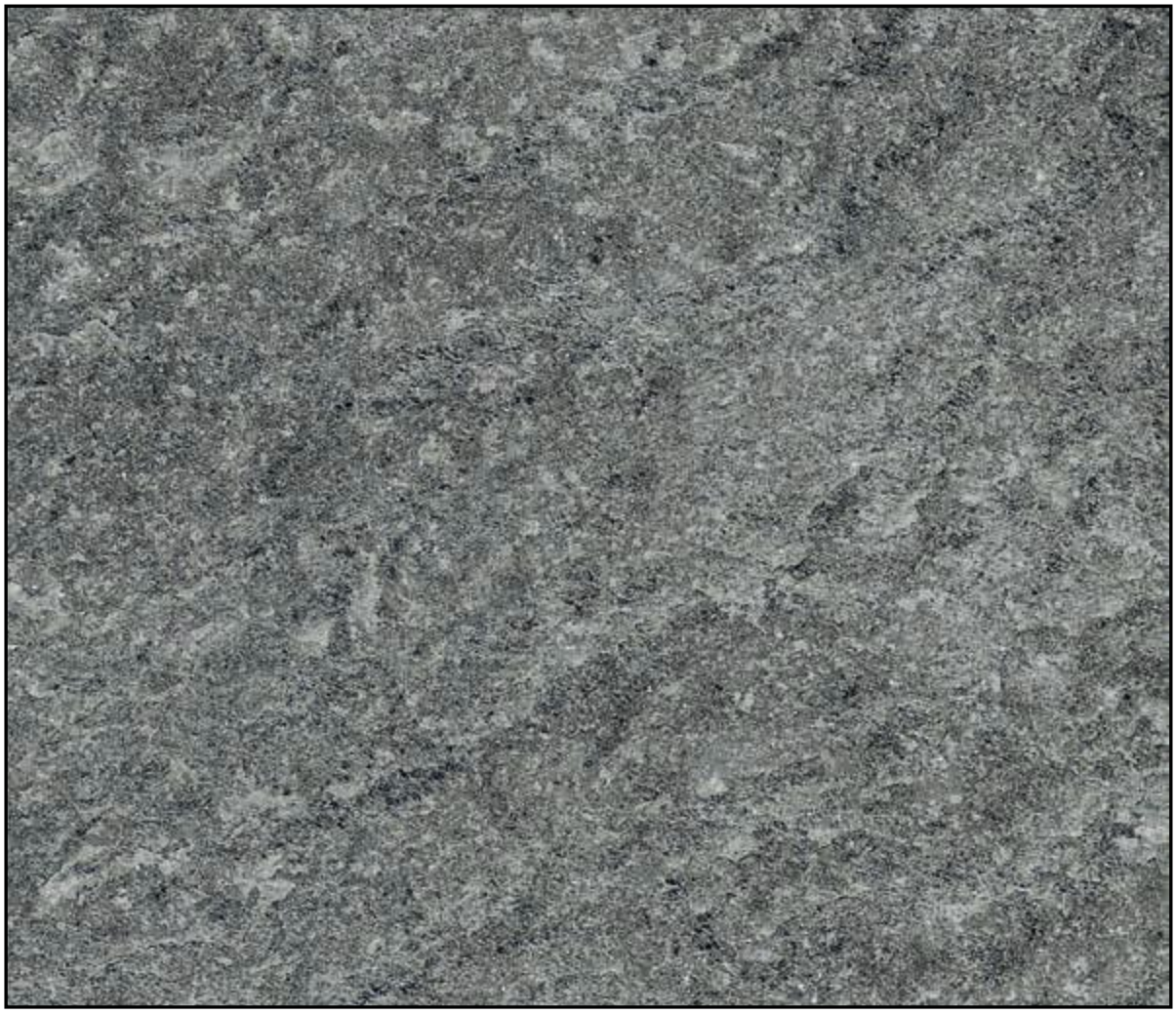
Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
Non-commercial directory		
Commercial directory		
Scientific publication	Ελληνική Γεώσφαιρα *Περιοδική Έκδοση Ι.Γ.Μ.Ε.* Απρίλιος 2009 Τεύχος 6	https://www.igme.gr/images/igme/magazine/Elliniki_Geosphaera_No6.pdf
Other publication		

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“Karystos” Schists Grey



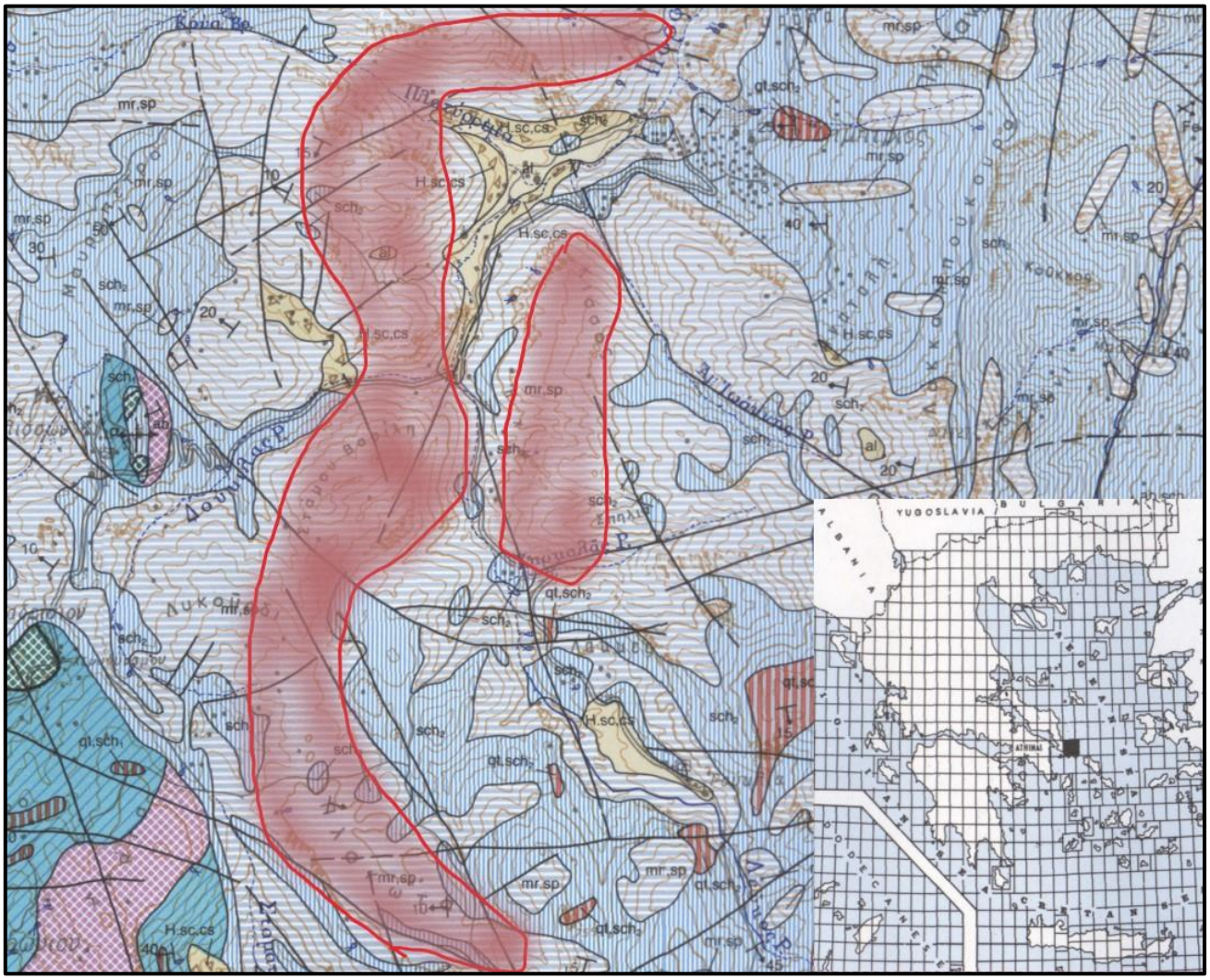
Scale 1:1

Short description: Fine to coarse-grained cipollino marble displaying mainly grey colours but also grey-green or off-white zones.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Marble	Cipollino marble	Grey	Greece	Central Greece	Karystos	Agios Dimitrios Marmari Paradisi

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Geological setting



Geology: Karystos Schists (red marking) belong to marbles and cipolins of Atticocycladic Massif. They are mainly thin-bedded and locally thick-bedded, to micro- to medium-crystalline marbles of grey, grey-black and black colours. Great participation of muscovite is often observed resulting in cipolins-marbles or / and cipolins. Chlorite also participates locally in significant proportion, turning them into green cipolins which have intensely exploited ever since the ancient times. The thin – bedded and even the medium bedded marbles and cipolins are highly exploited producing the well-known "Karystos plates".
(Source: Geological Map of Greece 1:50000, Karistos-Platanistos Sheet)

Production: The most important quarry area is near the villages of Agios Dimitrios, Marmari, Paradisi, in South Evia.

Geological age: Neogene – Middle – Upper Miocene
Geological unit: Atticocycladic Massif – Neohellenic Tectonic Nappe

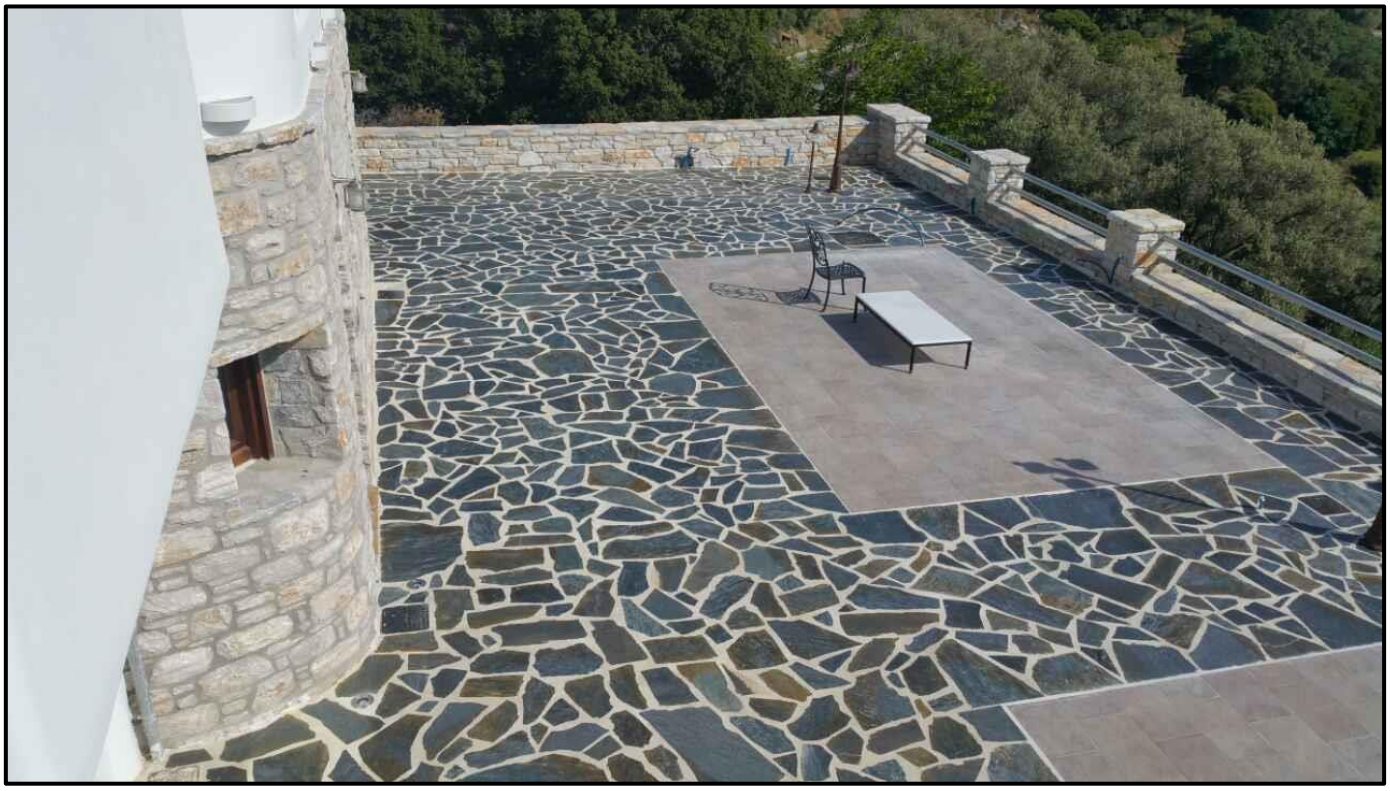
Application, use and heritage

Description: Karystos schists are widely used since archaic times in the construction of columns, monuments and other buildings of colossal ("cyclopean") dimensions for decorative, ritualistic or other practical purposes. Those constructions are dated before 700 BC or before the Trojan War (1300 BC) or even as early as the Neolithic Age (> 3000 BC). Karystos schists are compact and tough. They present low water absorption and open porosity. The values of mechanical properties determined for Karystos schists are much higher than the minimum acceptable for ornamental stones. They are now widely used for paving of roads and footpaths, in gardens and yards, as well as for masonry, wall cladding and flooring.



The **dragon houses** are some large, ruined buildings found in the south of Evia Island in Greece. They are dated before 700 BC. They were built with massive stone blocks without mortar and large stone slabs for the roofs. The Dragon House on Mount Ochi, north of Karystos is the most famous and well preserved.

(Source: *«ΚΑΡΥΣΤΙΑ ΛΙΘΟΣ» ΕΝΑ ΔΙΑΧΡΟΝΙΚΟ ΔΟΜΙΚΟ ΥΛΙΚΟ,* Ελληνική Γεώσφαιρα, *Περιοδική Έκδοση Ι.Γ.Μ.Ε.,* Απρίλιος 2009, Τεύχος 6)



Exterior flooring with Karystos slates.

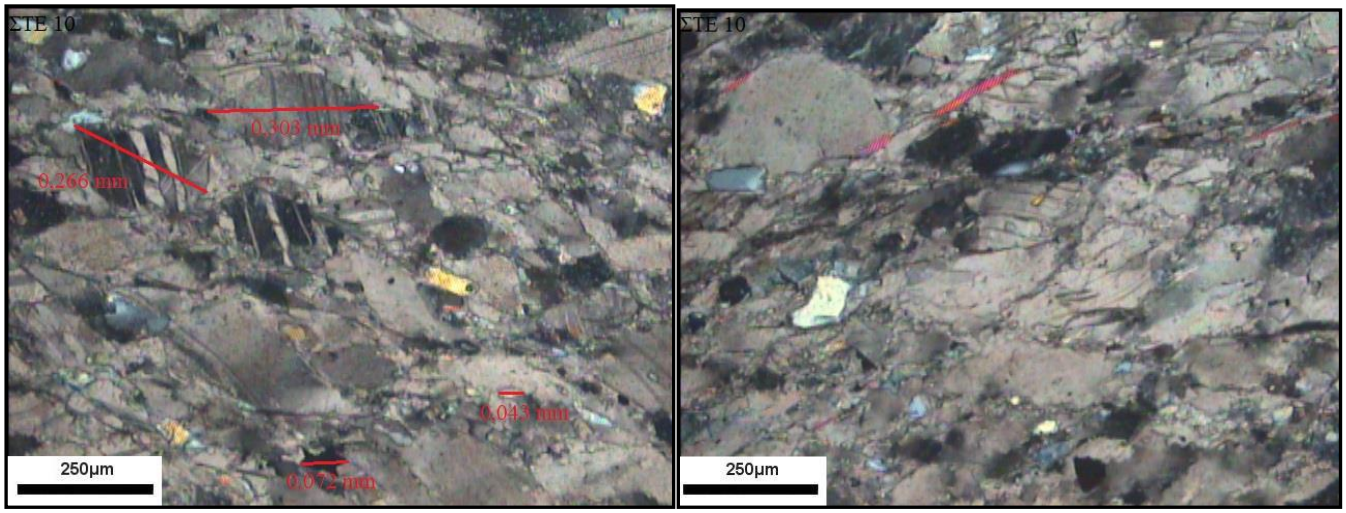
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Paving of roads and footpaths on the island of Kassos with polygonal Karystos slates.

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Petrography



Description: The main mineralogical constituent is calcite while the secondary minerals are muscovite and quartz. The colour of Karystos schists depends on their secondary and accessory minerals content.

Source of information: Hellenic Survey of Geology and Mineral Exploration

Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Calcite (%)	Muscovite (%)	Chlorite (%)	Albite (%)	Quartz (%)	Opaque minerals (%)	Titanite (%)
80	7	7	3	3	AM	AM
Epidote (%)						
SM						

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2720	0,2	0,1	-	24,0

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa
-	-		

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
24,1	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
20,0	-	-	-	-	-

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			5	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
5,60	1,02	0,64	-	0,80	51,35	0,39	0,33	0,05	-	-	40,20

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
8,0	23	370	5,5	36	21	23	2,5
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
500	0,5	90	7,0	0,5	9,0	0,0	<0,1
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
6,0	3,2	1,0	0,9	0,2	1,0		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
Non-commercial directory		
Commercial directory		
Scientific publication	Ελληνική Γεώσφαιρα *Περιοδική Έκδοση Ι.Γ.Μ.Ε.* Απρίλιος 2009 Τεύχος 6	https://www.igme.gr/images/igme/magazine/Ellinki_Geosphaera_No6.pdf
Other publication		

Compiled by:	**Hellenic Survey of Geology and Mineral Exploration (H.S.G.M.E.)** https://www.eagme.gr/	

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Styra Green



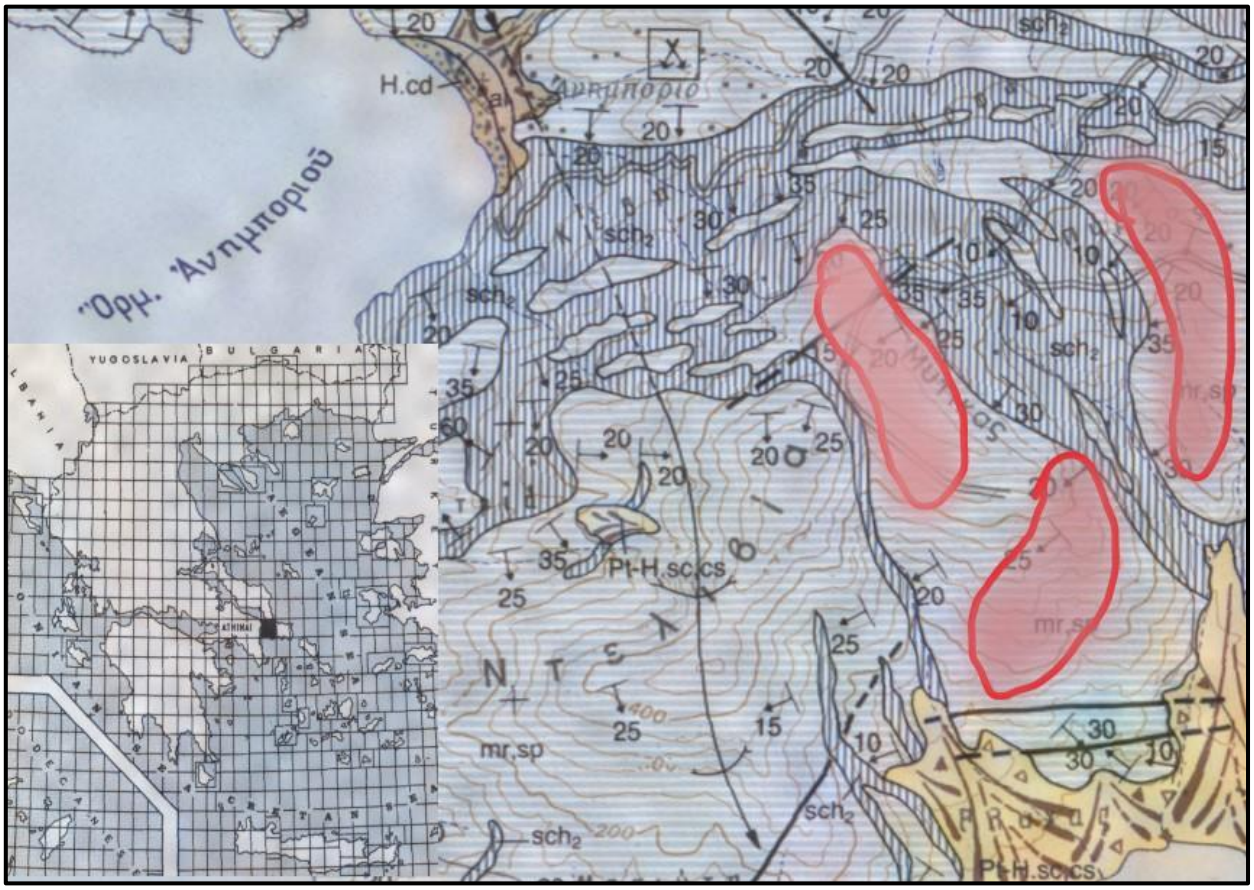
Scale 1:1

Short description: Medium grained marble with green veins crossing the light green crystalline mass.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Marble	Cipollino marble	Green	Greece	Central Greece	Styra	Kapsala

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Geological setting



Geology: Styra Green marbles (red markings) are very thick series of marbles and cipolins with schist and sometimes quartzite intercalations, which form the upwards regular evolution of the Tsakeoi Schists occupying a significant part of Southern Euboea. The marbles of the Styra series are usually grey, thin to medium bedded and locally thick-bedded, fine t medium crystalline, and often with great participation of muscovite, passing as a result to cipolin-marbles or / and cipolins. Besides that, chlorite participates locally in a significant proportion and they pass to green cipolins which have been intensely exploited, occasionally from the ancient times to the present day.
(Source: Geological Map of Greece 1:50000, Rafina Sheet)

Production: The most important quarry area is near Styra and Kapsala villages, in South Evia.

Geological age: Neogene – Middle – Upper Miocene

Geological unit: Neohellenic Tectonic Nappe Unit – Marbles and cipolins of Styra

Application, use and heritage

Description: Cipollino marble was a variety of marble used by the ancient Greeks and Romans, whose Latin term for it was *marmor carystium* (meaning "marble from Karystos"). It was quarried in several locations on the south-west coast of the Greek island of Euboea, between the modern-day cities of Styra and Karystos. Some of these ancient quarries survive with a mine-face of over 100 metres.

(Source: https://en.wikipedia.org/wiki/Cipollino_marble)





Hadrian's Library was created by Roman Emperor Hadrian in AD 132 on the north side of the Acropolis of Athens. The library was seriously damaged by the Herulian invasion of 267 and repaired by the prefect Herculius in AD 407-412. The Columns were made of Styra Green (cipollino marble).

(Source: https://en.wikipedia.org/wiki/Hadrian%27s_Library)



Ancient Colums with Styra Green in the Ancient Quarries on the southern flanks of Mountain Ochi.

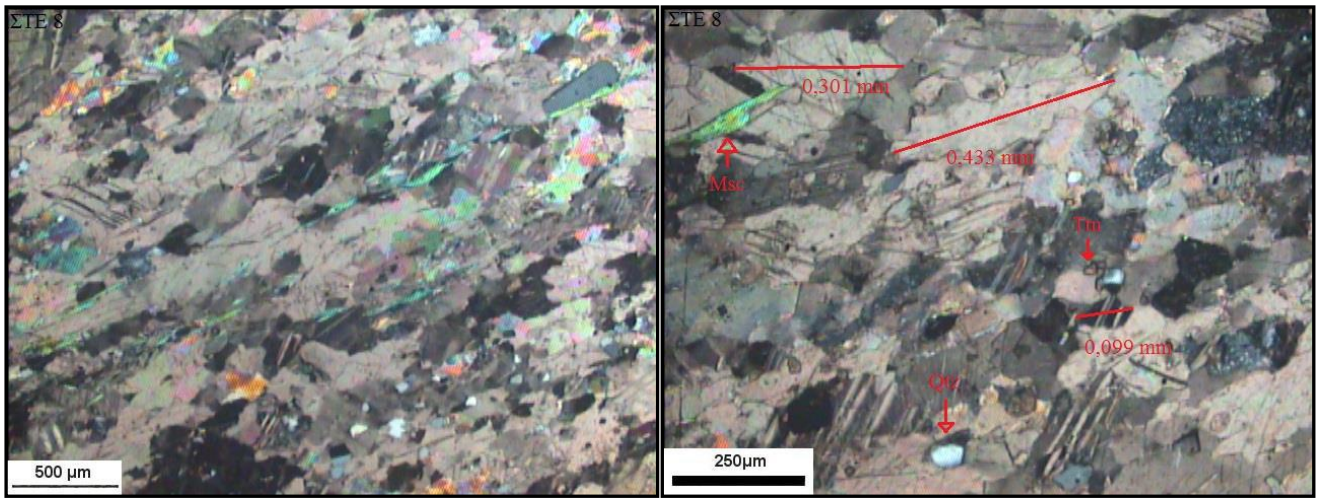


"Karystia Lithos" – Cipollino marble

(Source: «*ΚΑΡΥΣΤΙΑ ΛΙΘΟΣ» ΕΝΑ ΔΙΑΧΡΟΝΙΚΟ ΔΟΜΙΚΟ ΥΛΙΚΟ,* Ελληνική Γεώσφαιρα, *Περιοδική Έκδοση Ι.Γ.Μ.Ε.,* Απρίλιος 2009, Τεύχος 6)

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Petrography



Description: Photomicrograph of thin section, showing calcite crystals, presence of muscovite, quartz, titanite and chlorite.

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Calcite (%)	Muscovite (%)	Albite (%)	Chlorite (%)	Dolomite (%)	Quartz (%)	
70	14	8	5	2	1	

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2720	0,3	0,1	86	22,6

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa
-	-		

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
22,5	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
-	26	-	-	2000	3

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			6	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
3,00	0,73	0,45	-	0,80	52,20	1,50	0,40	0,15	-	-	41,65

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
10	26	950	4,0	25	104	22	2,0
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
570	0,6	56	12,5	0,3	5,5	<0,1	1,4
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
31	3,3	1,4	1,7	0,4	0,6		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
Non-commercial directory	Wikipedia	https://en.wikipedia.org/wiki/Cipollino_marble https://en.wikipedia.org/wiki/Hadrian%27s_Library
Commercial directory		
Scientific publication	Ελληνική Γεώσφαιρα, *Περιοδική Έκδοση Ι.Γ.Μ.Ε.*, Απρίλιος 2009, Τεύχος 6	https://www.igme.gr/images/igme/magazine/Elliniki_Geosphaera_No6.pdf
Other publication		

Compiled by:	**Hellenic Survey of Geology and Mineral Exploration (H.S.G.M.E.)** https://www.eagme.gr/	

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Syki Slates



Scale 1:1

Short description: Fine-grained, grey marble with semi white lines.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Marble	Cipollino marble	Grey	Greece	Thessalia	Volos	Syki

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Geological setting



Geology: Syki Slates (red marking) belong to formations of Pelagonian Zone, containing mica schists with crystalline limestone – marble intercalations. Amphibole – epidote – chlorite schists.

(Source: Geological Map of Greece 1:50000, Zagora Syki Sheet).

Production: The most important quarry area is near the village of Syki, in South Pelion.

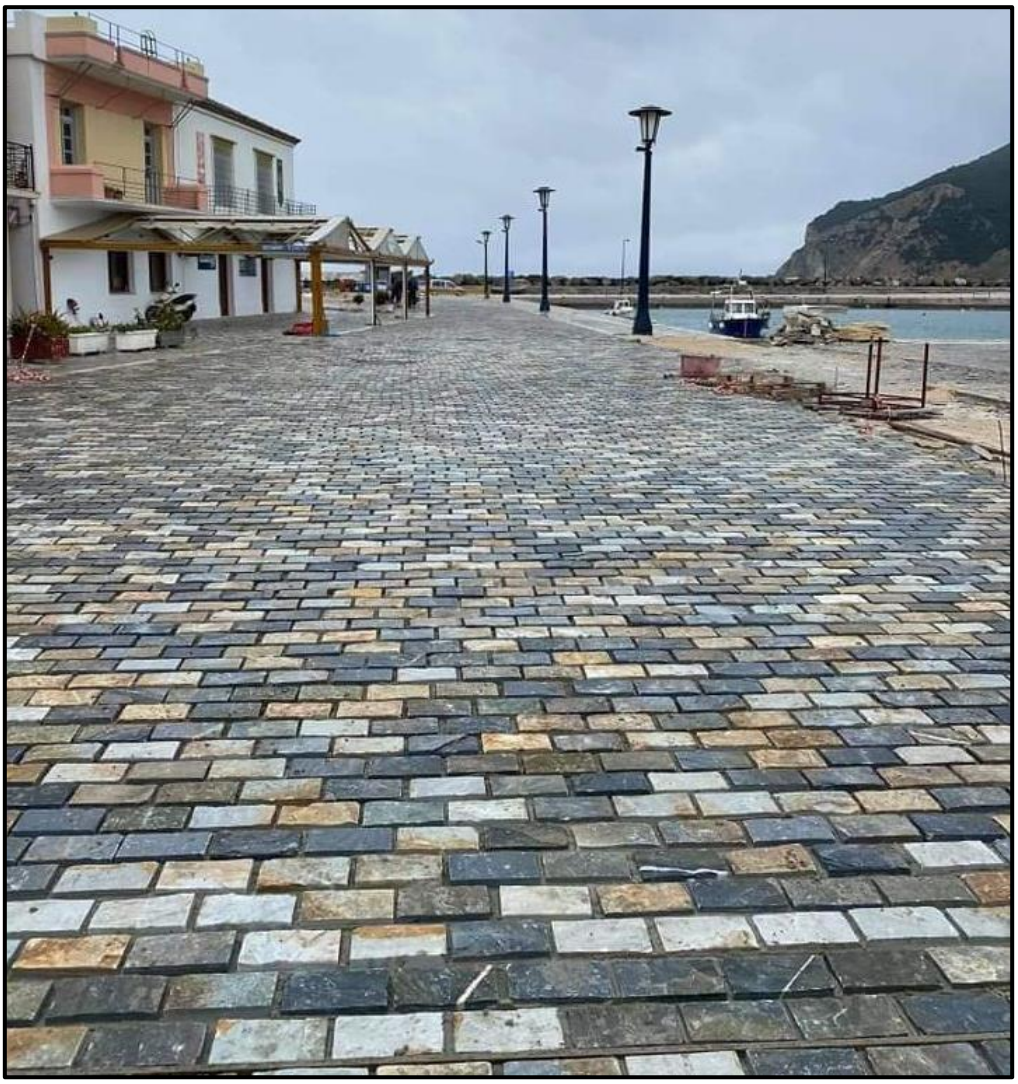
Geological age: -

Geological unit: Pelagonian Zone – Basic and ultrabasic rocks

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Application, use and heritage

Description: Syki Slates can be applied to many construction works, for interior and exterior uses, such as masonry, wall cladding, construction of floors (indoor and especially outdoor), paving of roads and footpaths, stairs, bathrooms and wall coverings.



Setts for external paving with Syki Slates.

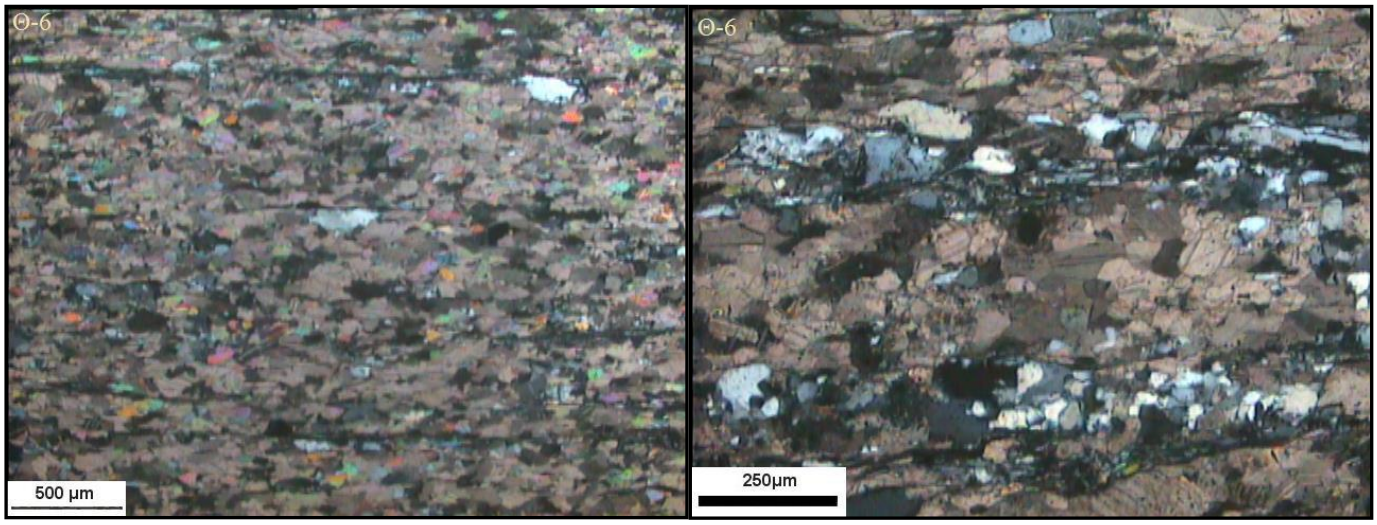
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Syki Slates used as building stones (house masonry).

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Petrography



Description: Photomicrograph of thin section, showing hypidiomorphic, oriented and slightly elongated calcite crystals, zonation composed of quartz, muscovite and chlorite and visible schistosity.

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Calcite (%)	Quartz (%)	Muscovite (%)	Opaque minerals (%)	Chlorite (%)		
92	8	AM	AM	AM		

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2710	0,3	0,1	-	20,1

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
16,7	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
24,5	-	-	-	-	-

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			4	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
6,05	1,40	0,80	<0,05	1,45	48,05	1,23	0,43	<0,05	-	-	39,42

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
15	295	275	11	147	16	47	4,0
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
426	<1,0	78	10	<1,0	7,0	<1,0	1,0
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
2,0	5,0	1,0	1,0	<1,0	2,5		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
Non-commercial directory		
Commercial directory		
Scientific publication		
Other publication		

Compiled by:	**Hellenic Survey of Geology and Mineral Exploration (H.S.G.M.E.)** https://www.eagme.gr/	

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MARBLES:

DOLOMITIC MARBLES

“Granitis” Drama White

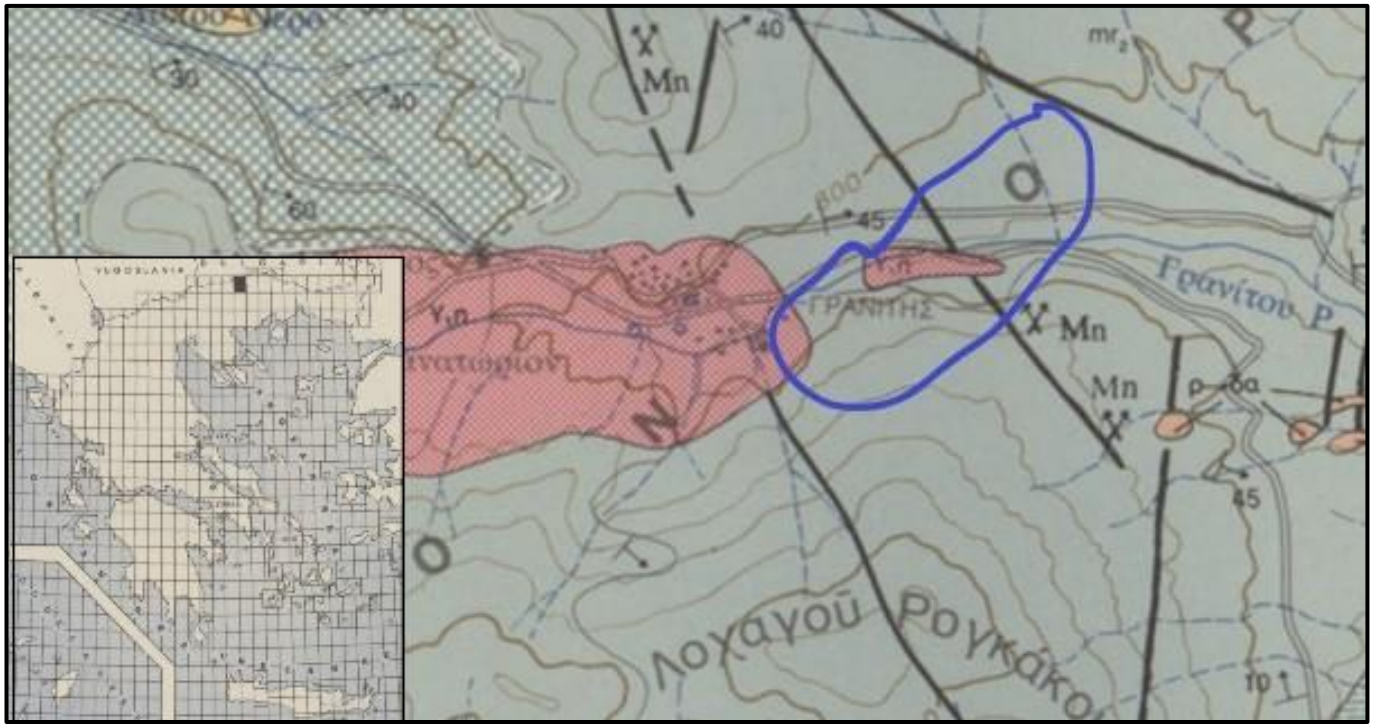


Scale 1:1

Short description: Fine-grained, white dolomitic marble scattered with grayish veining.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Marble	Dolomitic-marble	White	Greece	East Macedonia and Thrace	Drama	Granitis

Geological setting



Geology: Granitis Drama marble (blue curve) is a metamorphic rock classified into Middle series, belonging to the carbonate and dolomitic marbles of the Falacron Mountain, which is part of the region of East Macedonia and Thrace. The nearest village is Granitis, which has given the name for the "Granitis" Drama marble extracted in the area. (Source: Geological Map of Greece 1:50000, Kato Nevrokopion Sheet).

Production: The quarry area producing the Granitis marble is in a small enclosed plateau, in the Granitis Village.

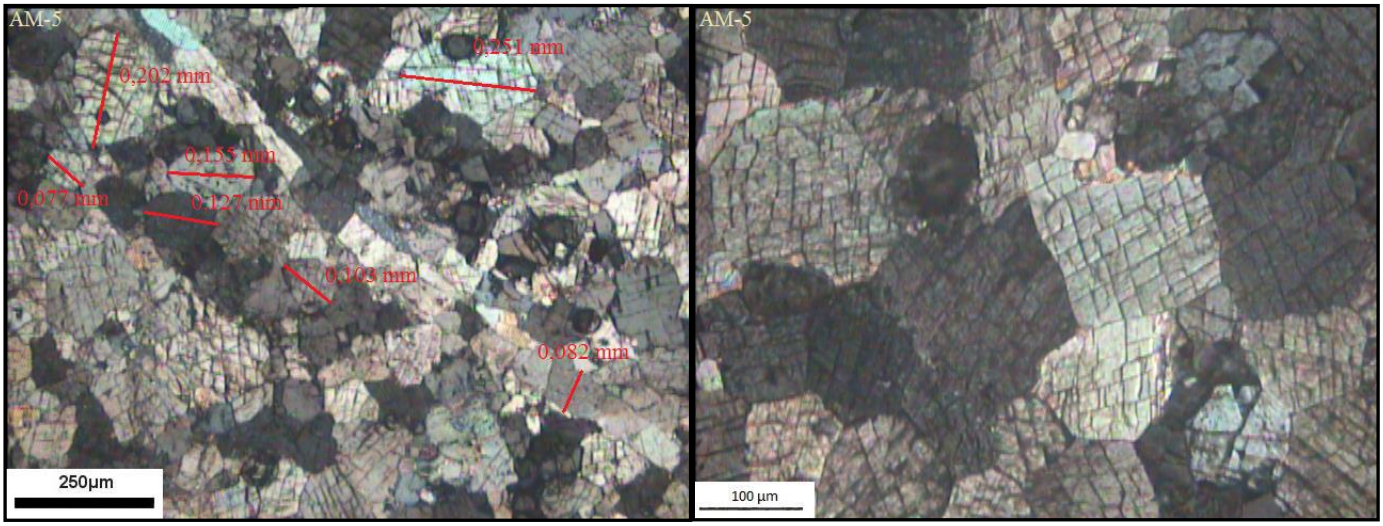
Geological age: -

Geological unit: Metamorphic Rocks - Middle series

Application, use and heritage

Description: “Granitis” Drama marble is suitable for interior and exterior applications. Its face can be finished into honed, polished or brushed.

Petrography



Description: Photomicrograph of thin section, showing dolomite crystals and secondary calcite microjoints – veins, as well as extensive fragmentation of the dolomite crystals.

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Dolomite (%)	**Calcite (%)**					
99	1					

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2840	1,0	0,3	190	2,3

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa
-	-		

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
5,0	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
-	27	-	-	1100	3

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			4	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
<0,10	<0,10	<0,10	<0,10	21,10	30,90	1,09	0,28	<0,05	-	-	46,24

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
0,5	24	12	2,8	8,0	2,0	21	1,3
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
16	0,6	6,0	4,3	0,3	0,3	0,2	0,3
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
7,4	2,7	0,3	0,3	0,7	1,1		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
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Scientific publication		
Other publication		

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Kokkinoghia Grey



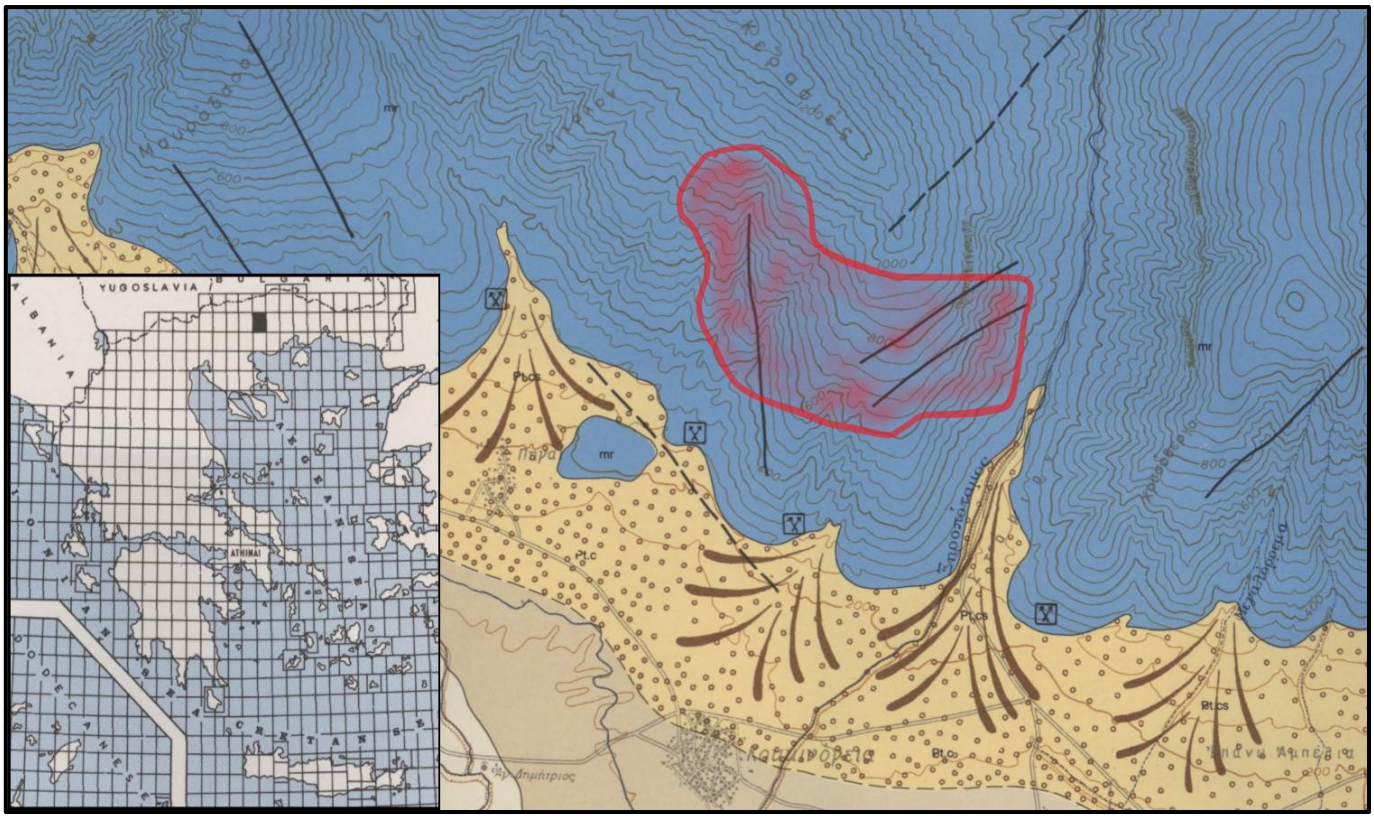
Scale 1:1

Short description: Fine-grained off-white dolomitic marble with grey-brown agglomerates and banded veins.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Marble	Dolomitic-marble	Grey	Greece	East Macedonia and Thrace	Drama	Kokkinoghia

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Geological setting



Geology: Kokkinoghia Grey (red marking) belongs to metamorphic formations of the Rhodhopi massif. They are marbles, grey to whitish, coarse-crystalline, massive to bedded and locally platy. Rarely dolomitized and in certain places intensely tectonized. Thermal contact metamorphism (Skarn) is observed in the area of Panorama. Two mica schist-gneiss in layers and lenses are intercalated in the marbles, with coarse-crystalline and granulo-lepidoblastic texture and oriented structure.
(Source: Geological Map of Greece 1:50000, Prosotsani Sheet).

Production: The quarry area is near the village of Kokkinoghia, which belongs to the municipality of Prosotsani.

Geological age: -

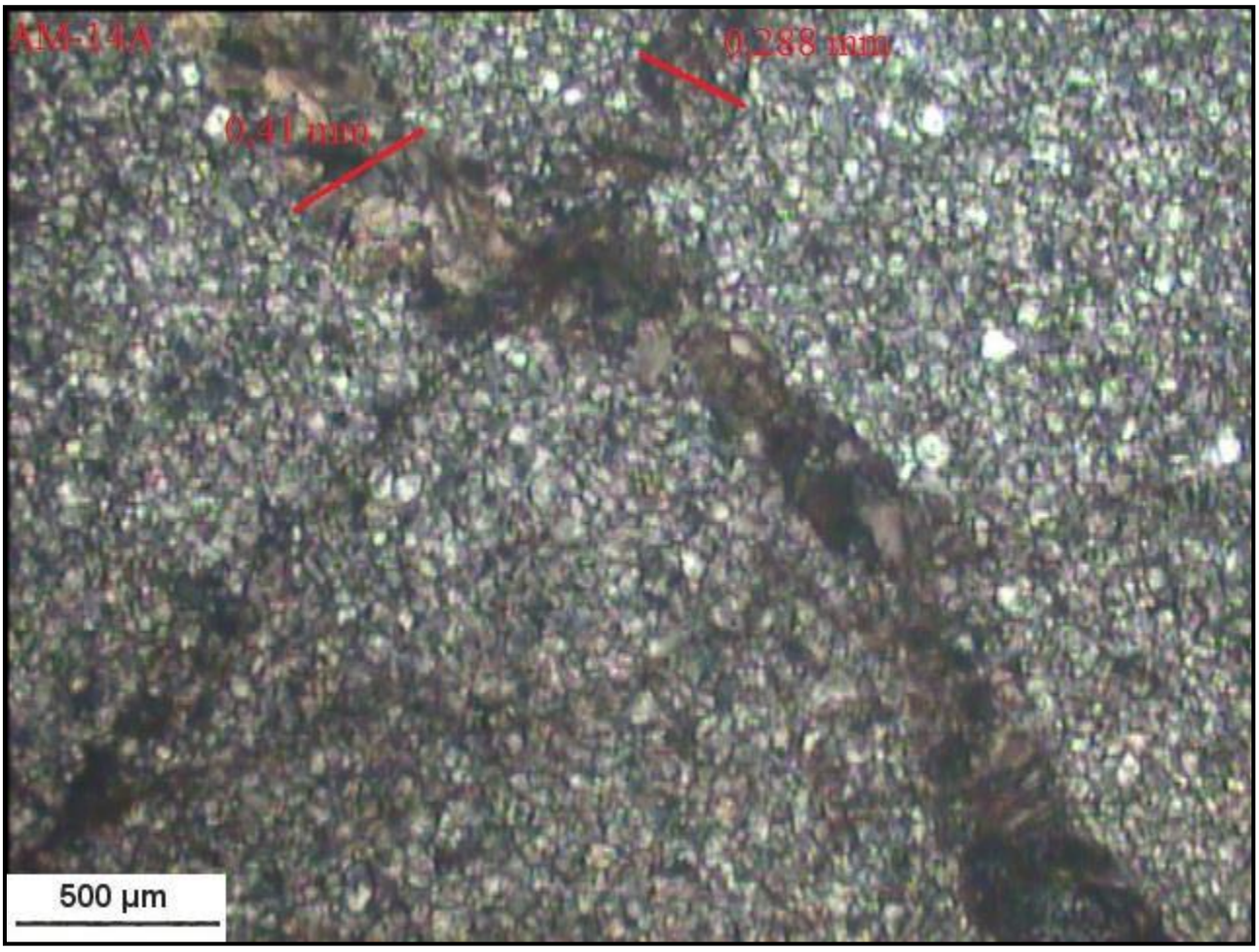
Geological unit: Metamorphic formations of Rhodhopi massif

Application, use and heritage

Description: Kokkinoghia grey marble is suitable for interior and exterior uses, such as on wall and floor coverings, fireplaces, kitchens, public areas and for many renovation applications.

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Petrography



Description: Photomicrograph of thin section, showing a network of three veins composed of coarse-grained calcite, clay material and iron oxides. On the other hand, dolomite crystals are hypidiomorphic.

Source of information: Hellenic Survey of Geology and Mineral Exploration

Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Dolomite (%)	**Calcite (%)**	**Iron oxides (%)**	**Clay minerals (%)**			
94	6	AM	AM			

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2820	1,2	0,3	236	15,6

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa
-	-		

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
14,6	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
-	20	-	-	2400	3

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			4	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
<0,10	<0,10	<0,10	<0,10	19,20	33,05	1,37	0,27	<0,05	-	-	45,77

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
0,6	22	20	2,0	10	5,0	16	3,0
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
80	0,6	23	7,5	0,7	12	<0,1	0,4
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
13	3,5	0,8	1,4	2,0	4,0		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
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Other publication		

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Kokkinoghia Pink



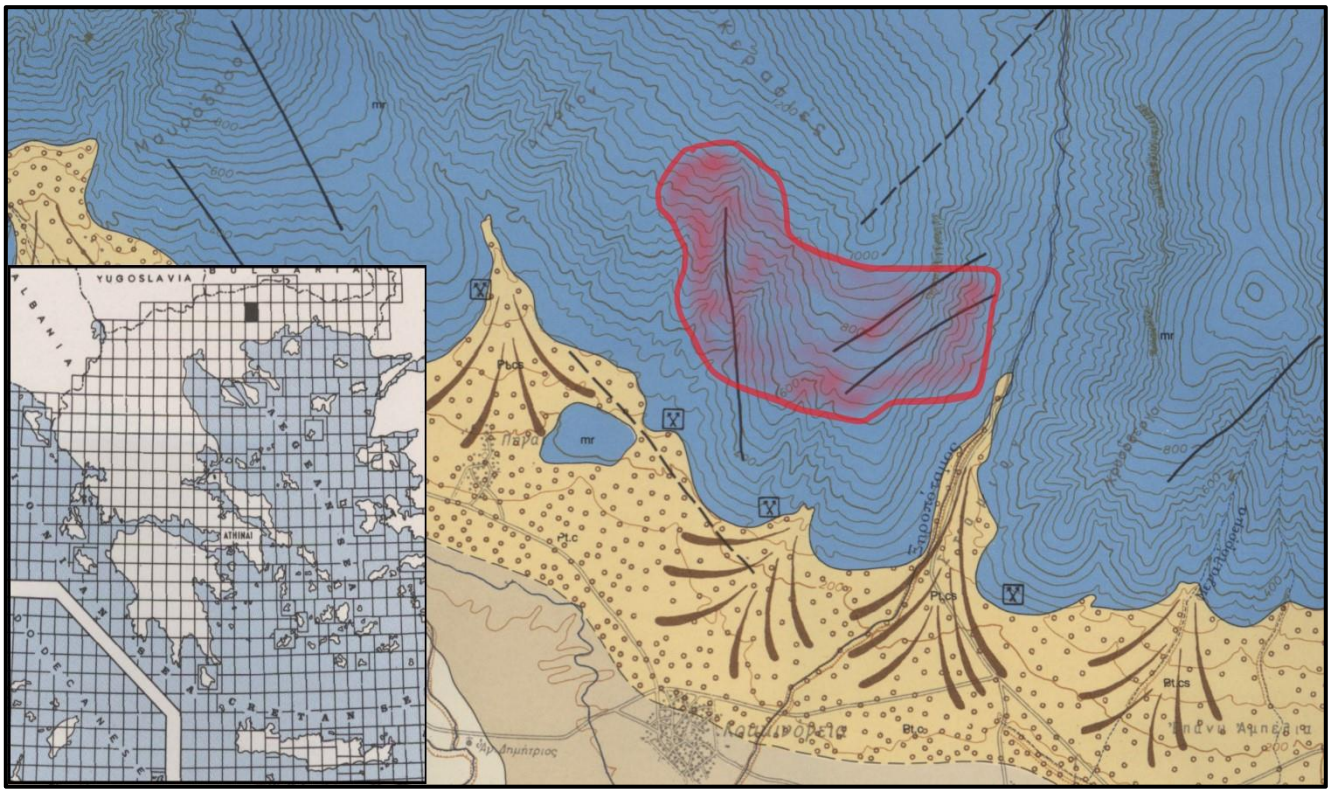
Scale 1:1

Short description: Fine-grained pink - white dolomitic marble with white agglomerates and white and redish veins.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Marble	Dolomitic-marble	Pink	Greece	East Macedonia and Thrace	Drama	Kokkinoghia

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Geological setting



Geology: Kokkinoghia Pink (red marking) belongs to metamorphic formations of the Rhodhopi massif. They are marbles, grey to whitish, coarse-crystalline, massive to bedded and locally platy. Rarely dolomitized and in certain places intensely tectonized. Thermal contact metamorphism (Skarn) is observed in the area of Panorama. Two mica schist-gneiss in layers and lenses are intercalated in the marbles, with coarse-crystalline and granulo-lepidoblastic texture and oriented structure.
(Source: Geological Map of Greece 1:50000, Prosotsani Sheet).

Production: The quarry area is near the village of Kokkinoghia, which belongs to the municipality of Prosotsani.

Geological age: -

Geological unit: Metamorphic formations of Rhodhopi massif

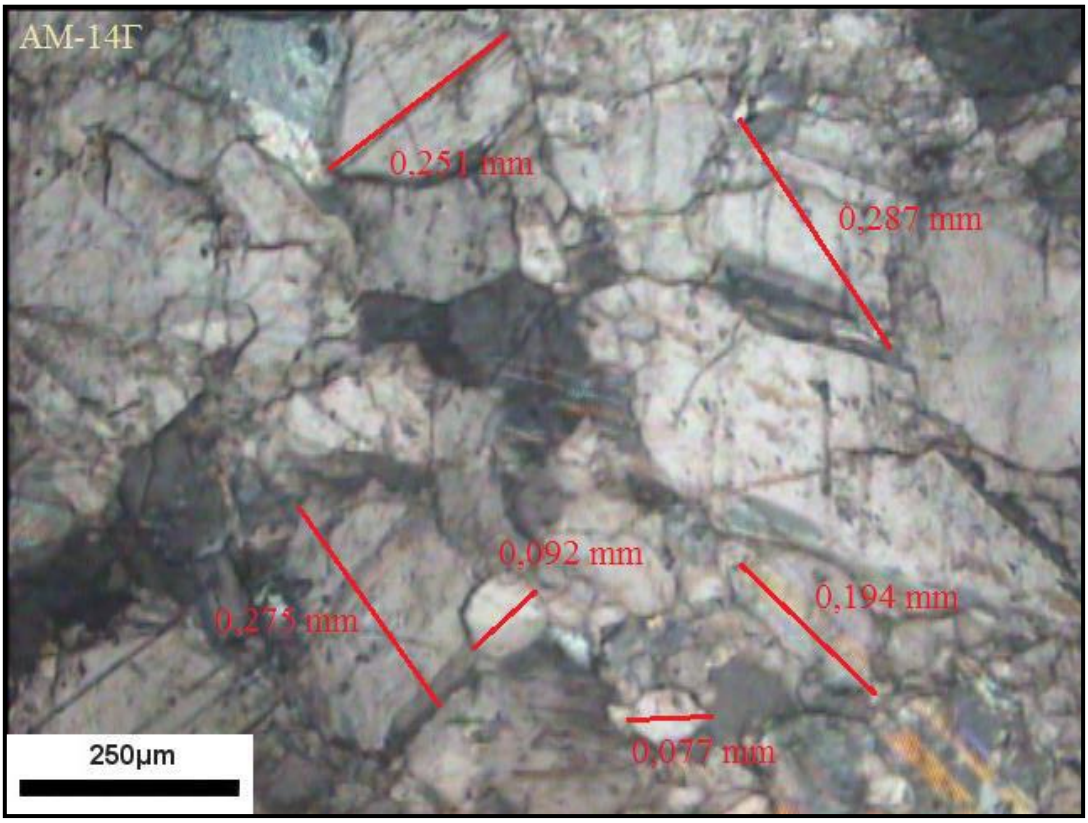
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Application, use and heritage

Description: Kokkinoghia pink marble is suitable for interior and exterior uses, such as on wall and floor coverings, fireplaces, kitchens, public areas and for many renovation applications.

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Petrography



Description: Photomicrograph of thin section, showing the presence of parallel microfissures, as well as dolomite and calcite crystals. The pink-grey parts consist of fine-grained dolomite, the grey ones consist of dolomite with clay material, and the white ones respectively of microcrystallized to mesocrystallized calcite. Dolomite crystals are hypidiomorphic.

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Dolomite (%)	Calcite (%)	Opaque minerals (%)				
92	8	AM				

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2800	1,5	0,4	203	14,8

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa
-	-		

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
15,9	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
-	21	-	-	2200	3

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			4	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
<0,10	<0,10	<0,10	<0,10	18,30	30,70	2,97	0,99	<0,05	-	-	45,80

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
<0,1	22	16	1,3	7,0	4,0	13	1,5
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
67	0,1	18	7,0	<0,1	0,5	<0,1	0,1
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
8,5	1,8	0,3	0,7	0,2	0,8		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
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Other publication		

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Ochiro White



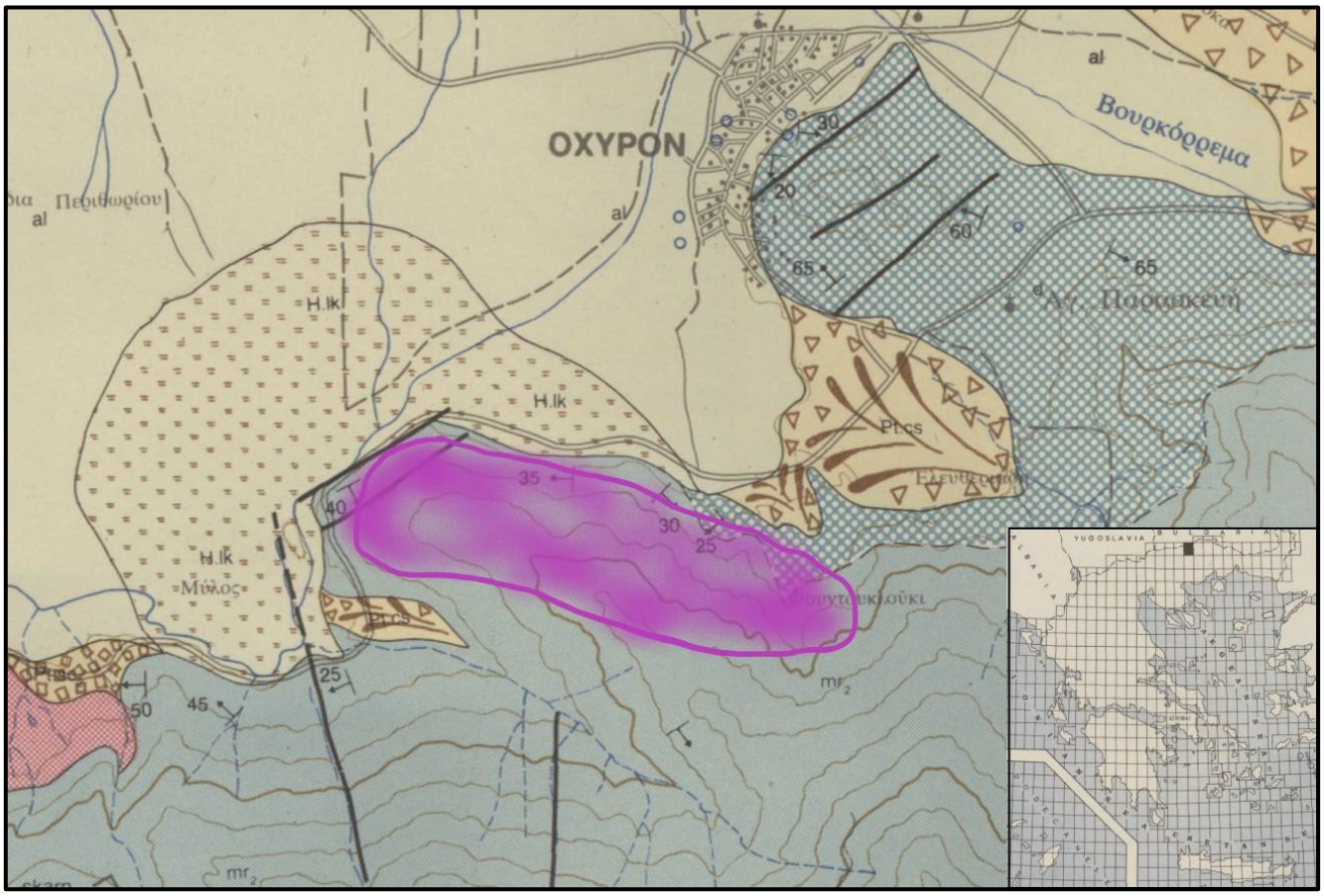
Scale 1:1

Short description: Fine-grained white dolomitic marble with grey and grey-brown agglomerates consisting mainly of calcite.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Marble	Dolomitic marble	White	Greece	East Macedonia and Thrace	Drama	Ochiro

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Geological setting



Geology: Ochiro White (pink marking) belongs to the carbonate and dolomitic marbles of Falacron Mountain. They are white, compact marbles dolomitized and usually bituminous. Crystalline dolomite intercalations of white to greyish – black colour are observed within them. Locally appears metaconglomerate (2km NW of Granitis village). Meta-breccia appears, at two places: a) 1km SW of Kato Nevrokopion and b) at the 24th km of the road Drama-Kato Nevrokopion (in the Vrachomera torrent). Thin – platy marbles with intercalations of mica schists with marbles and of two mica-epidote gneisses appear in the lower members of the series.
(Source: Geological Map of Greece 1:50000, Kato Nevrokopion Sheet)

Production: The quarry area is near the Village of Ochiro, belonging to the municipality of Kato Nevrokopi in Drama.

Geological age: -

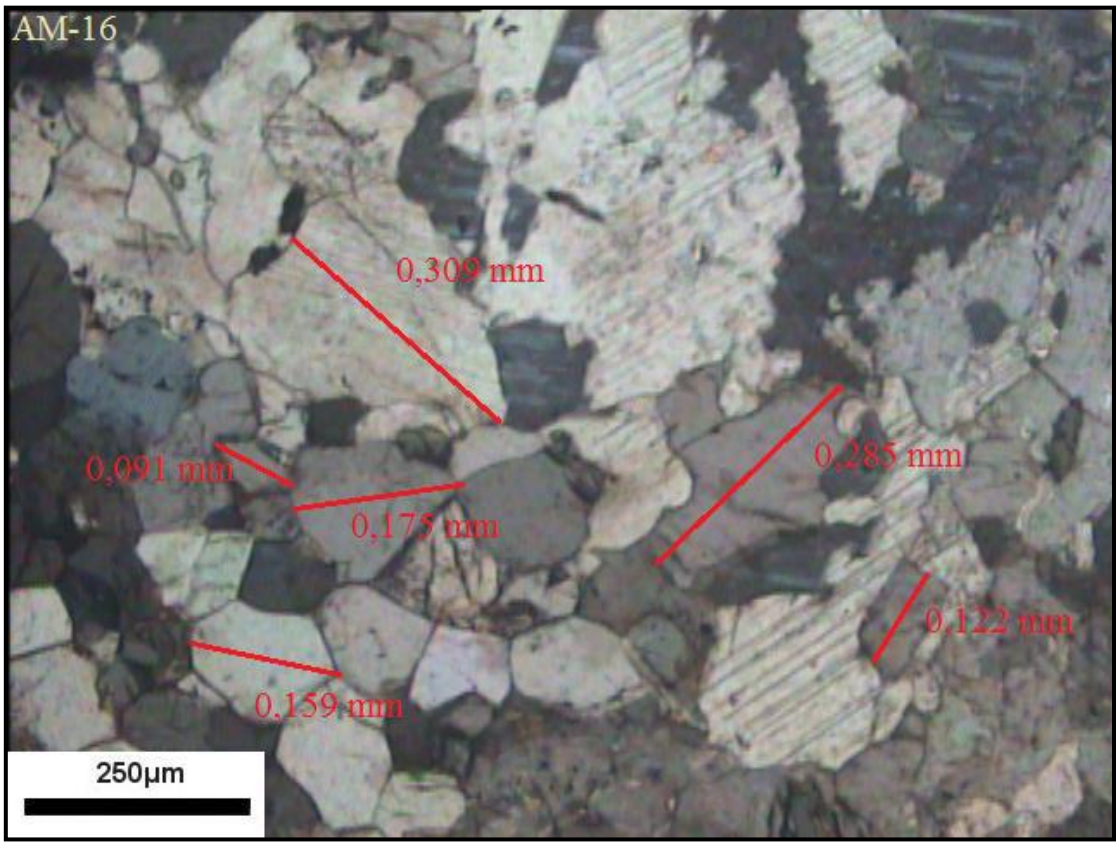
Geological unit: Metamorphic rocks – Carbonate and dolomitic marbles of Falacron Mountain

Application, use and heritage

Description: Ochiro White marble is suitable for interior and exterior uses, such as on wall and floor coverings**,** fireplaces**,** kitchens**,** public areas and for many renovation applications**.**

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Petrography



Description: Photomicrograph of thin section, showing the hypidiomorphic dolomite crystals and veins filled with calcite and oriented particle agglomerates arranged in a straight line with discontinuities due to tectonic processes. The granoblastic texture of the rock becomes, in places, heterogranular and its crystals allotriomorphic.

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Dolomite (%)	Calcite (%)	Opaque minerals (%)				
97	3	AM				

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2830	0,9	0,3	187	4,6

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
4,5	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
-	33	-	-	1350	3

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			6	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
0,25	<0,10	<0,10	<0,10	16,80	35,20	0,30	0,06	<0,05	-	-	45,68

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
0,4	6,0	7,0	2,0	7,5	3,2	12	0,9
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
62	0,5	20	2,0	0,8	0,9	<0,1	0,4
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
36	2,0	0,5	0,5	0,2	1,4		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
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Pirgi Drama White



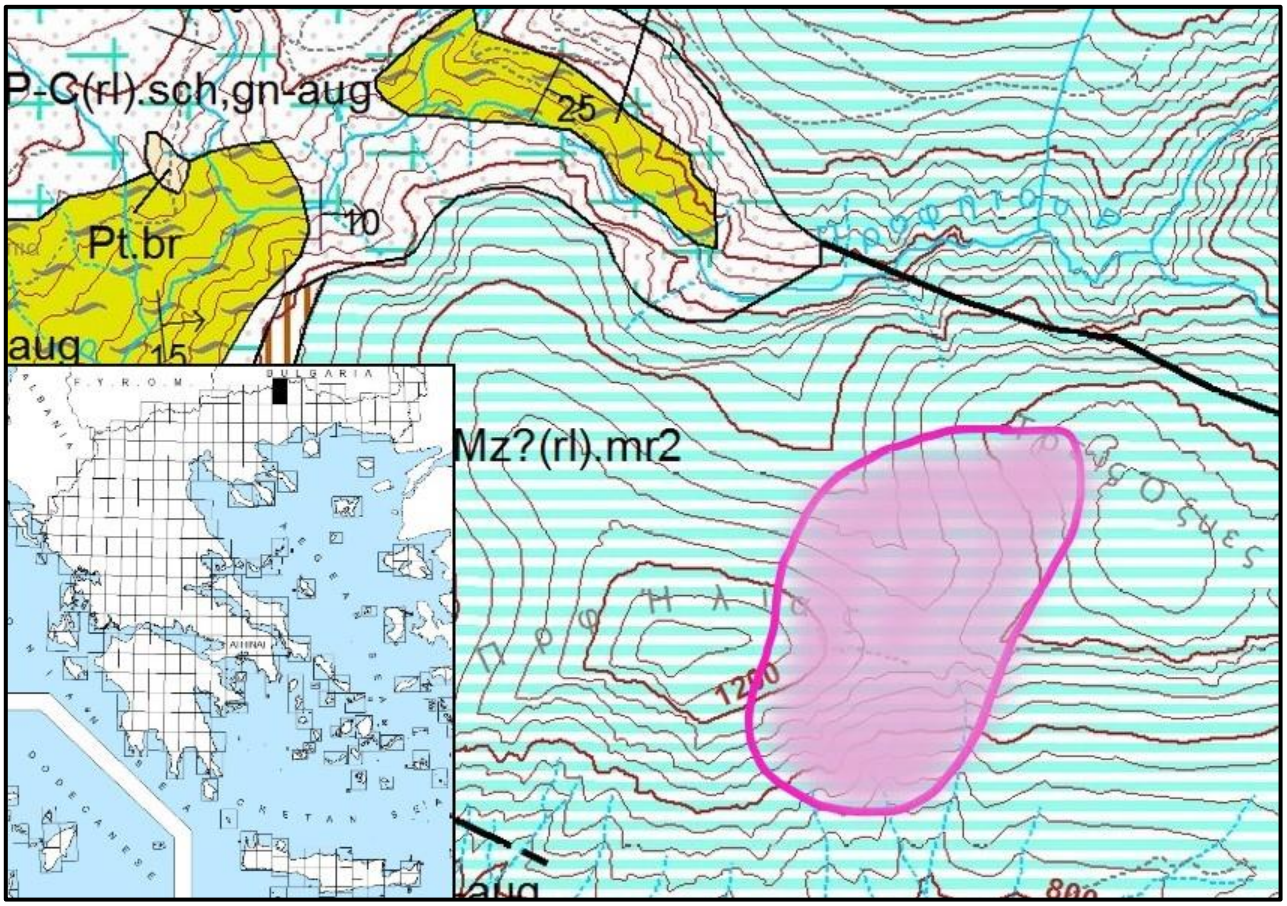
Scale 1:1

Short description: Fine-grained, white dolomitic marble.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Marble	Dolomitic-marble	White	Greece	East Macedonia and Thrace	Prosotsani	Pirgi

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Geological setting



Geology: Pirgi Drama White (pink marking) belongs to the carbonate and dolomitic marbles of Rhodope Mass area, which is part of the region of East Macedonia and Thrace.
(Source: Geological Map of Greece 1:50000, Potamoi Sheet)

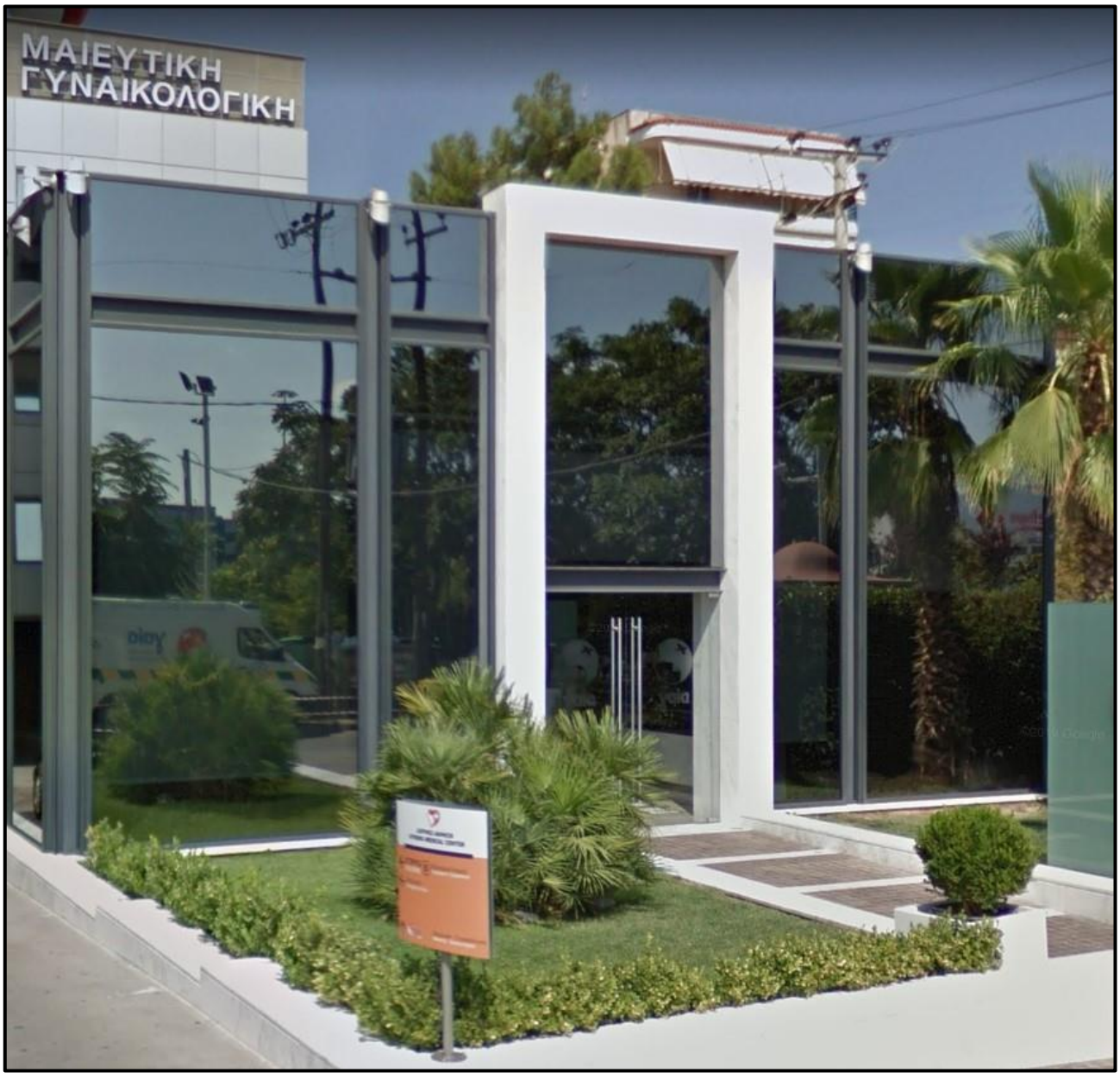
Production: The most important quarry area is near the village of Pirgi Drama.

Geological age: Mesozoic

Geological unit: Lower Unit - Carbonate and dolomitic marbles

Application, use and heritage

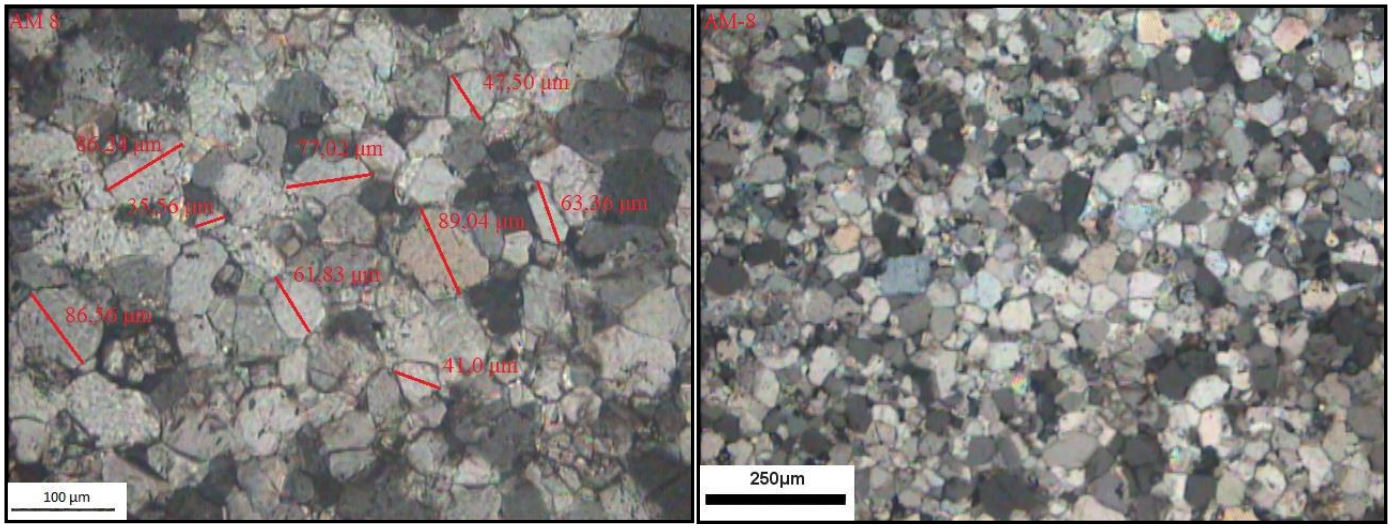
Description: **T**he most common use is on wall and floor coverings**,** fireplaces**,** kitchens**,** public areas and for many renovation applications**.**



Gaia Maternity MD: Interior and exterior cladding

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Petrography



Description: Photomicrograph of thin sections, showing the almost isogranular and microcrystalline texture of the rock. The rock contains large crystals of dolomite, ranging in size from 0,036mm to 0,089mm, which are hypidiomorphic, and scattered calcite crystals.

Source of information: Hellenic Survey of Geology and Mineral Exploration

Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Dolomite (%)	**Calcite (%)**					
99	1					

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2830	0,8	0,3	208	11,6

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa
-	-		

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
9,4	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
-	22	-	-	1800	3

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			5	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
0,30	<0,10	<0,10	<0,10	17,15	35,05	0,17	0,03	<0,05	-	-	45,93

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
1,5	6,0	17	1,2	5,5	3,5	14	4,0
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
25	0,7	95	8,0	1,0	2,3	0,1	0,6
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
38	4,5	1,5	1,0	0,2	1,5		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
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Platanotopos Yellowish White



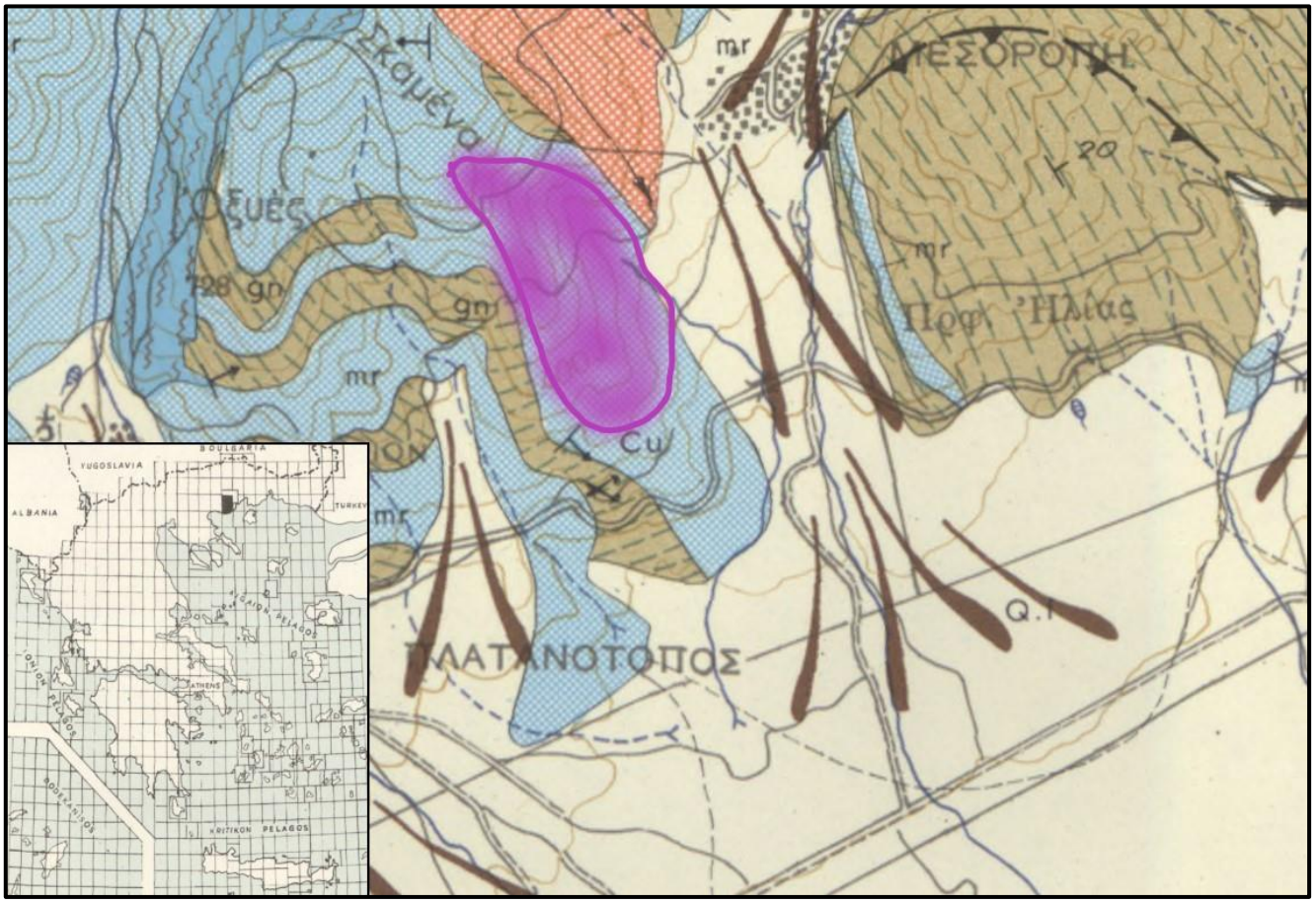
Scale 1:1

Short description: Fine-grained off-white dolomitic marble with dense network of red and red-yellow veins.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Marble	Dolomitic marble	Yellow	Greece	East Macedonia and Thrace	Kavala	Platanotopos

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Geological setting



Geology: Platanotopos Yellowish White (pink marking) belongs to the carbonate marbles of Rhodopi mass area. According to the geological map of the area, they are poorly bedded or massive white marbles (they are thought to be former reefs); also lighter and darker grey-coloured, well or thin bedded, often banded marbles, in beds and lenses. The banded grey marbles occur in the transition zones from marbles to micaschists and gneisses with varying parts of quartz, micas and albites. General grain size 0,3-1,0mm.
(Source: Geological Map of Greece 1:50000, Nikisiani – Loutra Elevtheron Sheet)

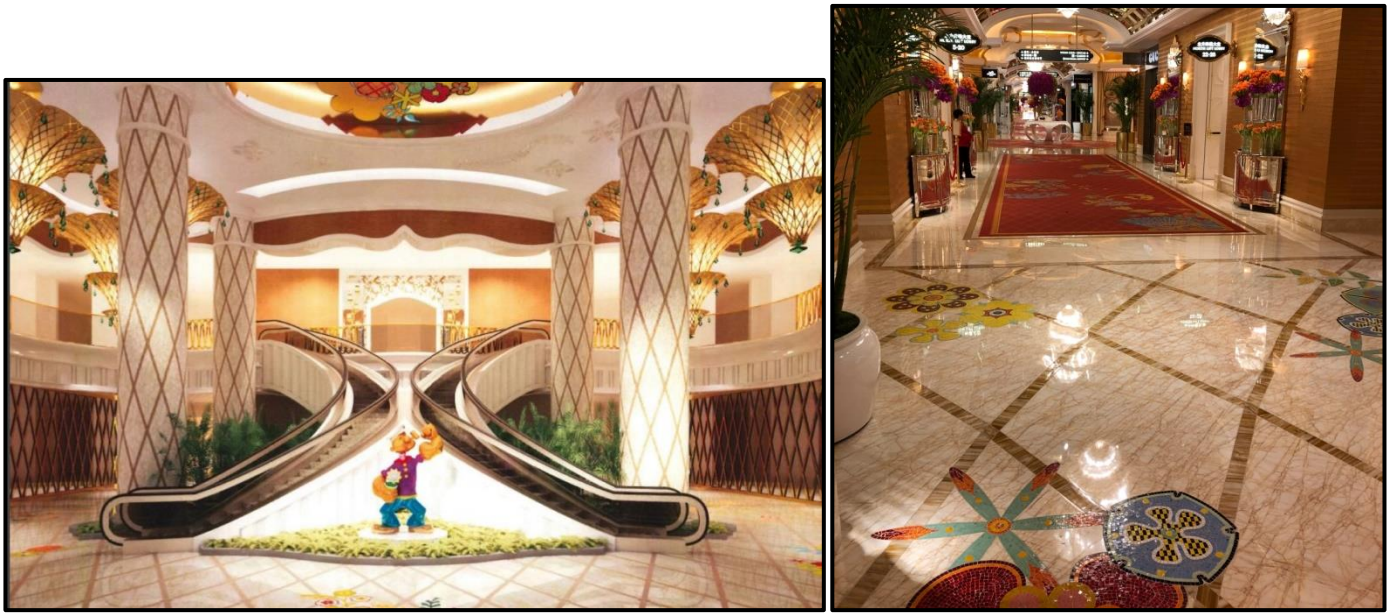
Production: The quarry area is near the village of Platanotopos belonging to the municipality of Pangaio in the Kavala regional Unit.

Geological age: Tertiary - Pliocene
Geological unit: Crystalline Rocks

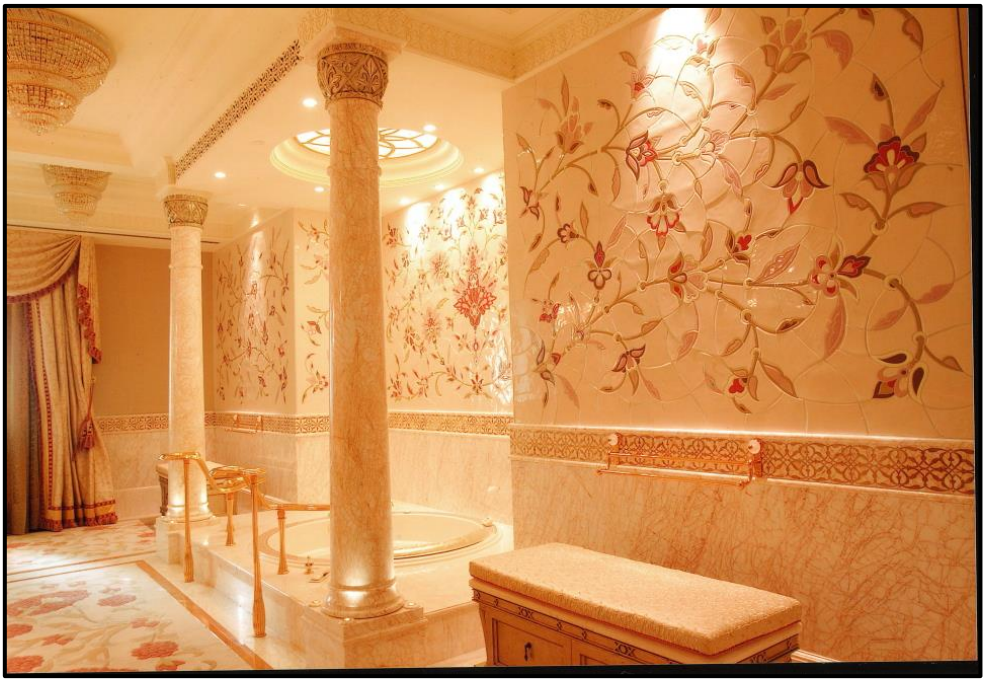
Application, use and heritage

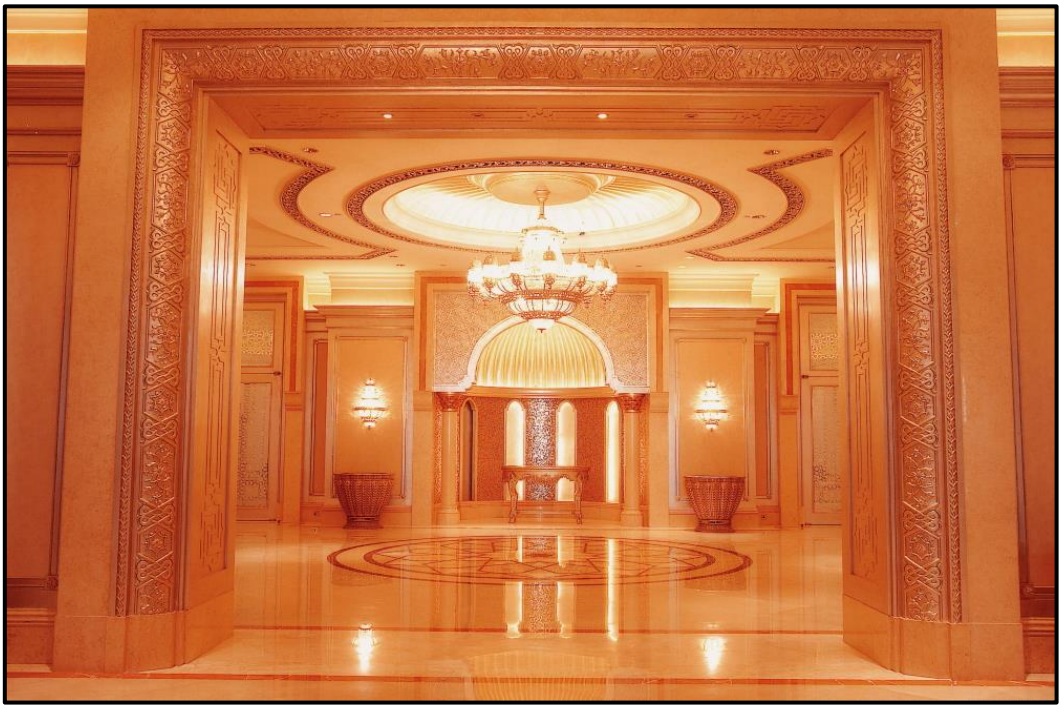
Description: Platanotopos Yellowish White presents very good physical and mechanical properties and can take fine polishing. It is fitted for internal and external projects. It can be used for: wall cladding, floors, stairs and various interior and exterior coverings.





WYNN ENCORE HOTEL AND WYNN HOTEL AND CASINO, LAS VEGAS, U.S.A.: Flooring and Cladding

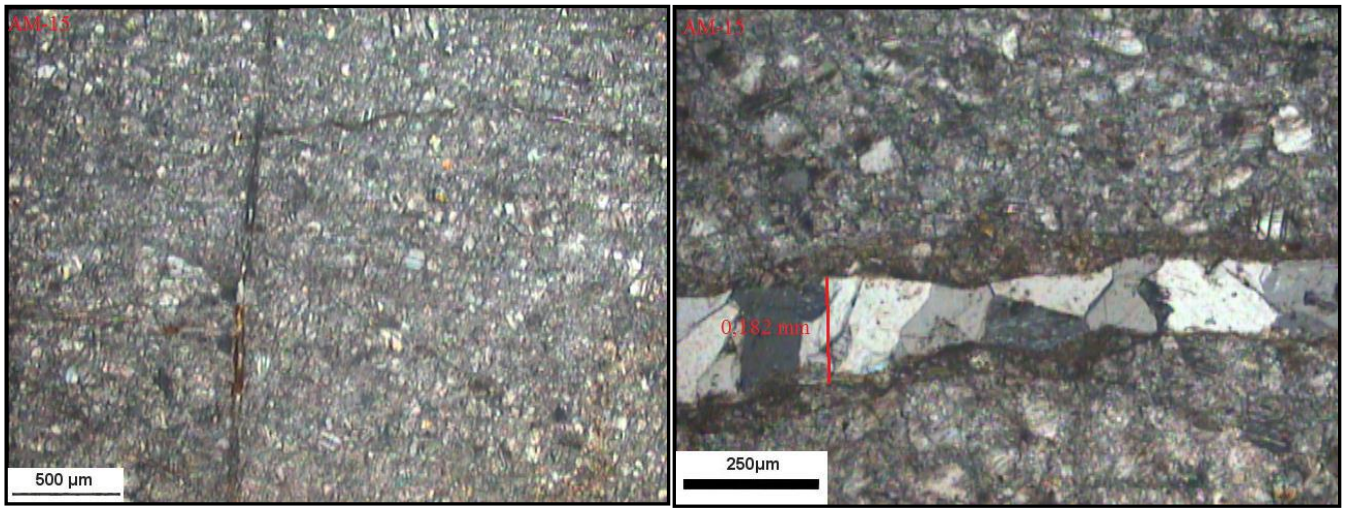




EMIRATES HOTEL PALACE, ABU DHABI: Flooring and Cladding

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Petrography



Description: Photomicrograph of thin section, showing the hypidiomorphic dolomite crystals and calcite veins with some iron and manganese oxides.

Source of information: Hellenic Survey of Geology and Mineral Exploration

Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Dolomite (%)	Calcite (%)	Opaque minerals (%)	Clay minerals (%)			
98	2	AM	AM			

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2820	1,2	0,3	194	15,1

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa
-	-		

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
12,3	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
-	14	-	-	1400	3

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			4	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
<0,10	<0,10	<0,10	<0,10	21,40	31,10	1,08	0,21	<0,05	-	-	46,15

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
0,1	22	18	1,4	7,0	4,5	23	2,0
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
22	0,6	23	10	0,4	1,0	<0,1	<0,1
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
9,0	1,3	0,5	0,9	0,9	0,9		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
Non-commercial directory		
Commercial directory		
Scientific publication		
Other publication		

Compiled by:	**Hellenic Survey of Geology and Mineral Exploration (H.S.G.M.E.)** https://www.eagme.gr/	

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Thassos White



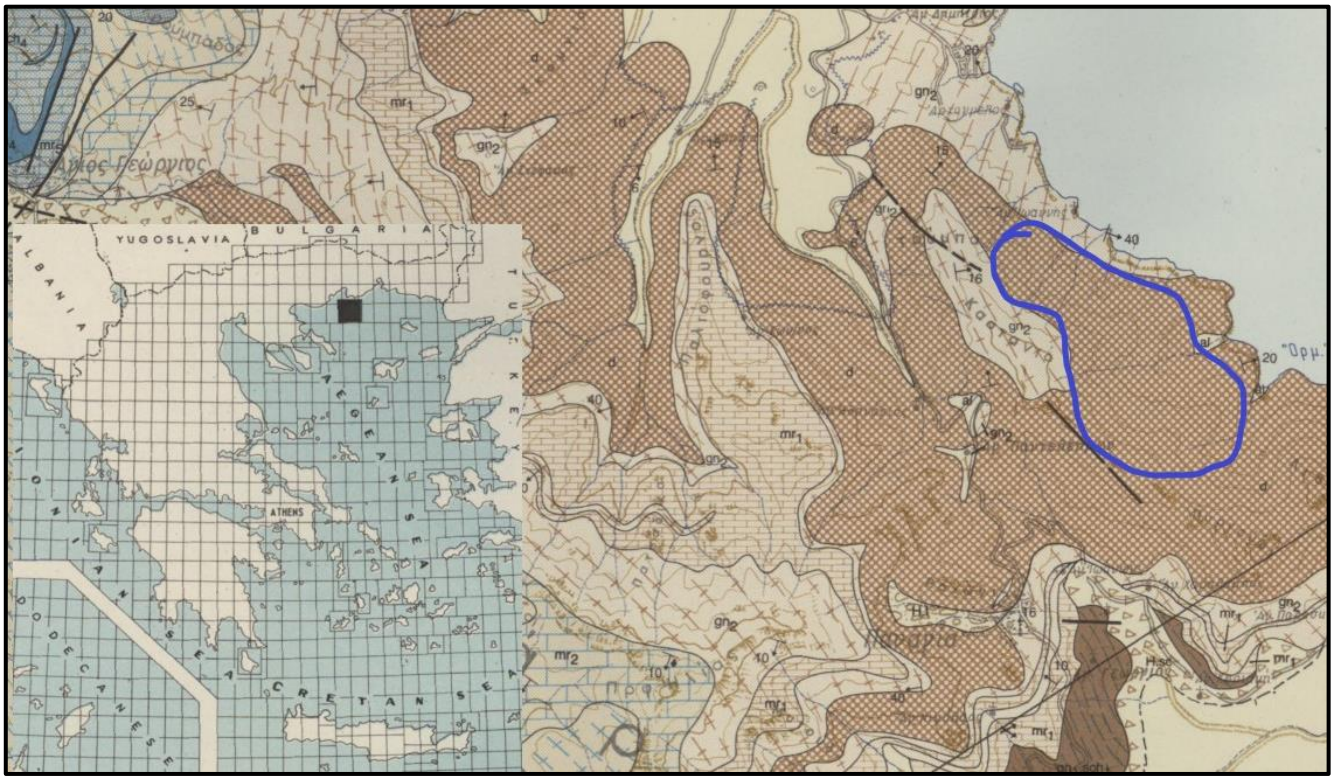
Scale 1:1

Short description: Medium grained snow white dolomitic marble with large calcite crystals.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Marble	Dolomitic marble	White	Greece	East Macedonia and Thrace	Thasos	Thasos

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Geological setting



Geology: Thassos White (blue curve) is a metamorphic rock belonging to the carbonate marbles of Rhodope Mass area, which is part of the region of East Macedonia and Thrace.

(Source: Geological Map of Greece 1:50000, Thassos Sheet).

Production: The most important quarry area is near the village of Limenas in the northeastern part of the island.

Geological age: -

Geological unit: Potamia Series

Application, use and heritage

Description: Thassos White Marble is known for many centuries all over the world for its pure sparkling whiteness, and it has been used by many architects, traders and builders both for marble various application purposes. It provides a high reflection of sunlight and holds its cool temperature, making it perfect suitable for claddings in warmer regions. Being a marble with high strength properties, it is suitable for interior and exterior use, wall cladding, flooring, stairs, and other design projects.



Shali Mosque, in the Chechen Republic of Russia: Interior and exterior cladding with Thassos White marble (completed in 2019).

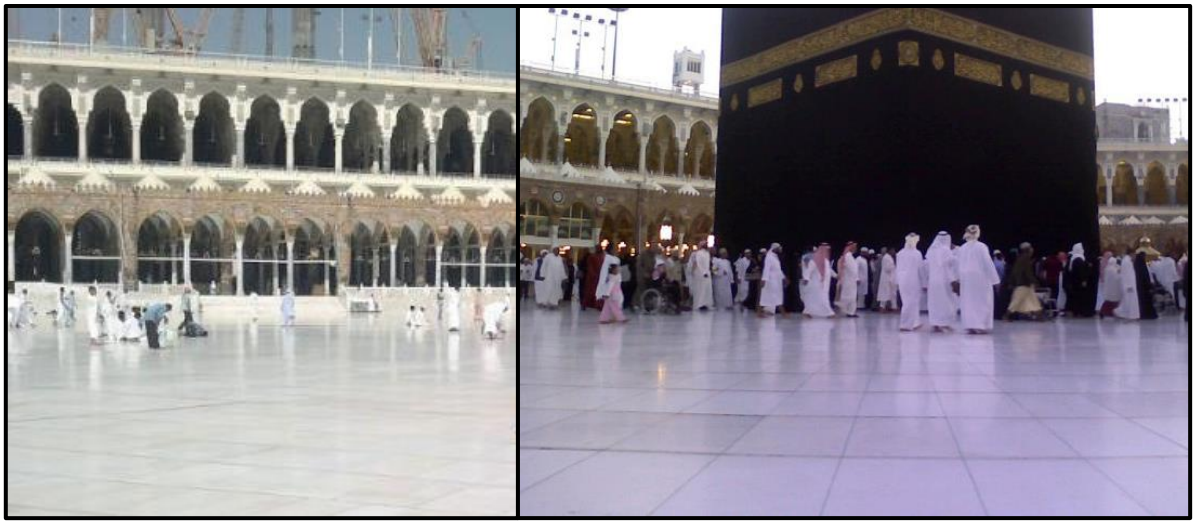
(Photo: wikipedia)



Masjid All Hayy Mosque in Sanford, USA: Wall cladding, flooring, artifacts, parapets, columns.

(Photo: *evensi*)

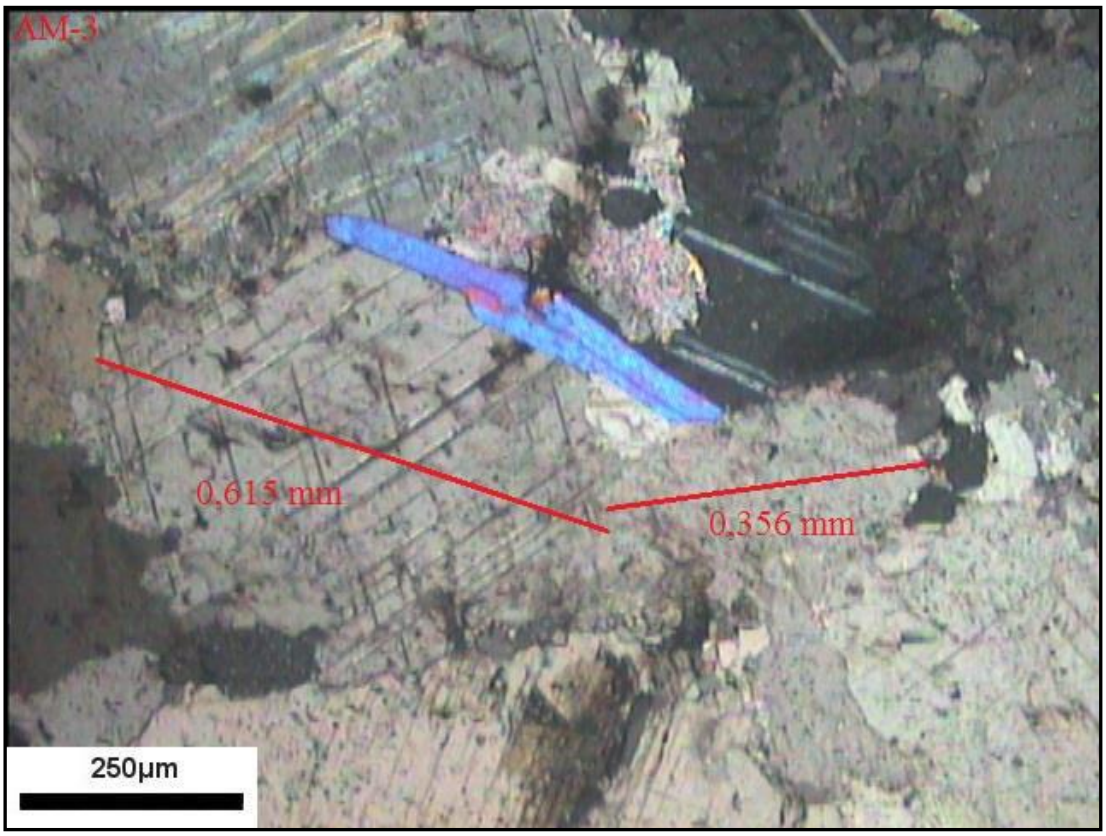




Religious Mecca Project, Makkah, KSA: Installation of Thassos tiles in the courtyards of the Grand Mosque. The new marble floor tiles maintain the same temperature day and night, allowing visitors to walk barefoot in the afternoons without feeling any heat. Thassos marble reflects the sunlight keeping its low temperature stabilized throughout the day.

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Petrography



Description: Photomicrograph of thin section, showing dolomite crystals as well as crystals of phlogopite and muscovite.

Source of information: Hellenic Survey of Geology and Mineral Exploration

Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Dolomite (%)	Calcite (%)	Muscovite (%)	Apatite (%)	Quartz (%)	Phlogopite (%)	
99	1	AM	AM	AM	AM	

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2840	0,7	0,2	164	18,5

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa
-	-		

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
15,7	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
-	24	-	-	2250	3

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			4	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
<0,10	<0,10	<0,10	<0,10	19,90	30,40	1,38	0,18	<0,05	-	-	46,31

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
0,3	25	18	2,5	8,0	5,0	14	0,6
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
21	0,3	12	4,0	<0,1	0,3	<0,1	<0,1
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
6,5	0,5	0,2	0,1	0,7	0,5		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
Non-commercial directory	Wikipedia	https://en.wikipedia.org/wiki/Shali,_Chechen_Republic
Commercial directory		
Scientific publication		
Other publication	*evensi*	https://www.evensi.us/interfaith-iftar-masjid-hayy/256372582

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Tsakalina Nevrokopi White



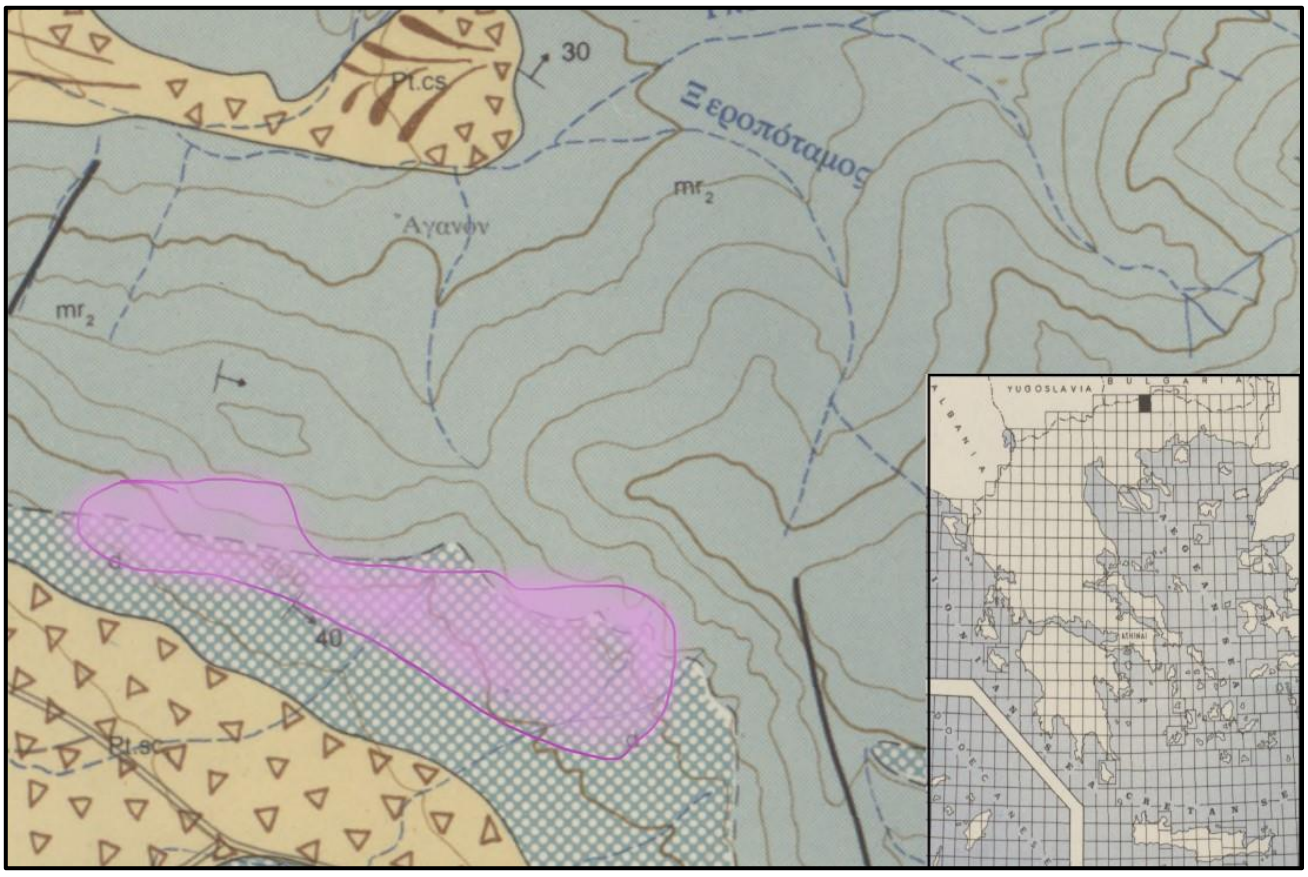
Scale 1:1

Short description: Fine-grained dolomitic marble with grey and grey-brown agglomerates consisting of calcite.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Marble	Dolomitic marble	White	Greece	East Macedonia and Thrace	Nevrokopi	Tsakalina

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Geological setting



Geology: Tsakalina Nevrokopi White (pink marking) belongs to the carbonate and dolomitic marbles of Falacron Mountain. They are white, compact marbles dolomitized and usually bituminous. Crystalline dolomite intercalations of white to greyish – black colour are observed within them. Locally appears metaconglomerate (2km NW of Granitis village). Meta-breccia appears, at two places: a) 1km SW of Kato Nevrokopion and b) at the 24th km of the road Drama-Kato Nevrokopion (in the Vrachomera torrent). Thin – platy marbles with intercalations of mica schists with marbles and of two mica-epidote gneisses appear in the lower members of the series.
(Source: Geological Map of Greece 1:50000, Kato Nevrokopion Sheet).

Production: The most important quarry area is near the village of Kato Nevrokopi in the northwest section of the Drama regional unit,

Geological age: -

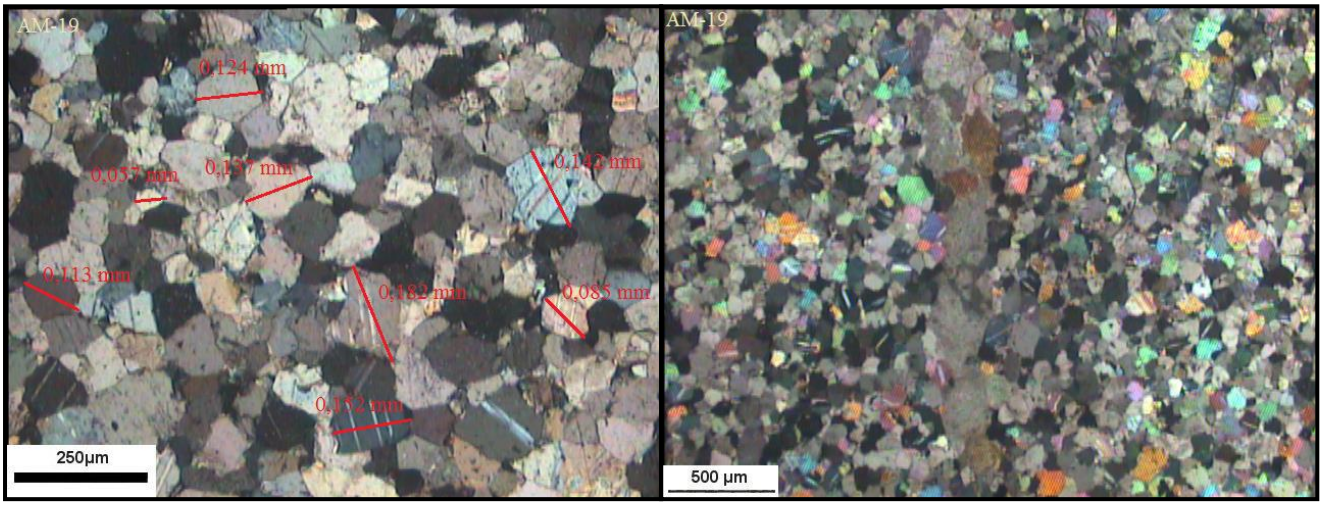
Geological unit: Metamorphic rocks – Carbonate and dolomitic marbles of Falacron Mountain

Application, use and heritage

Description: Tsakalina Nevrokopi White marble is suitable for interior and exterior uses, such as on wall and floor coverings**,** fireplaces**,** kitchens**,** public areas and for many renovation applications**.**

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Petrography



Description: Photomicrograph of thin section, showing the hypidiomorphic crystals of dolomite and calcite veins.

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Dolomite (%)	Calcite (%)	Opaque minerals (%)				
99	1	AM				

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2840	0,8	0,3	179	5,0

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
5,5	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
-	32	-	-	1350	3

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			5	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
0,18	0,05	0,05	<0,05	19,80	32,80	0,65	0,11	<0,05	-	-	45,15

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
1,0	6,0	7,0	2,0	10	3,0	4,0	1,0
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
20	<1,0	12	80	<1,0	<1,0	2,0	<1,0
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
23	3,0	1,0	ND	ND	ND		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
Non-commercial directory		
Commercial directory		
Scientific publication		
Other publication		

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Volakas Drama Semi White



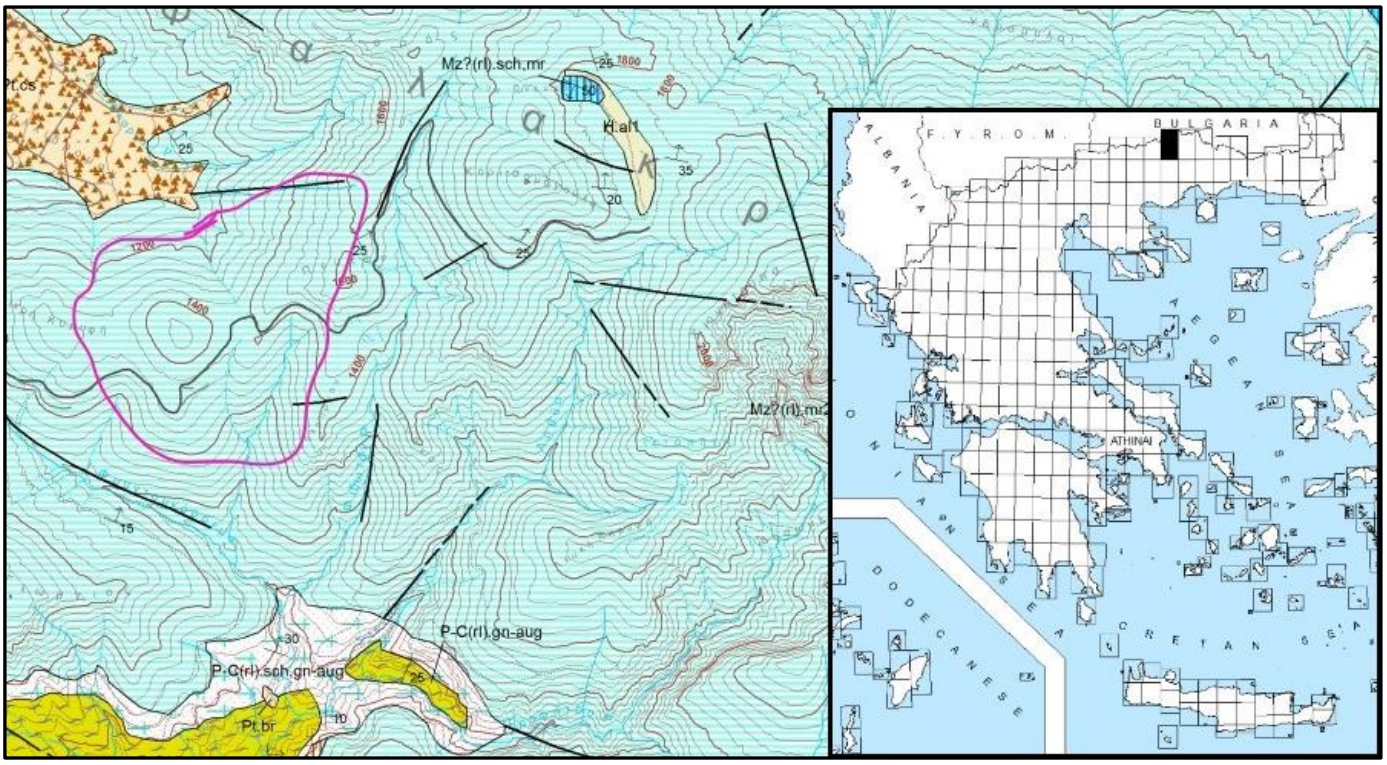
Scale 1:1

Short description: Fine-grained white dolomitic marble with grey veins.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Marble	Dolomitic marble	Semi white	Greece	East Macedonia and Thrace	Kato Nevrokopi	Volakas

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Geological setting



Geology: Volakas Drama White (pink curve) belongs to the carbonate and dolomitic marbles of Rhodope Mass area, which is part of the region of East Macedonia and Thrace.
(Source: Geological Map of Greece 1:50000, Potamoi Sheet)

Production: The most important quarry area is near the Volakas village, which is built in a cavity, formed between the mountain masses of Falakro.

Geological age: Mesozoic
Geological unit: Lower Unit - Carbonate and dolomitic marbles

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Application, use and heritage

Description: VOLAKAS marble is quarried in the Mountainside of Falakro in Drama, Greece. Volakas Marble is known as the “Carrara of Greece”, due to its all-white background with grey or brown veins. The marble blocks are quarried open-pit and underground, through tunnel excavation. The most common use is on wall and floor coverings**,** fireplaces**,** kitchens**,** public areas and for many renovation applications**.**



Building of the French public national television broadcaster (France Télévisions): Cladding

(Photo: wikiwand)

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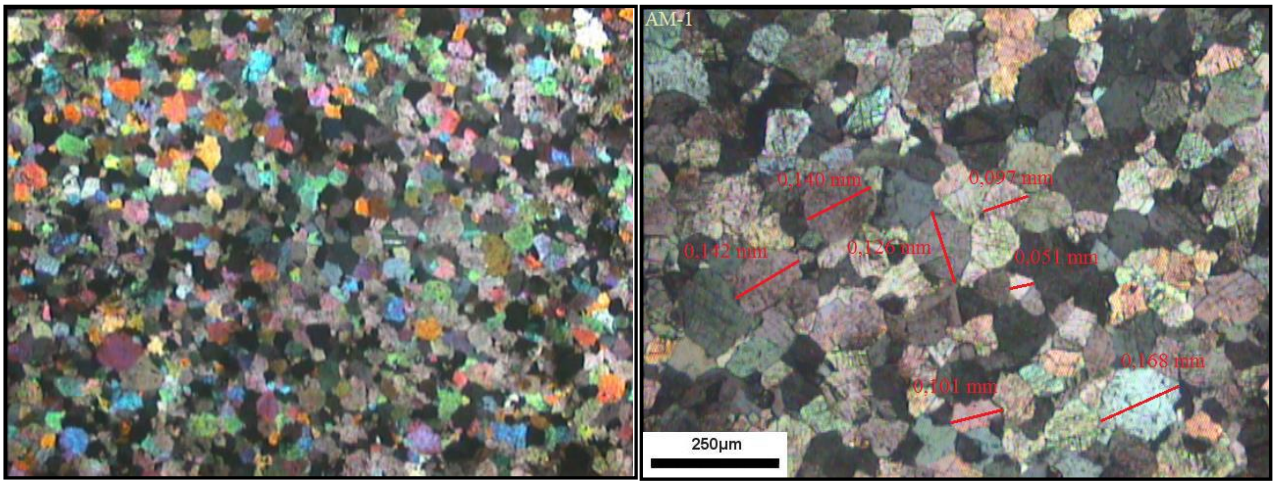


Panepistimio metro station (Athens): Wall cladding

(Photo: wikipedia)

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Petrography



Description: Photomicrograph of thin section, showing dolomite crystals and scattered fine-grained calcite.

Source of information: Hellenic Survey of Geology and Mineral Exploration

Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Dolomite (%)	Calcite (%)	Quartz (%)	Opaque (%)			
99	1	AM	AM			

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2840	0,7	0,2	186	6,3

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s0,5)	Flexural strength under constant moment (EN 13161) MPa

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
5,8	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
-	26	-	-	900	3

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			4	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
<0,10	<0,10	<0,10	<0,10	19,75	30,65	1,29	0,21	<0,05	-	-	46,33

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
0,1	25	5,0	1,0	8,0	2,2	18	0,6
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
32	0,5	9	4,0	0,6	0,2	0,1	<0,1
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
6,5	0,5	0,3	<0,1	1,8	0,7		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	www.eagme.gr
Non-commercial directory	wikipedia	https://en.wikipedia.org/wiki/Panepistimio_metro_station_(Athens)
Commercial directory		
Scientific publication		
Other publication	Wikiwand	https://www.wikiwand.com/es/France_T%C3%A9l%C3%A9visions

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Volakas Drama White



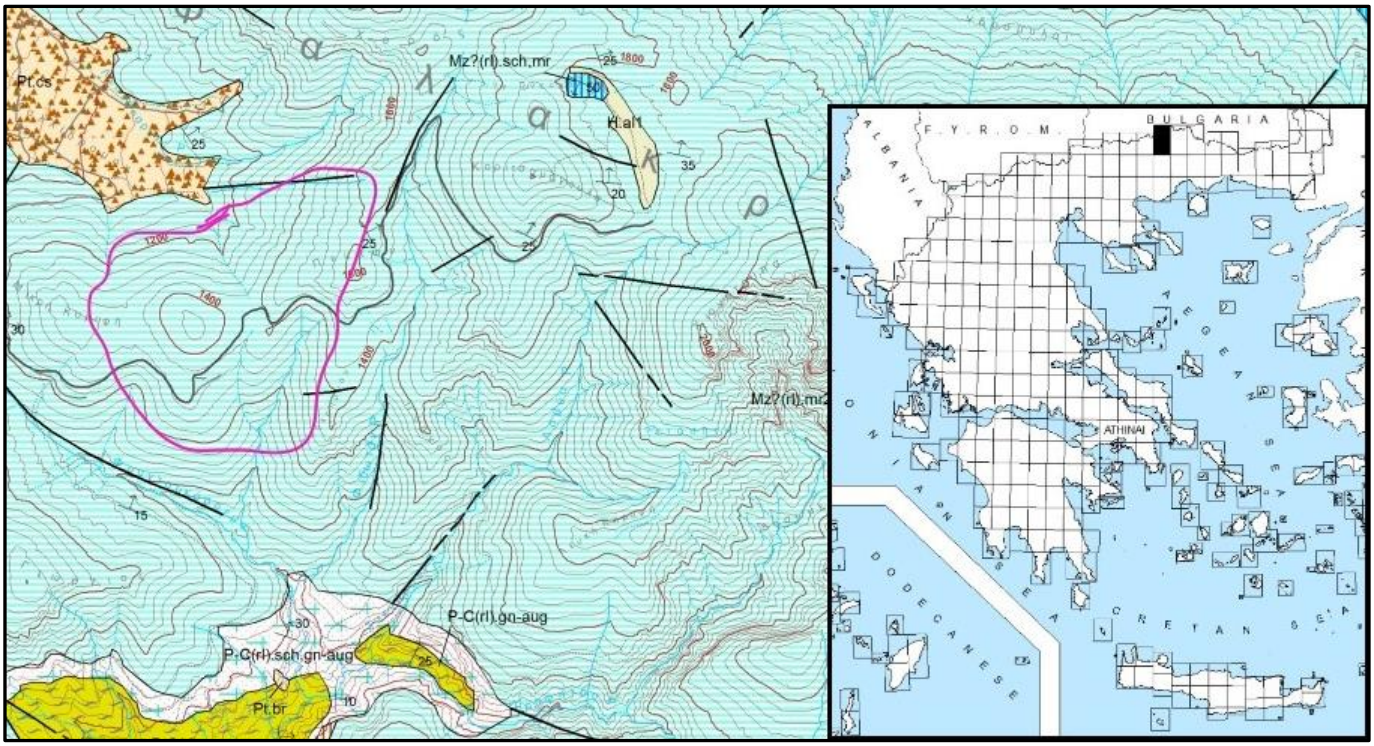
Scale 1:1

Short description: Fine-grained white dolomitic marble with grey veins.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Marble	Dolomitic marble	White	Greece	East Macedonia and Thrace	Drama	Volakas

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Geological setting



Geology: Volakas Drama White (pink curve) belongs to the carbonate and dolomitic marbles of Rhodope Mass area, which is part of the region of East Macedonia and Thrace.

(Source: Geological Map of Greece 1:50000, Potamoi Sheet)

Production: The most important quarry area is near the Volakas village, which is built in a cavity, formed between the mountain masses of Falakro.

Geological age: Mesozoic
Geological unit: Lower Unit - Carbonate and dolomitic marbles

Application, use and heritage

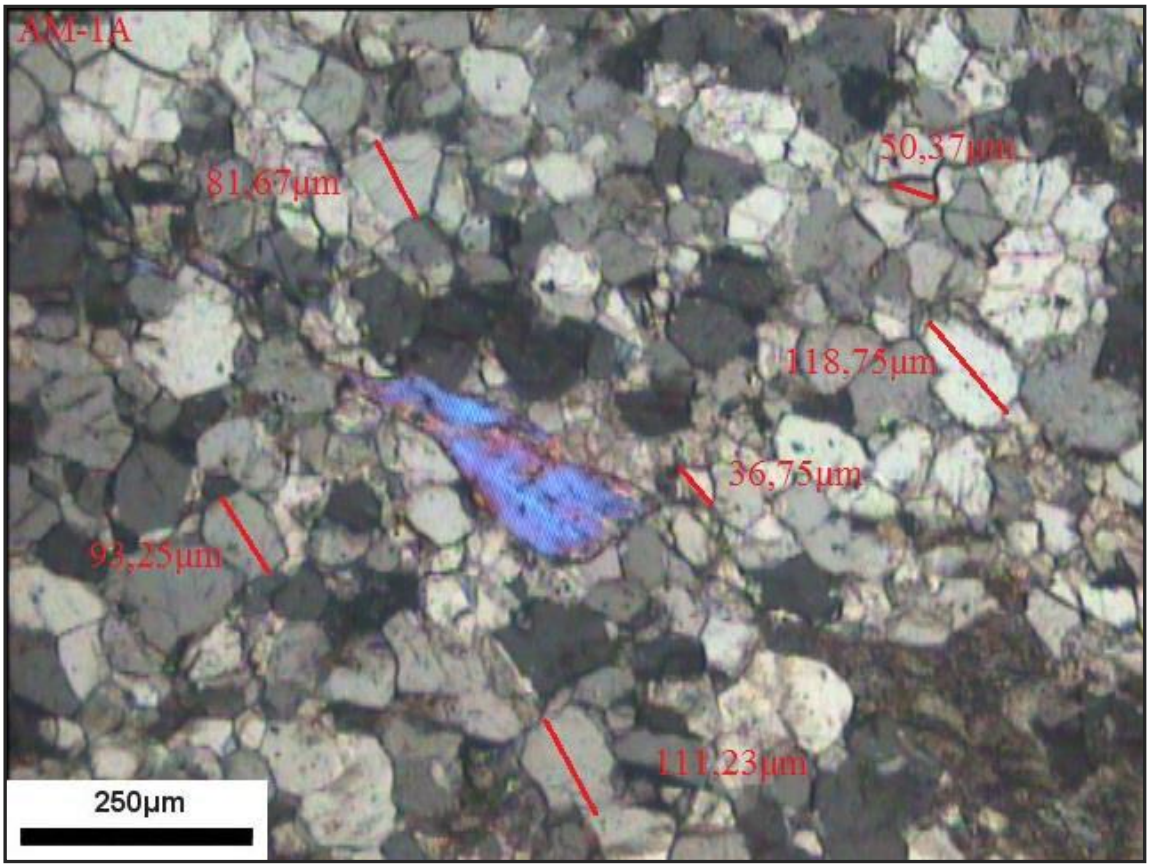
Description: VOLAKAS marble is quarried in the Mountainside of Falakro in Drama, Greece. Volakas Marble is known as the “Carrara of Greece”, due to its all-white background with grey or brown veins. The marble blocks are quarried open-pit and underground, through tunnel excavation. The most common use is on wall and floor coverings**,** fireplaces**,** kitchens**,** public areas and for many renovation applications**.**





Syntagma – Metro Station: Cladding with Volakas marble.

Petrography



Description: Photomicrograph of thin section, showing calcite and dolomite crystals and presence of muscovite.

Source of information: Hellenic Survey of Geology and Mineral Exploration

Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Dolomite (%)	Calcite (%)	Muscovite (%)	Plagioclase (%)	Ilmenite (%)	Apatite (%)	
98	2	AM	AM	AM	AM	

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2810	0,6	0,2	178	5,5

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
5,3	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
-	22	-	-	950	3

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			6	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
<0,10	<0,10	<0,10	<0,10	19,45	31,20	1,29	0,11	<0,05	-	-	46,13

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
2,0	25	5,0	1,3	7,0	2,5	18	0,9
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
35	0,8	7,0	4,0	1,0	0,3	<0,1	0,1
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
3,4	0,7	0,2	0,2	0,7	0,4		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	www.eagme.gr
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MARBLES

ONYX MARBLE

Evia “Alabaster”



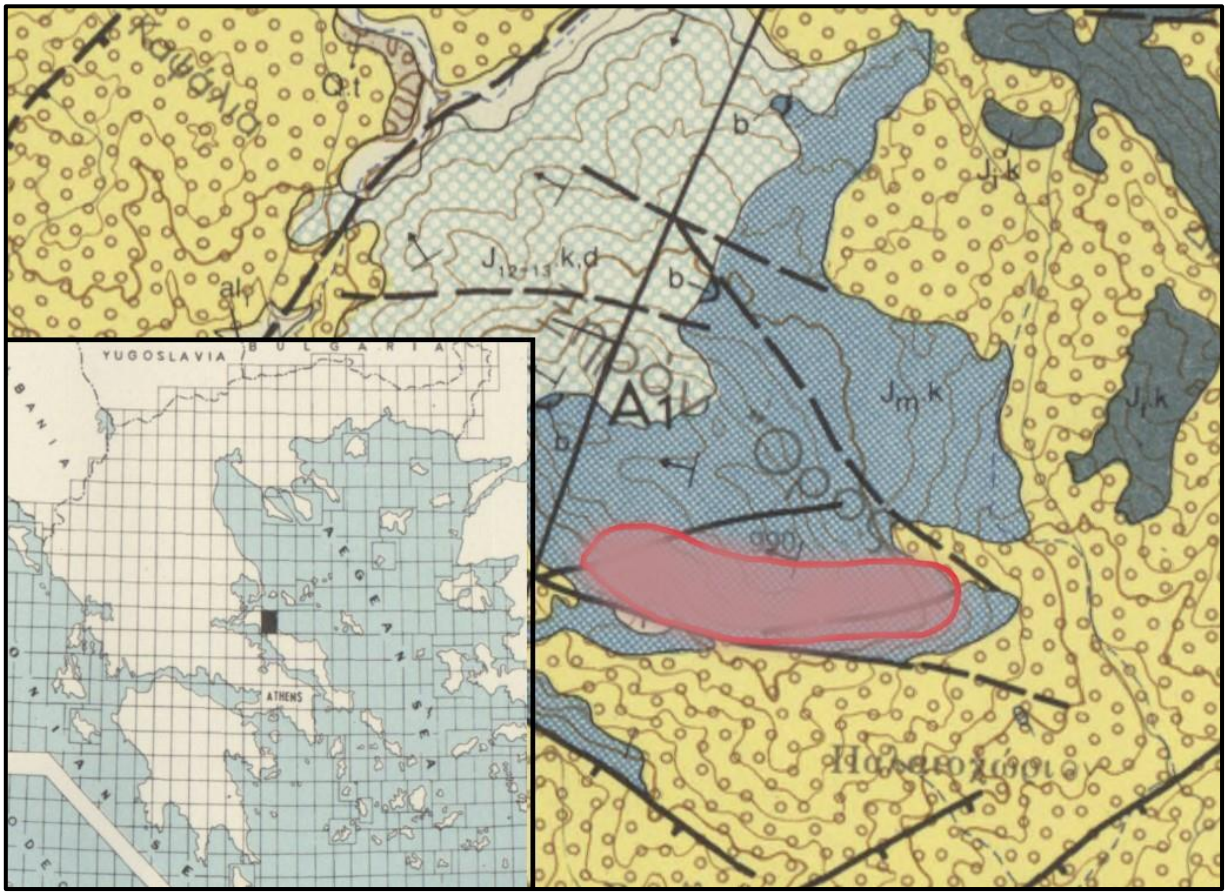
Scale 1:1

Short description: Medium to fine-grained marble and beige to orange botryoidal.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Marble	Onyx marble	Multicoloured	Greece	Central Greece	Limni	Drymonas

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Geological setting



Geology: Evia Alabaster (red marking) belongs to the Subpelagonian – Pelagonian Zone containing limestones light-coloured, microcrystalline, grumous, pseudoolithic, oolitic, underlying uncomformably Kimmeridgian limestones and bauxites. They pass laterally to the following schist-chert system.
(Source: Geological Map of Greece 1:50000, Limni Sheet)

Production: The quarry area is near Drymonas village on North Evia Island.

Geological age: Mesozoic - Dogger

Geological unit: Subpelagonian – Pelagonian Zone

Application, use and heritage

Description: Evia Alabaster marble can be used in many construction projects, such as stairs, floors, facades, bathrooms, or in the decorative objects or jewelry.



Countertop with Evia Alabaster



Flooring with Evia Alabaster

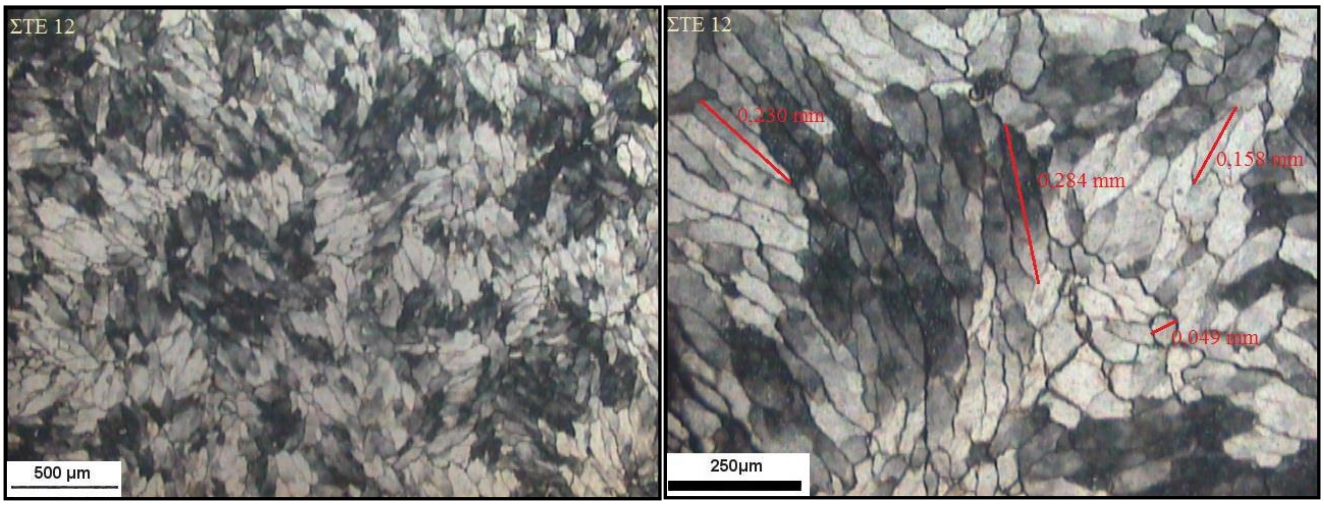




Alabaster quarry in Evia.

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Petrography



Description: Photomicrograph of thin section, showing hypidiomorphic calcite crystals forming groups that are elongated and oriented in different directions.

Source of information: Hellenic Survey of Geology and Mineral Exploration

Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Calcite (%)						
100						

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2710	0,5	0,1	150	11,9

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
10,0	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
-	13	-	-	-	-

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			4	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
0,23	<0,10	<0,10	<0,10	1,57	51,20	0,60	0,16	-	-	-	44,50

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
0,5	25	42	1,5	8,0	4,0	13	1,5
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
220	0,4	28	6,0	1,5	0,4	0,4	0,3
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
10	0,5	0,9	0,6	2,7	3,9		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
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LIMESTONES

“Alfa” Porous Limestone



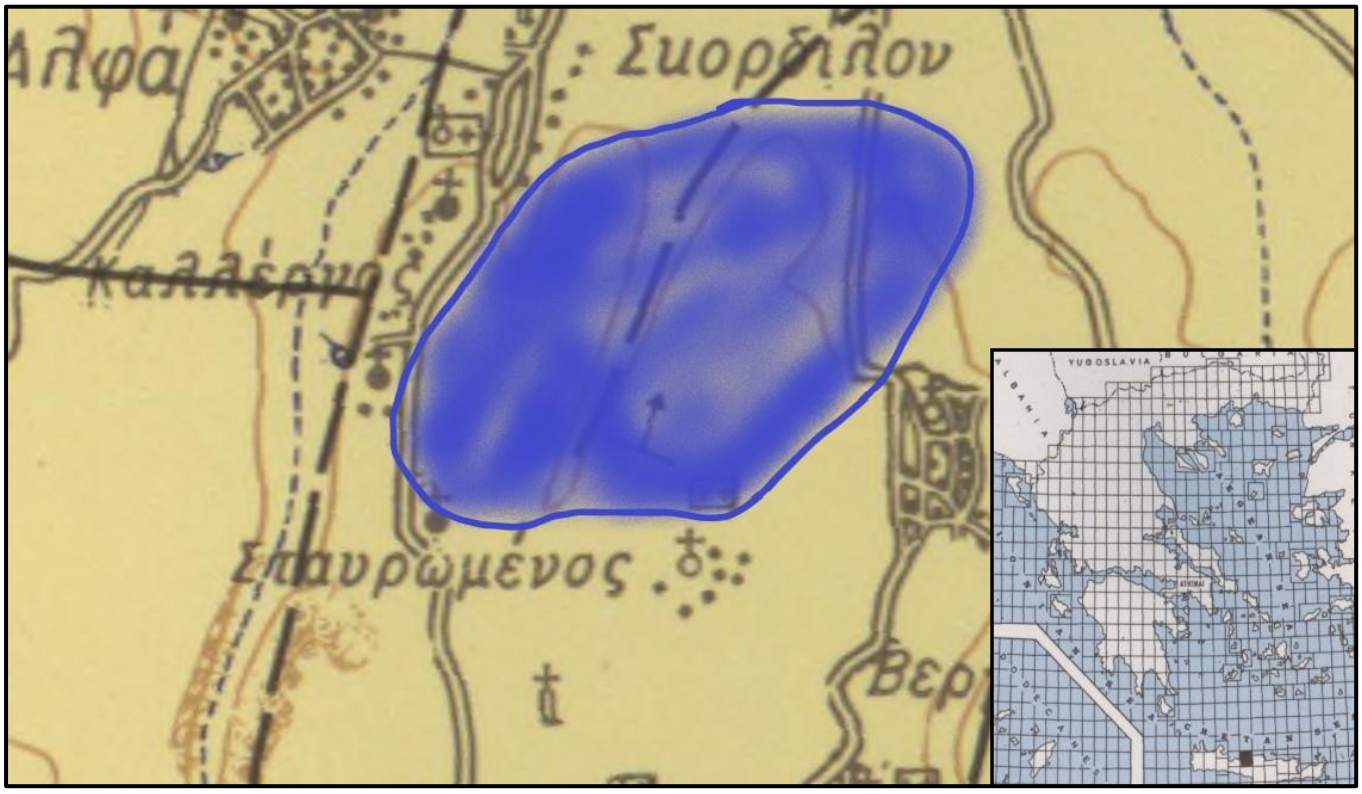
Scale 1:1

Shortdescription: Fine-grained beigeand light yellow porous limestone.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Limestone	Bioclastic limestone	Beige	Greece	Crete	Rethymno	Alfa

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Geological setting



Geology: Alfa Porous Limestone (blue marking) belongs to Post-Alpine formations, consisting of biogenic limestones, marls, clays and conglomerates. They overlie uncomformably the alpine formations and are lithostratigraphically distinguished in three horizons, upper, intermediate and lower.

(Source: Geological Map of Greece 1:50000, Perama Sheet)

Production: The most important quarry area is near Alfa and Plevriana villages, in Rethymno city on the island of Crete.

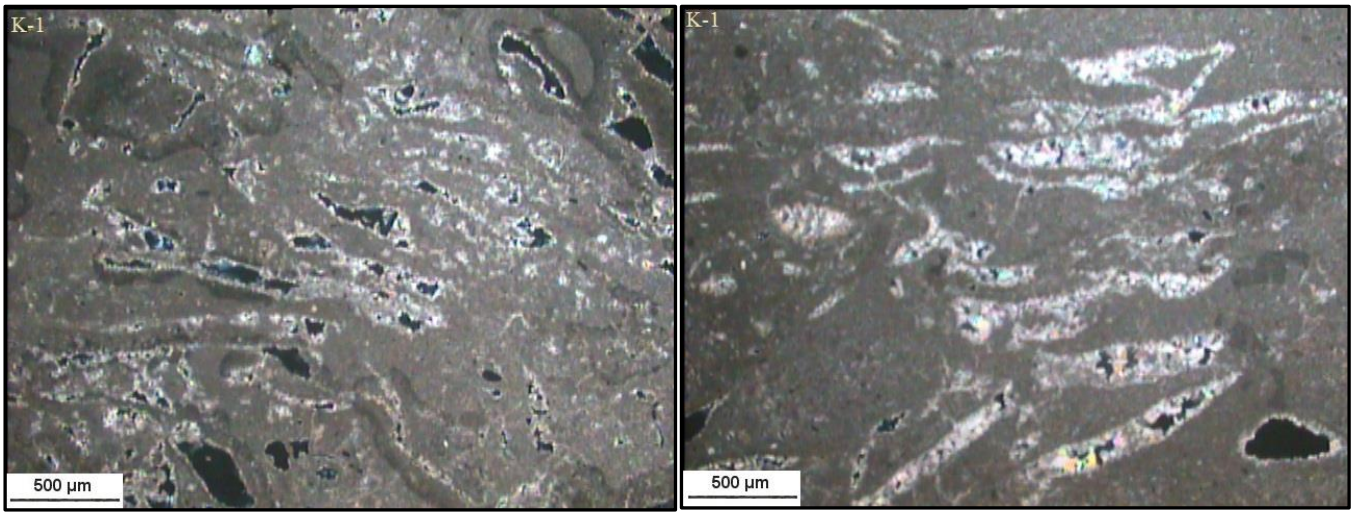
Geological age: Miocene
Geological unit: Post – Alpine Formations

Application, use and heritage

Description: Alfa Porous limestone is suitable for indoor and outdoor use, such as fireplaces, stairs, sinks, monuments, pool coping, sills, ornamental stone, mosaic and as building stone.

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Petrography



Description: Photomicrograph of thin section, showing micrite–microsparitic calcite and fossils (Foraminifera, Ostracoda, Φύκη κλπ.)containing aggregates of sparitic calcite. The texture of calcite crystals displaying “triple junctions”.

Source of information:Hellenic Survey of Geology and Mineral Exploration

Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Calcite (%)	Quartz (%)	Aragonite (%)	Iron Oxides – Hydroxides (%)			
99,5	0,5	AM	AM			

Source of information:Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2030	25,1	8,5	69	12,7

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
7,7	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
28,0	-	-	-	-	-

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			3	-

Source of information:Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3(%)	LOI (%)
5,05	0,80	0,15	<0,05	<0,05	50,05	0,30	0,25	<0,05	-	-	39,33

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
6,0	7,0	170	3,0	12	8,0	47	8,0
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
137	0,0	180	13	1,0	92	<1,0	4,0
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
24	3,0	2,0	1,0	3,0	3,0		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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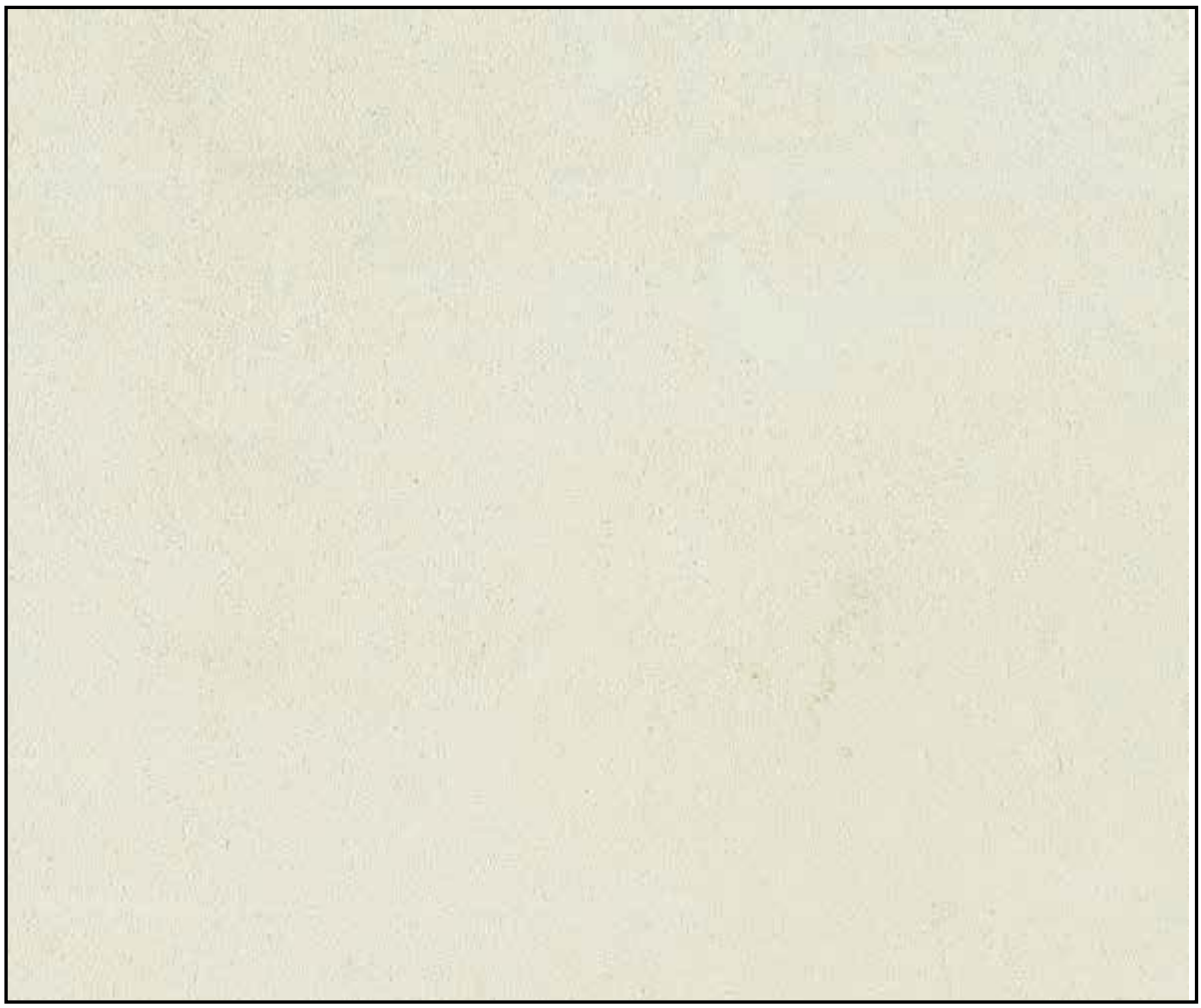
Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
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“Alfa” Limestone



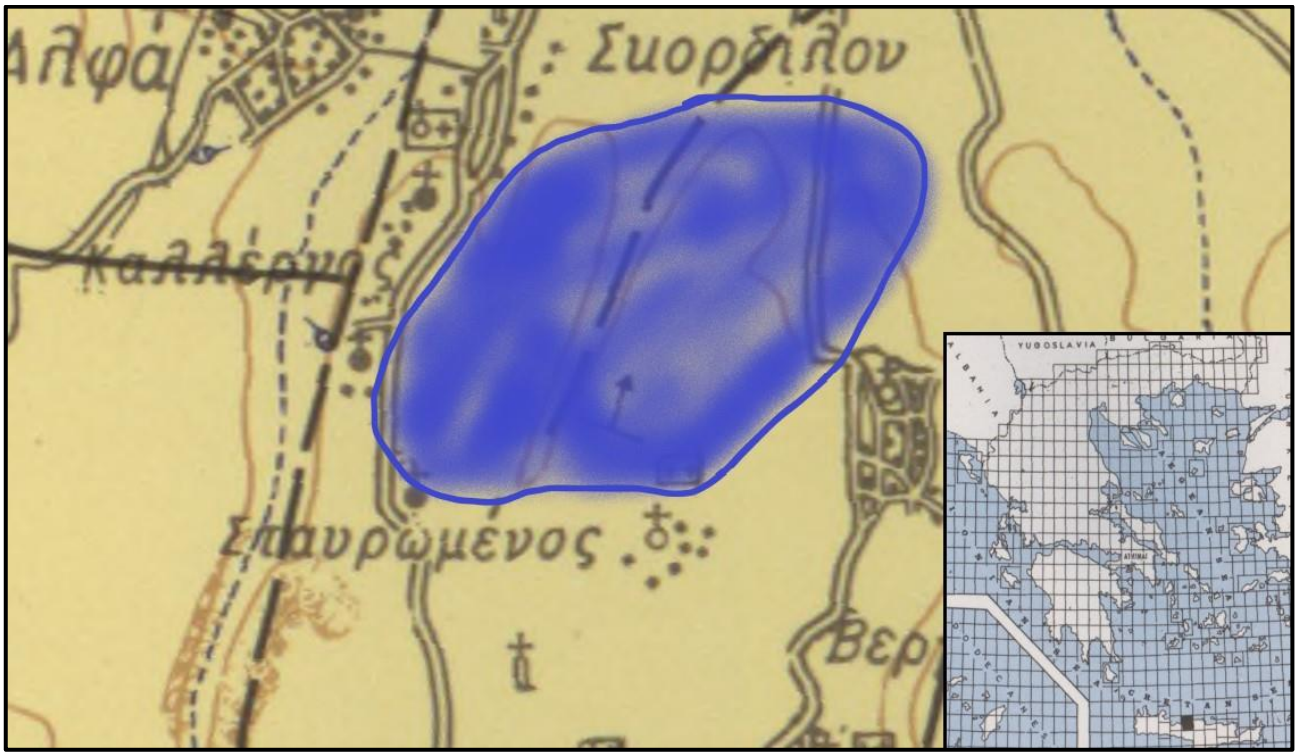
Scale 1:1

Shortdescription: Fine-grained beige and light yellow microporous limestone.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Limestone	Biomicrite Limestone	Beige	Greece	Crete	Rethymno	Alfa

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Geological setting



Geology: Alfa Limestone (blue marking) belongs to Post-Alpine formations, consisting of biogenic limestones, marls, clays and conglomerates. They overlie uncomformably the alpine formations and are lithostratigraphically distinguished in three horizons, upper, intermediate and lower.

(Source: Geological Map of Greece 1:50000, Perama Sheet)

Production: The most important quarry area is near Alfa and Plevriana villages, in Rethymno city on the island of Crete.

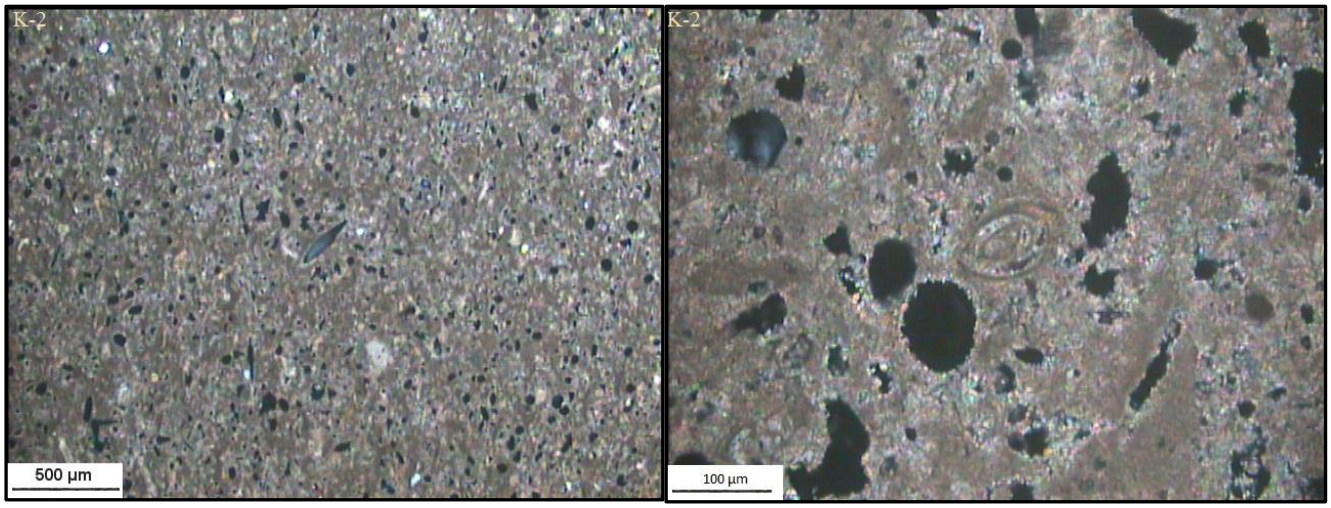
Geological age: Miocene
Geological unit: Post – Alpine Formations

Application, use and heritage

Description: Alfa limestone is suitable for indoor and outdoor use, such as fireplaces, stairs, sinks, monuments, pool coping, sills, ornamental stone, mosaic and as building stone.

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Petrography



Description: Micrite-microsparitic texture characterized by equal in size particles and fossils containing aggregates of sparitic calcite. The texture of calcite crystals displaying “triple junctions”. Many small empty cavities and fossils (alveolina) are observed within the micritic mass. Scattered quartz and albite grains are also found, while aragonite is scattered around the periphery.

Source of information:Hellenic Survey of Geology and Mineral Exploration

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Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Calcite (%)	Aragonite (%)	Quartz (%)	Albite (%)	Iron Oxides–Hydroxides (%)		
95	2	2	1	AM		

Source of information:Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
1810	36,3	14,3	30	7,4

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
6,5	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
43,0	-	-	-	-	-

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			2	-

Source of information:Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3(%)	LOI (%)
0,90	0,57	0,10	<0,05	0,35	54,00	0,80	0,25	<0,05	-	-	42,43

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
6,0	10	57	3,0	12	10	20	3,0
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
575	0,0	110	3,0	0,0	5,0	0,0	3,0
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
15	3,0	1,0	0,0	1,0	1,0		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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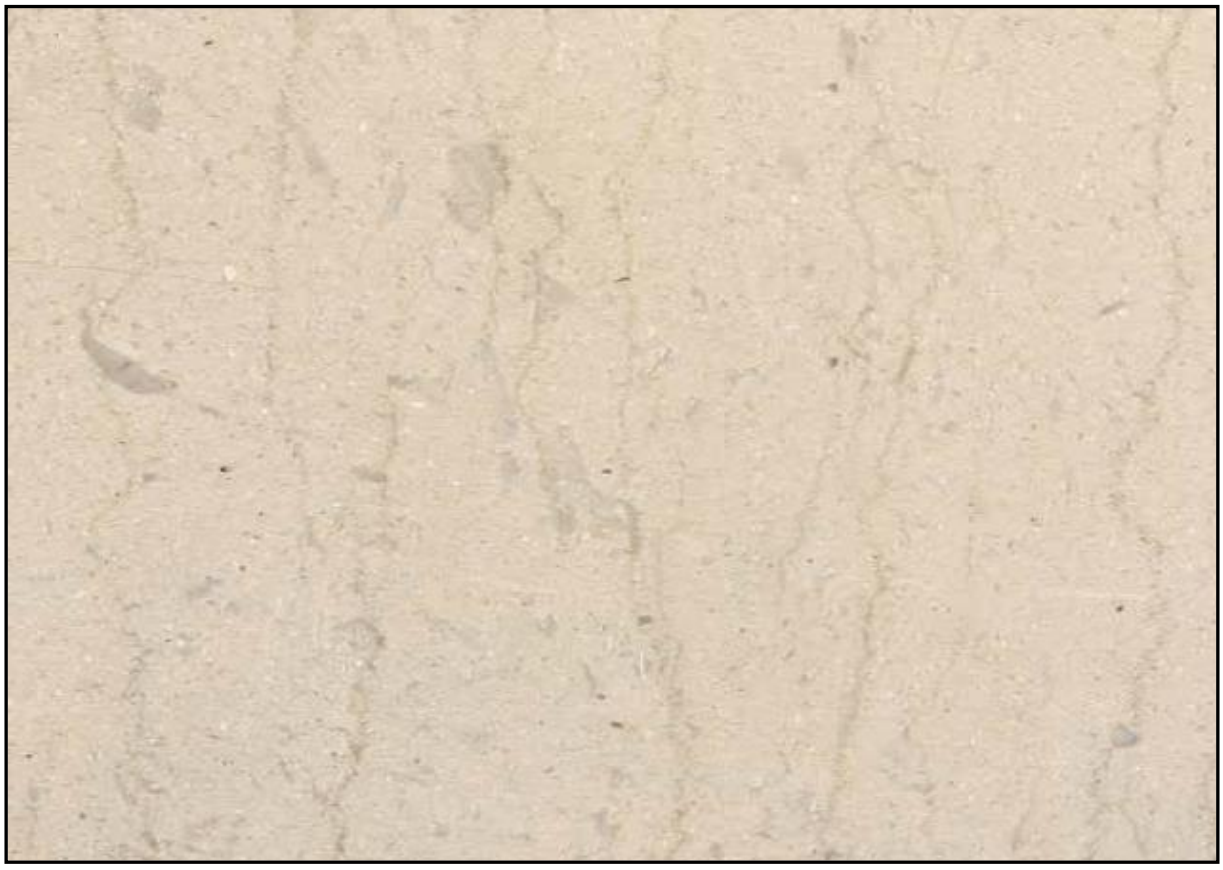
Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
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Ioannina Beige – Special



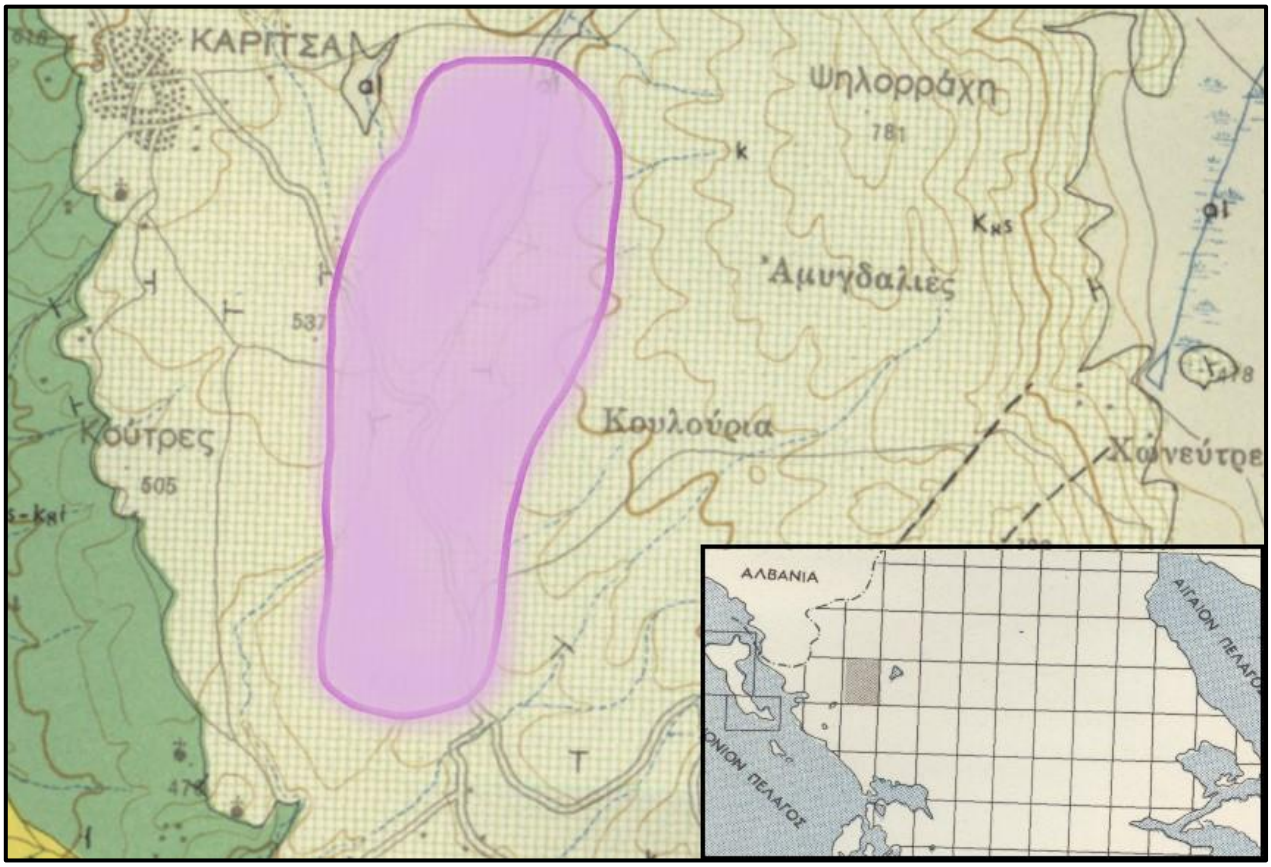
Scale 1:1

Short description: Medium to fine-grained, beige limestone with brown grey parallel veins (stylolites) and grey-brown agglomerates.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Limestone	Biomicrite limestone	Beige	Greece	Epirus	Ioannina	Klimatia

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Geological setting



Geology: Ioannina Beige – Special belongs to limestones of Ionian Zone. (Source: Geological Map of Greece 1:50000, Klimatia Sheet)

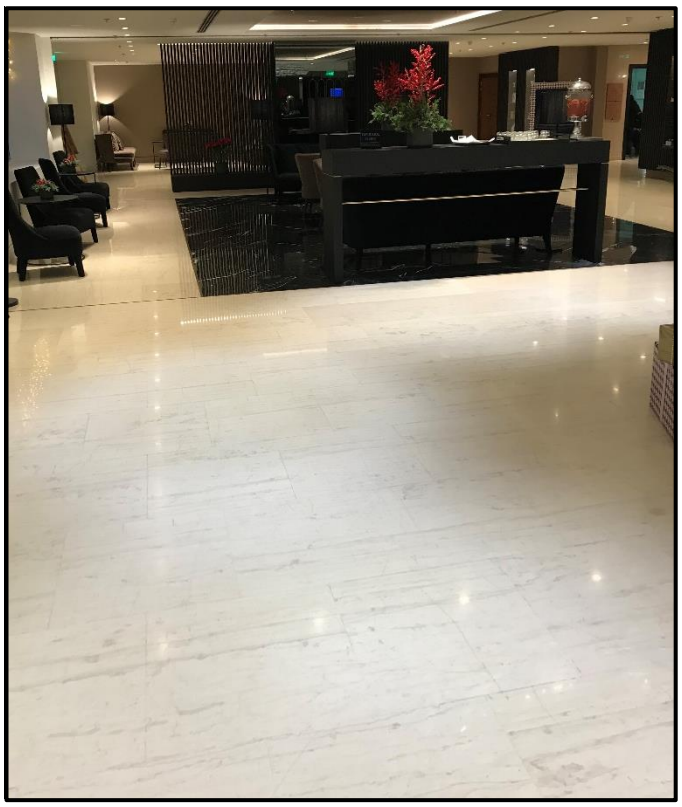
Production: The quarry area is near the Village of Klimatia in the regional unit of Ioannina.

Geological age: Cretaceous – Upper Eocene
Geological unit: Limestones of Ionian Zone

Application, use and heritage

Description: Ioannina Beige Special is suitable for various interior and exterior uses and applications, such as interior wall cladding, floor covering, stairs, kitchens, fireplaces, bathrooms.





Stairs covering and Interior flooring with Ioannina Beige Special

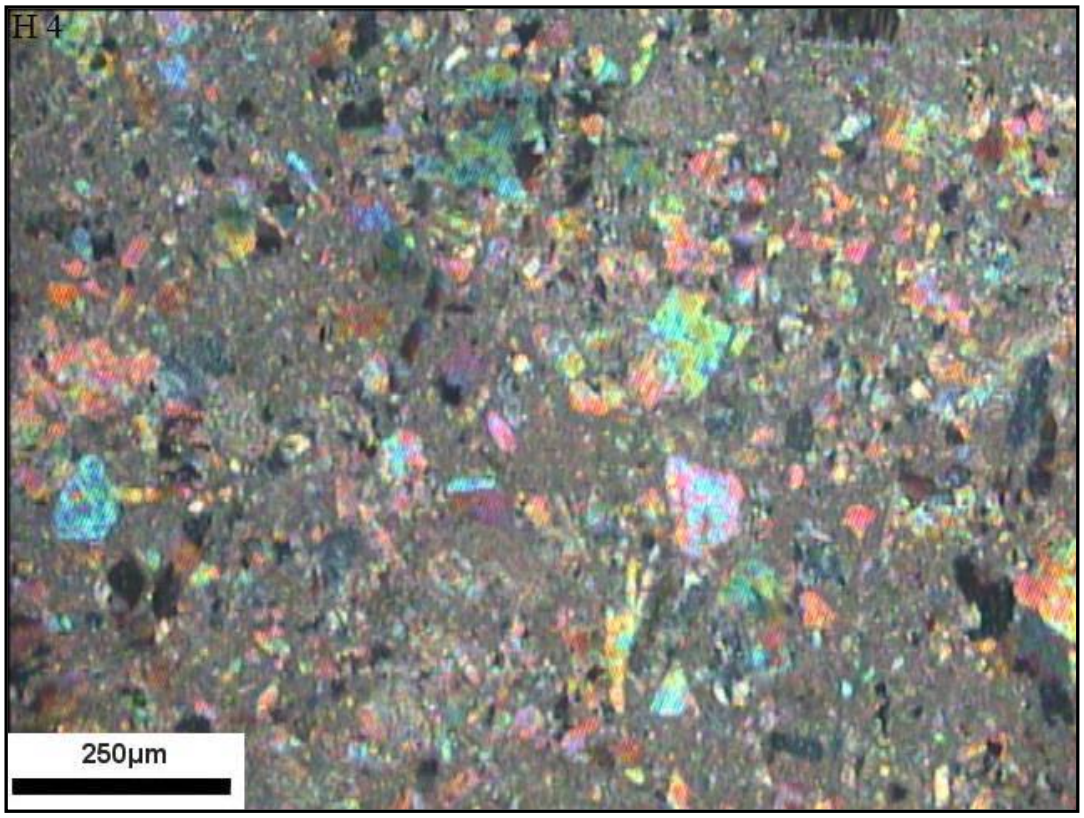
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Archaeological Site of Dodona, Ancient Theatre of Dodoni, Ioannina: Restoration with Ioannina Beige Special

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Petrography



Description: Photomicrograph of thin section, showing the presence of micrite to sparitic calcite and fossils. The sample contains also skeletal grains and endoclasts.

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Calcite (%)	**Iron Oxides (%)**					
100	AM					

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2630	2,8	0,8	186	16,6

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
17,0	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
-	17	-	-	2100	3

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			3	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
0,20	0,11	0,07	<0,05	0,32	53,50	0,59	0,13	<0,05	-	-	43,44

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
1,8	10	175	2,9	11	5,3	28	3,0
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
375	0,3	50	7,0	<0,1	2,0	<0,1	0,6
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
30	3,0	0,1	1,0	0,3	1,0		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
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Ioannina Beige – Trani



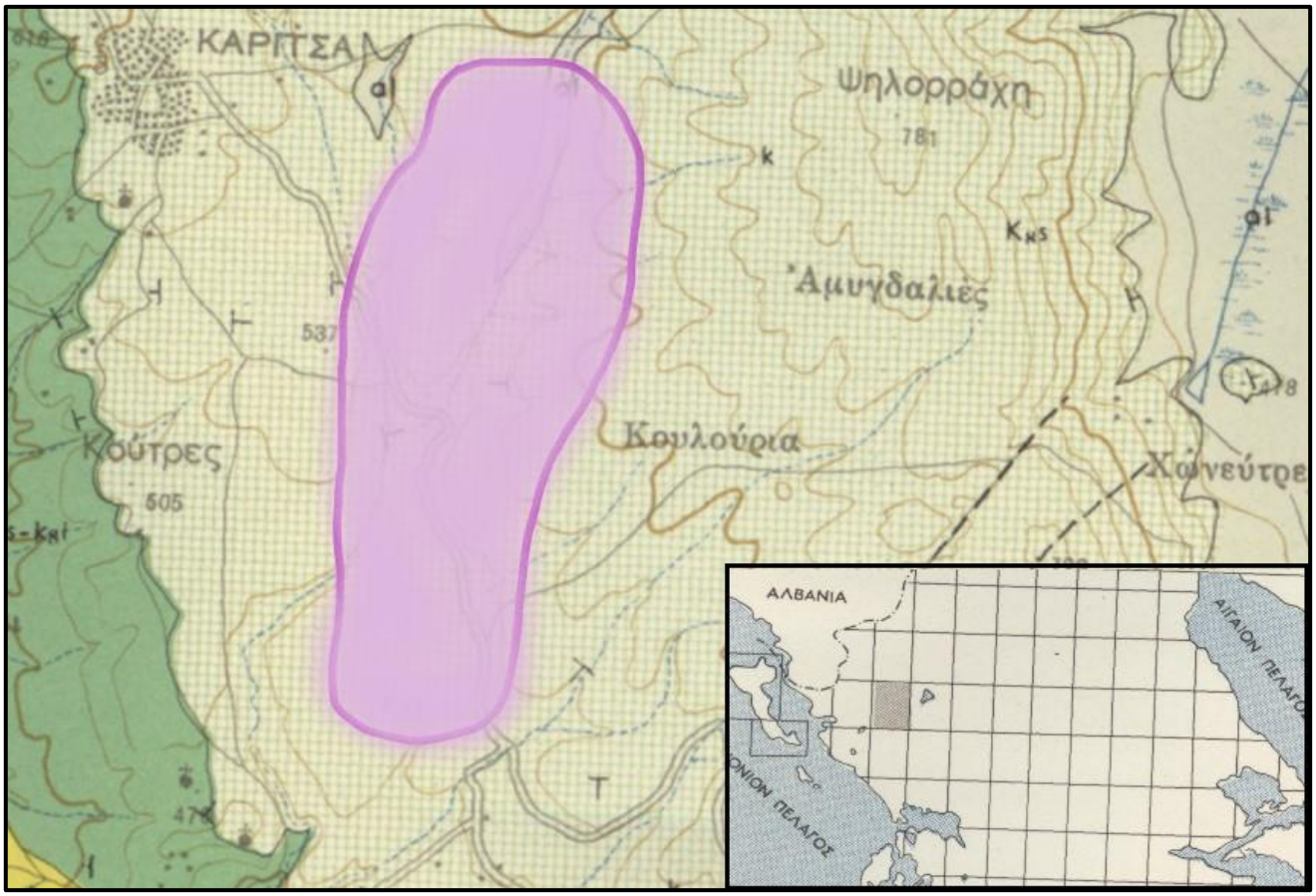
Scale 1:1

Short description: Fine grained, beige limestone with beige-grey agglomerates, white spots and yellowish parallel veins crosscutting the rock.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Limestone	Biomicrite limestone	Beige	Greece	Epirus	Ioannina	Klimatia

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Geological setting



Geology: Ioannina Beige – Vrachos belongs to limestones of Ionian Zone.

(Source: Geological Map of Greece 1:50000, Klimatia Sheet)

Production: The quarry area is near the Village of Klimatia in the regional unit of Ioannina.

Geological age: Cretaceous – Upper Eocene

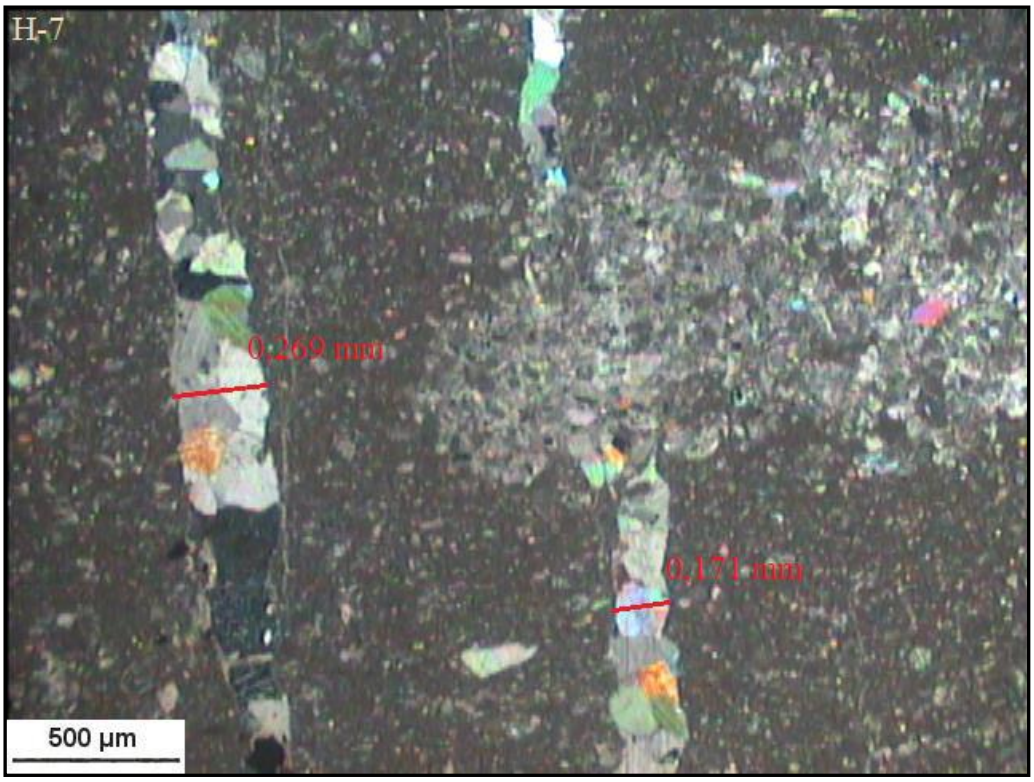
Geological unit: Limestones of Ionian Zone

Application, use and heritage

Description: Ioannina Beige - Trani is suitable for various interior and exterior uses and applications, such as interior wall cladding, floor covering, stairs, kitchens, fireplaces, bathrooms.

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Petrography



Description: Photomicrograph of thin section, showing the presence of micrite to microsparitic calcite, many fossils, endoclasts and a few lithoclasts. Beige-grey agglomerates contain accumulation of clastic material.

Source of information: Hellenic Survey of Geology and Mineral Exploration

Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Calcite (%)	Opaque minerals (%)	Clay minerals (%)				
100	AM	AM				

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2650	2,2	0,7	154	14,7

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
11,3	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
-	15	-	-	2300	3

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			2	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
0,50	0,11	0,21	<0,05	0,46	53,80	0,30	0,06	<0,05	-	-	43,08

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
4,6	12	88	3,0	12	6,0	27	3,3
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
325	0,4	54	7,0	<0,1	1,8	<0,1	1,3
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
32	3,5	0,2	1,3	0,2	0,8		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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Sources of more information

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Ioannina Beige – Vrachos



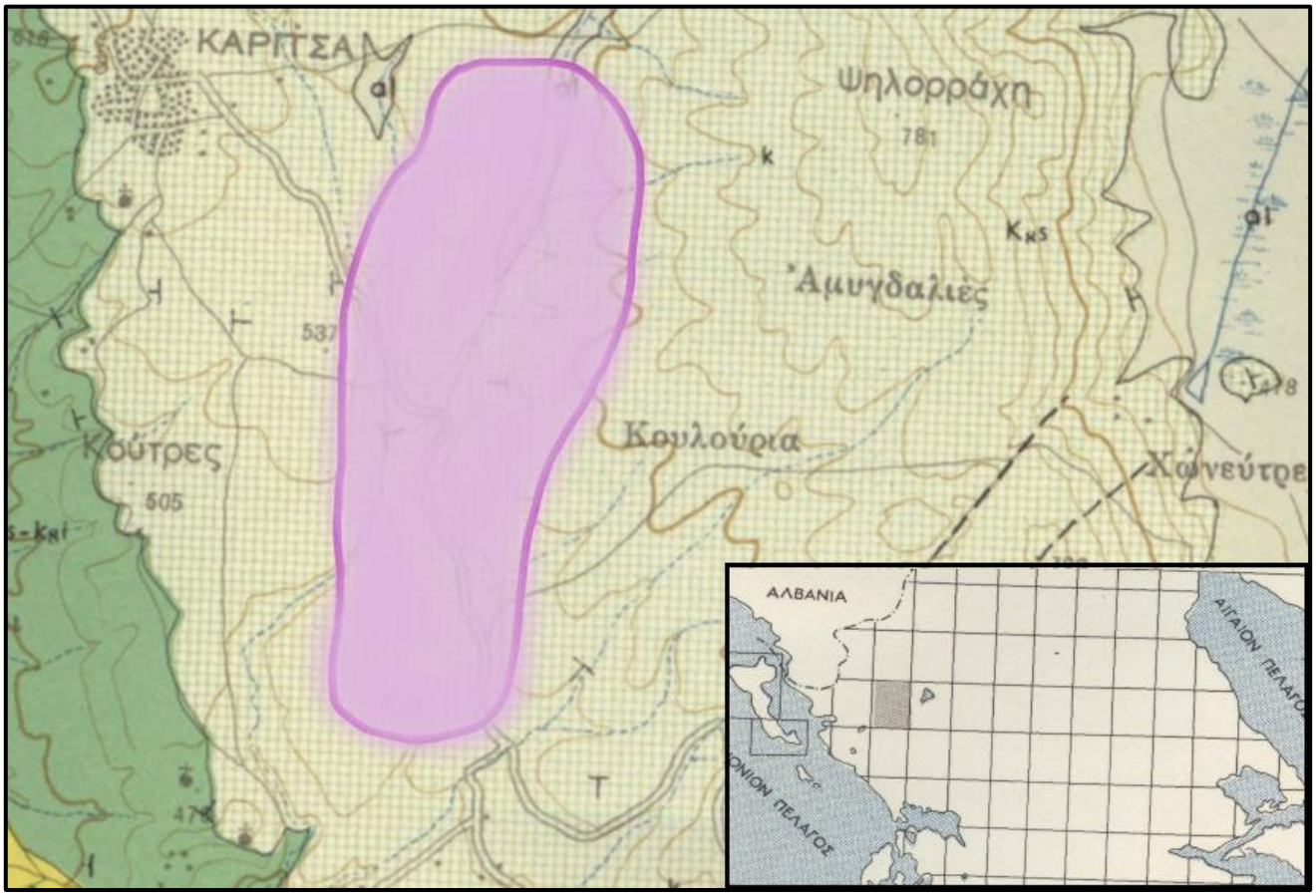
Scale 1:1

Short description: Medium to fine-grained, beige limestone with yellowish thin veins (stylolites), grey brown veins and agglomerates (clastic material) and scattered white spots.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Limestone	Biomicrite limestone	Beige	Greece	Epirus	Ioannina	Klimatia

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Geological setting



Geology: Ioannina Beige – Vrachos belongs to limestones of Ionian Zone.

(Source: Geological Map of Greece 1:50000, Klimatia Sheet)

Production: The quarry area is near the Village of Klimatia in the regional unit of Ioannina.

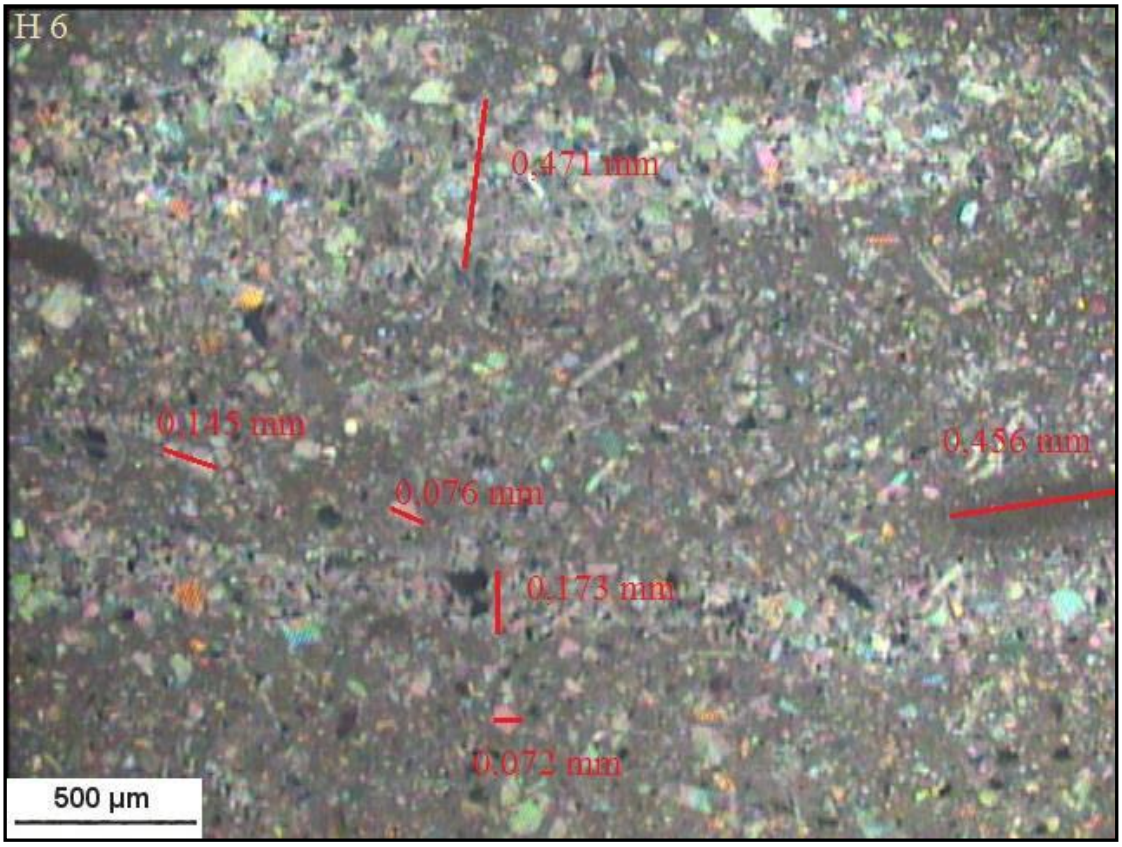
Geological age: Cretaceous – Lower Jurassic

Geological unit: Limestones of Ionian Zone

Application, use and heritage

Description: Ioannina Beige - Vrachos is suitable for various interior and exterior uses and applications, such as interior wall cladding, floor covering, stairs, kitchens, fireplaces, bathrooms.

Petrography



Description: Photomicrograph of thin section, showing the presence of micrite calcite and many fossils (broken or not), endoclasts, lithoclasts and sedimentary structures formed as a result of the accumulation and deposition of clastic material.

Source of information: Hellenic Survey of Geology and Mineral Exploration

Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Calcite (%)						
100						

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2650	2,2	0,7	189	14,3

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
10,8	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
-	17	-	-	2250	3

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			2	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
0,35	0,08	0,20	<0,05	0,30	53,80	0,35	0,07	<0,05	-	-	43,50

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
5,0	11	135	3,6	16	32	26	2,0
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
385	0,5	38	7,0	<0,1	2,0	<0,1	0,7
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
36	4,0	0,1	1,1	0,3	0,8		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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Sources of more information

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Psatha Sitia “Maltezopetra”



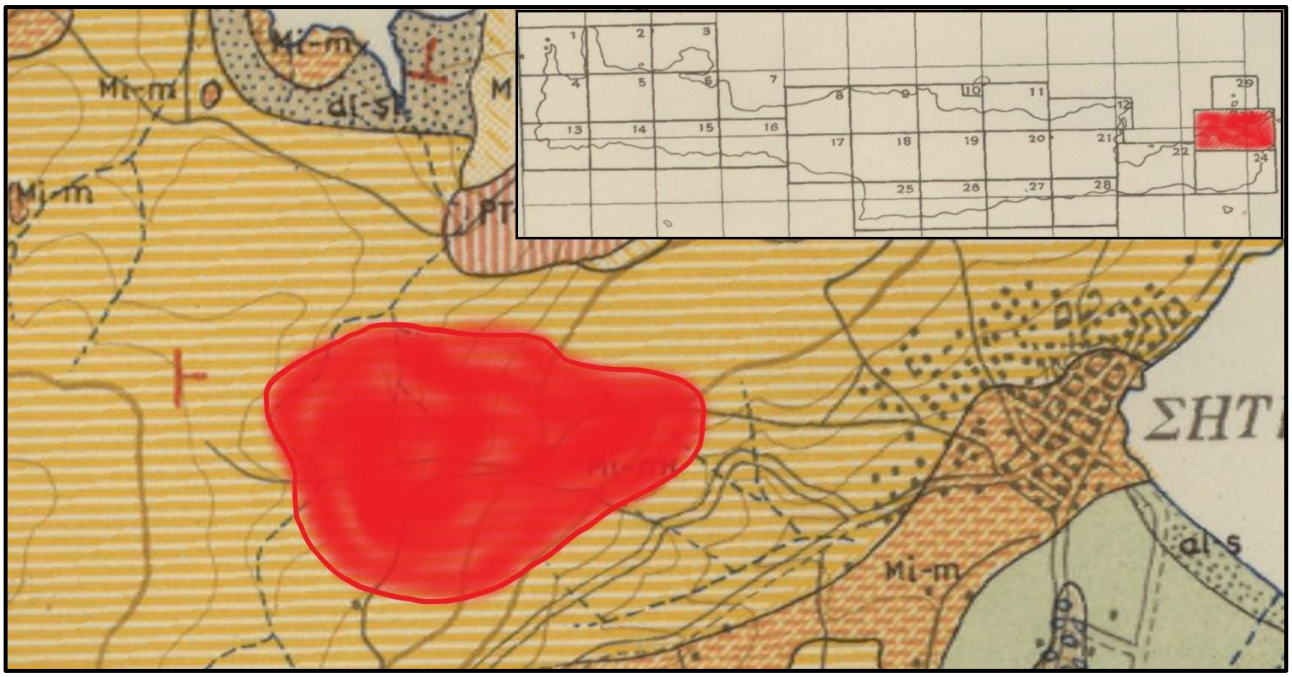
Scale 1:1

Short description: Beige, microporous calcite matrix with sparse yellowish banded veins.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Limestone	Biomicrite limestone	Beige	Greece	Crete	Sitia	

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Geological setting



Geology: Psatha Sitia "Maltezopetra" (red marking) belongs to marly limestones with fossils (Pecten, Chlamys, Ostrea).
(Geological Map of Greece 1:50000, Sitia Sheet)

Production: The quarry area is near Sitia town, in Eastern Crete.

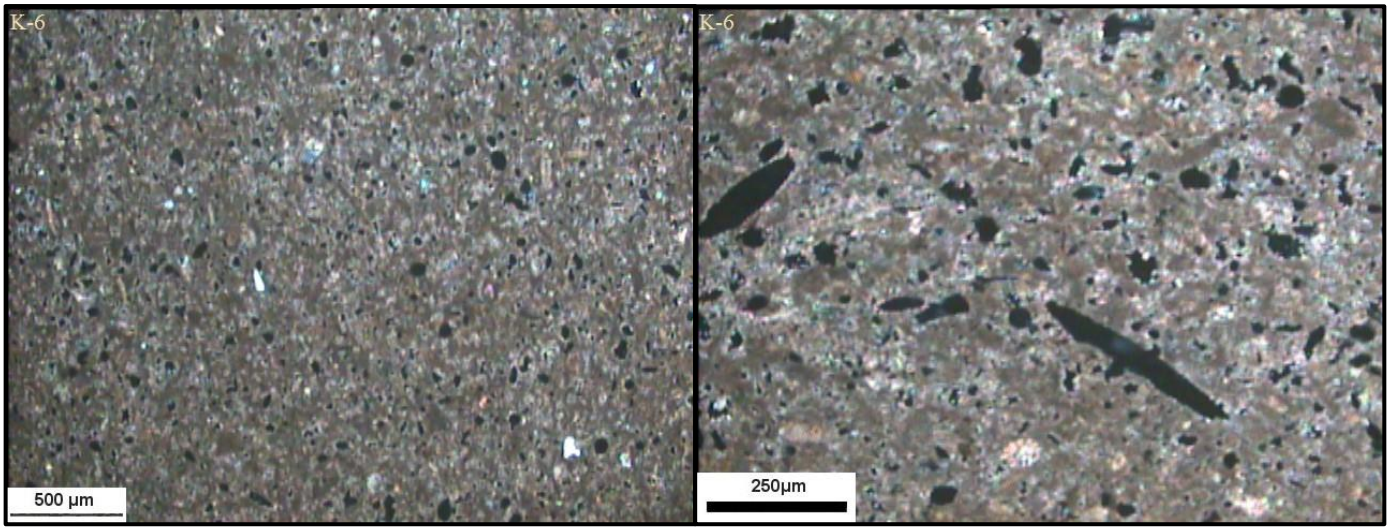
Geological age: Neogene – Miocene
Geological unit: Marly Limestones

Application, use and heritage

Description: Psatha Sitia “Maltezopetra” is suitable for various interior and exterior uses and applications, such as interior wall cladding, floor covering, stairs, kitchens, fireplaces, bathrooms.

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Petrography



Description: Photomicrograph of thin section, showing several fossils replaced by sparite material and microporosity which is usually developed due to detachment of fossils.

Source of information: Hellenic Survey of Geology and Mineral Exploration

Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Calcite (%)	Aragonite (%)	Quartz (%)	Dolomite (%)	Clay minerals (%) (%)	Iron Oxides – Hydroxides (%)	
94	3	2	1	AM	AM	

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
1760	33,6	13,5	25	7,5

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
6,7	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
46,0		-	-	-	-

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			2	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
<0,05	0,20	0,15	<0,05	0,60	54,00	1,30	0,30	<0,05	-	-	42,95

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
3,0	5,0	49	2,0	11	4,0	13	5,0
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
287	0,0	53	2,0	0,0	1,0	<1,0	2,0
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
17	6,0	2,0	1,0	1,0	3,0		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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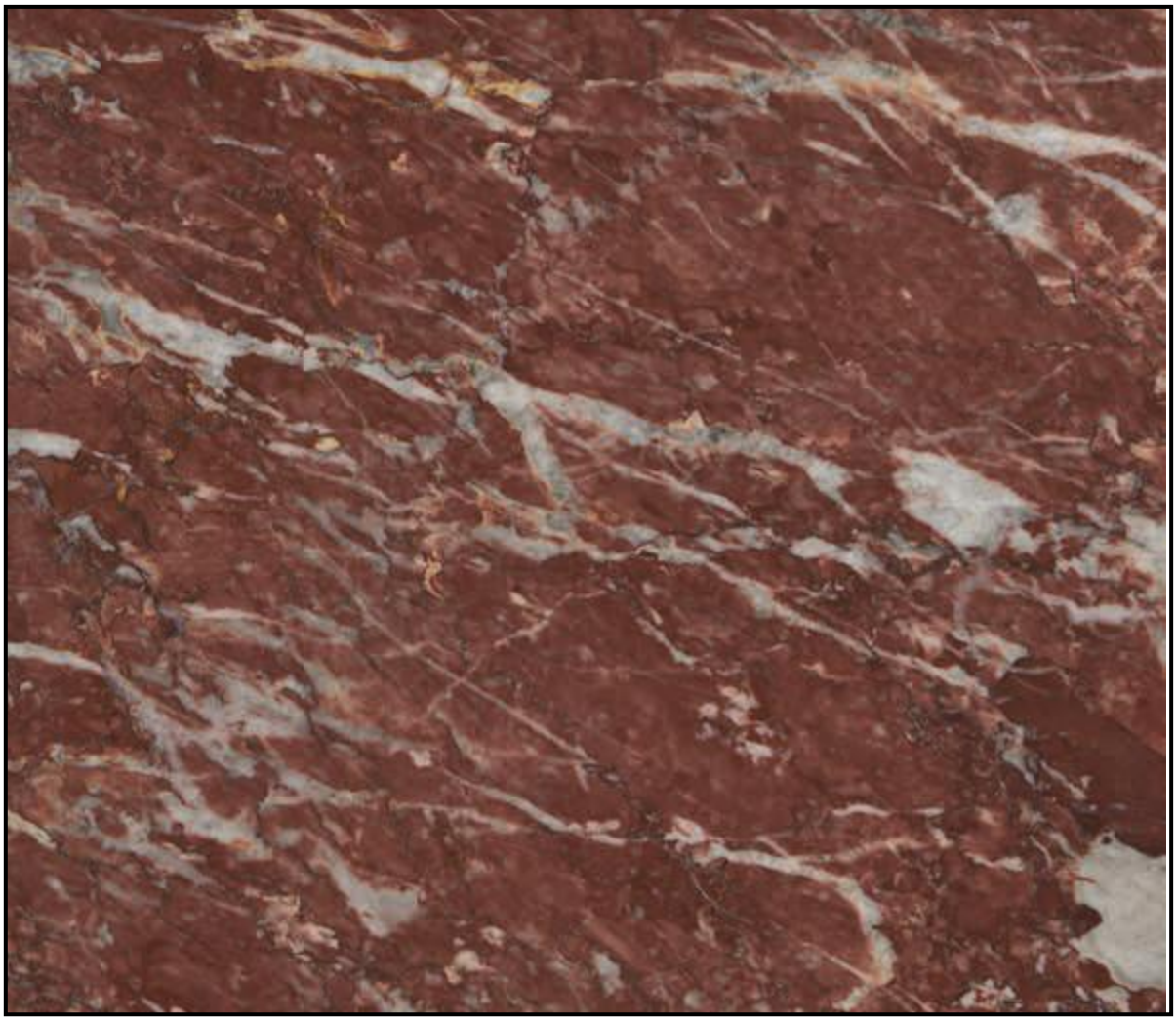
Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
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Ritsona Red



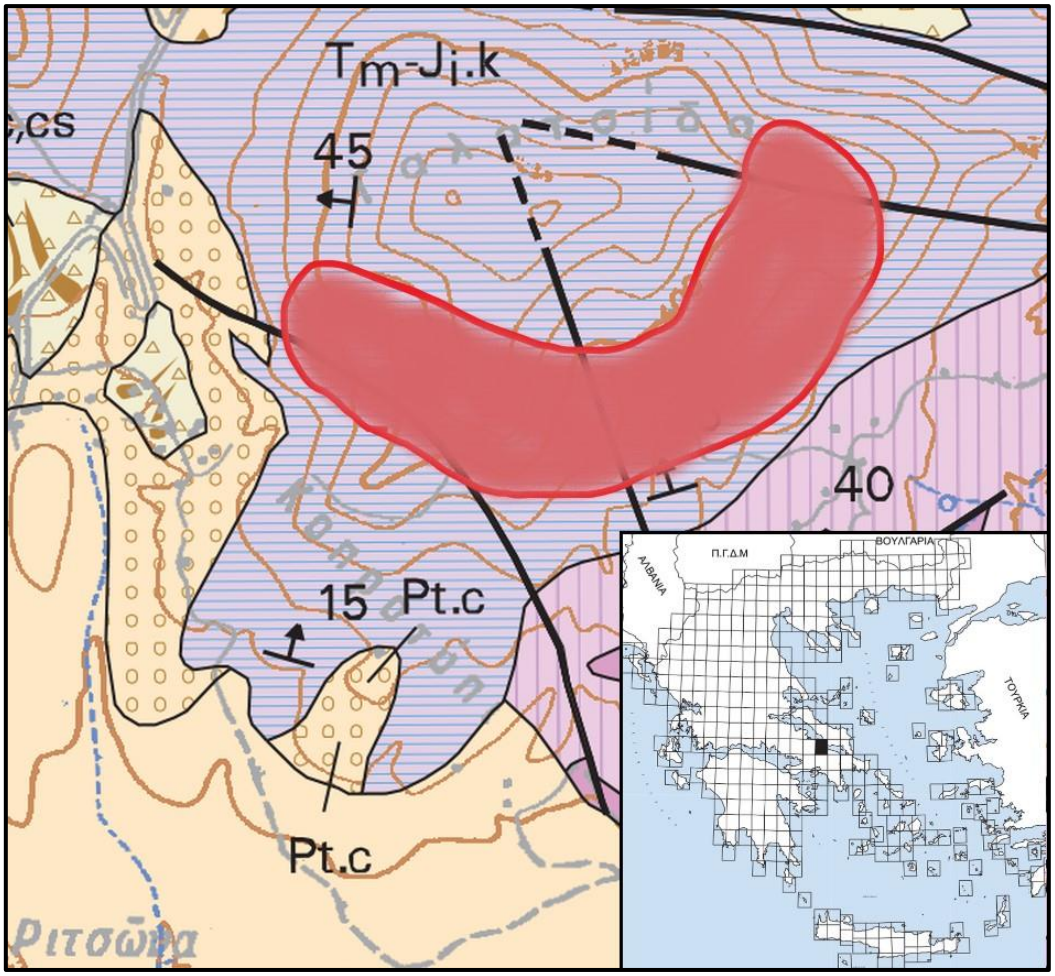
Scale 1:1

Short description: Medium to fine-grained, red limestone with white, yellowish and reddish agglomerates and gray, white or yellowish veins.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Limestone	Biomicritic limestone	Red	Greece	Central Greece	Chalkida	Ritsona

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Geological setting



Geology: Ritsona Red (red marking) belongs to Pelagonian Zone Unit of non-metamorphic formations, which consists of limestones, dolomitic limestones and dolomites, gray to white-gray, medium to thick-bedded, locally unbedded, usually microcrystalline, and strongly tectonized. At the mountain Ktypas and Galatideza red limestone intercalations occur of small thickness. At the southern margins of Ktypas mountain big *Megalodon* are observed (up to 25cm diameter).

(Source: Geological Map of Greece 1:50000, Chalkida Sheet)

Production: Quarry area is near Ritsona village, in the municipality of Chalkis.

Geological age: Middle Triassic – Middle Lias

Geological unit: Pelagonian Zone Unit of non-metamorphic formations – Euboea part

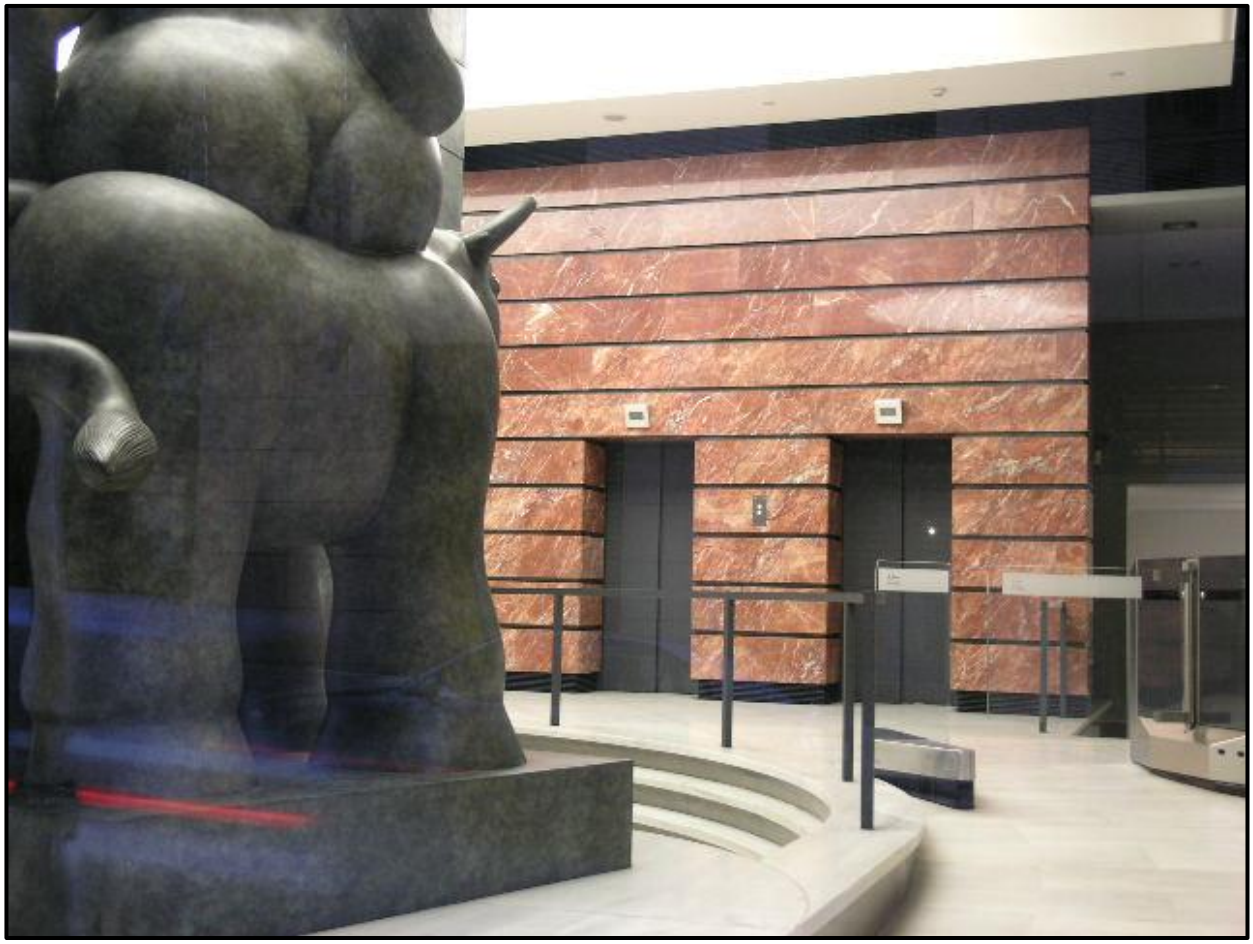
Application, use and heritage

Description: During the Archaic and Byzantine times, Ritsona red rock had wide use as an ornamental material for temples and buildings. Nowdays, it is suitable for indoor and outdoor flooring and cladding. The most common uses are for pavement recreations.



Bank of Greece: Exterior walkway pavement with Ritsona Red.

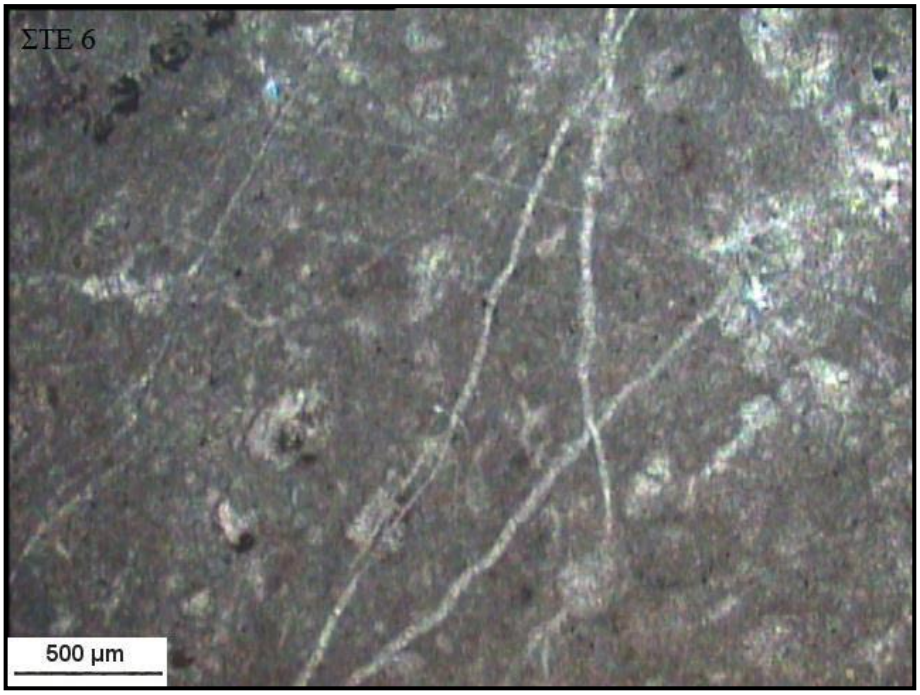
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Piraeus Bank: Indoor wall cladding with Ritsona Red.

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Petrography



Description: Photomicrograph of thin section, showing a dense network of calcite veins and stylolites which sometimes intersect the veins. Calcite crystals range from microsparitic to sparitic.

Source of information: Hellenic Survey of Geology and Mineral Exploration

Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Calcite (%)	Quartz (%)	Dolimite (%)	Iron Oxides (%)			
92	5	2	AM			

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2730	0,3	0,1	159	15,5

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
15,0	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
-	13	-	-	3000	3

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			4	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
2,90	0,89	0,51	-	1,70	51,90	0,13	0,33	0,01	-	-	42,25

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
4,0	16	76	0,9	14	4,2	18	2,3
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
85	0,3	56	6,7	0,1	10	0,2	0,7
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
9,0	1,5	1,4	0,6	0,4	0,8		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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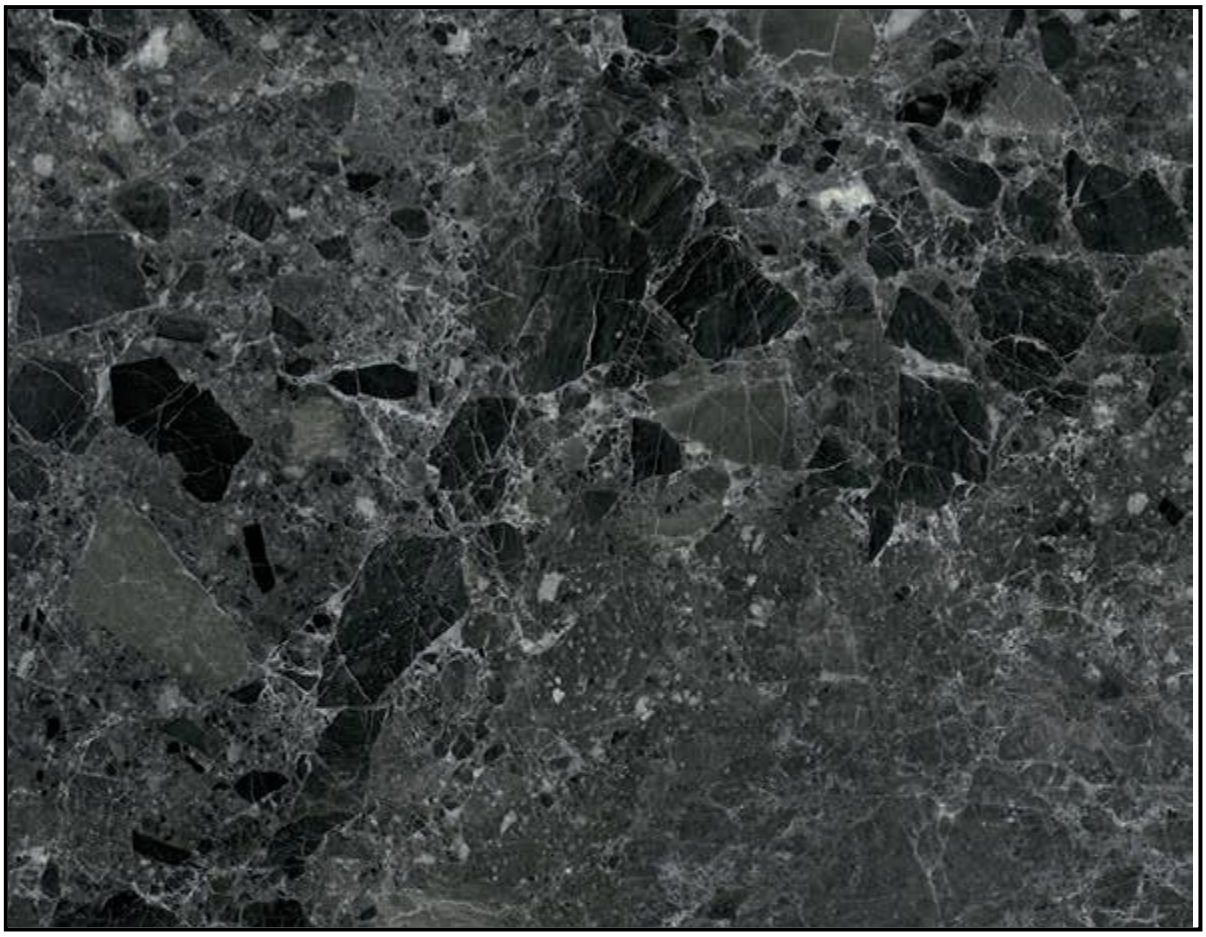
Sources of more information

Type of information	Name of provider	URL
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Argolida Black



Scale 1:1

Shortdescription: Fine-grained, black dolomite with white veins and agglomerates creating the illusion of a breccia. Blackcolourisduetoorganic compounds.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Limestone	Dolomite	Black	Greece	Peloponnese	Argos	Elliniko

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Geological setting



Geology: Argolida Black (red marking) belongs to Autochton Tripolis Series, consisting of limestones, dolomites, dolomitic limestones bituminous, grey, dark-grey to black, sometimes light coloured. Usually thick bedded to thin bedded. In the Mavrovounion Mountain the deeper beds present an obvious crystallinity and their contact to the underlying metamorphosed system is anomalous. They contain Lamelibranches, among them Rudists, Gastropodes, Ostracodes, Algae, and Foraminifera.

(Source: Geological Map of Greece 1:50000, Argos Sheet)

Production: The quarry area is near Elliniko village, in Argos town, Peloponnese.

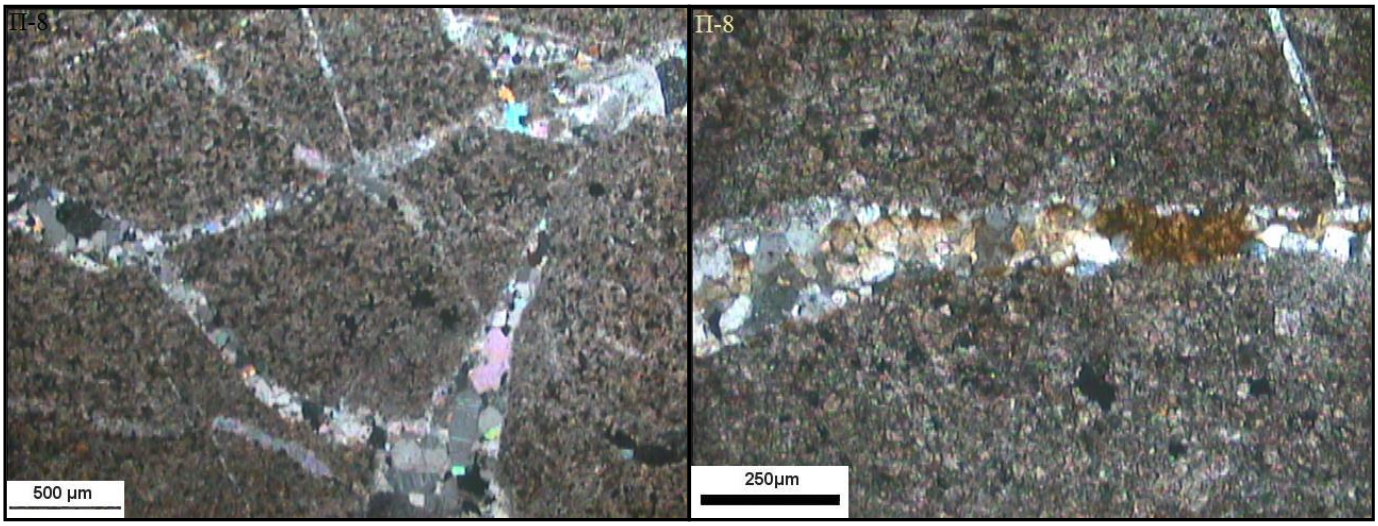
Geological age: Upper Cretaceous

Geological unit: Autochthon Tripolis Series

Application, use and heritage

Description: Argolida Black is suitable for interior and exterior uses, such as onwall and floor coverings, fireplaces, kitchens, public areas and for manyrenovation applications**.**

Petrography



Description: Photomicrograph of thin section, showing multiple veins filled with calcite or dolomite minerals crossing the rock masswhile one of them is filled with clay mineral. Calcite mineral is micritic to microsparitic.Calcite mesocrystals are also observed.

Source of information:Hellenic Survey of Geology and Mineral Exploration

Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Dolomite (%)	Calcite (%)	Clay minerals (%)	Iron Oxides (%)			
92,6	7,4	AM	AM			

Source of information:Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2790	2,2	0,6	184	8,3

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
10,3	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
-	17	-	-	2300	3

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			4	-

Source of information:Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3(%)	LOI (%)
<0,05	<0,05	0,05	<0,05	18,10	35,30	1,93	0,38	<0,05	-	-	44,20

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
5,0	30	46	4,0	20	8,0	31	4,0
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
251	<1,0	72	8,0	<1,0	2,0	<1,0	3,0
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
<1,0	<1,0	<1,0	1,0	1,0	2,0		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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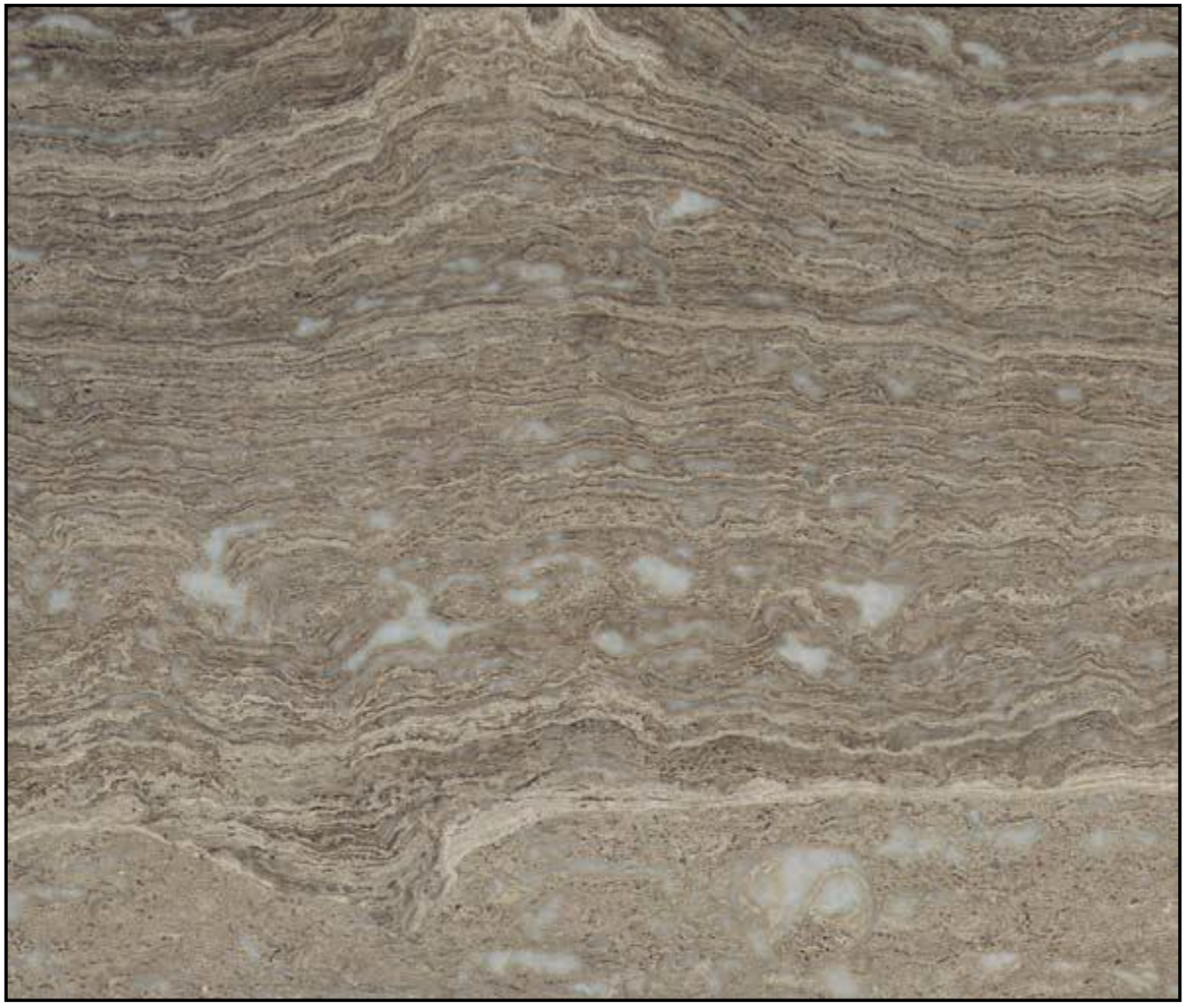
Sources of more information

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Didymon Beige



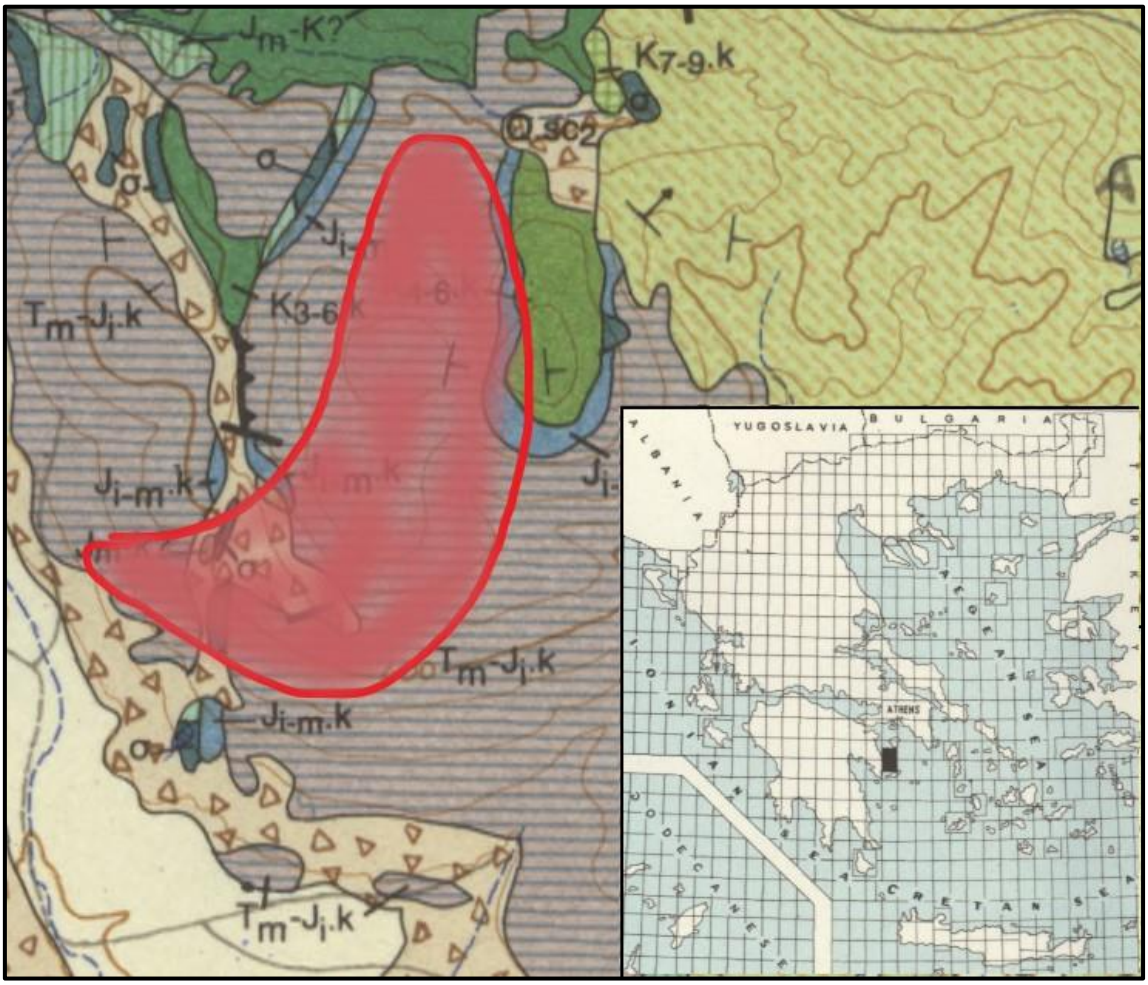
Scale 1:1

Short description: Fine-grained beige dolomite with white and grey veins.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Limestone	Dolomite	Beige	Greece	Peloponnese	Ermioni	Didyma

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Geological setting



Geology: Didymon Beige (red marking) belongs to the group of carbonate rocks "Pantokrator limestones", medium to thick bedded grey white or yellowish limestones, crystalline or pseudoolithic, resedimentary breccias, cherty layers in the upper parts. Small ferruginous duricrusts.
(Source: Geological Map of Greece 1:50000, Methana Sheet)

Production: The most important quarry area is near Didyma village, in Peloponnese.

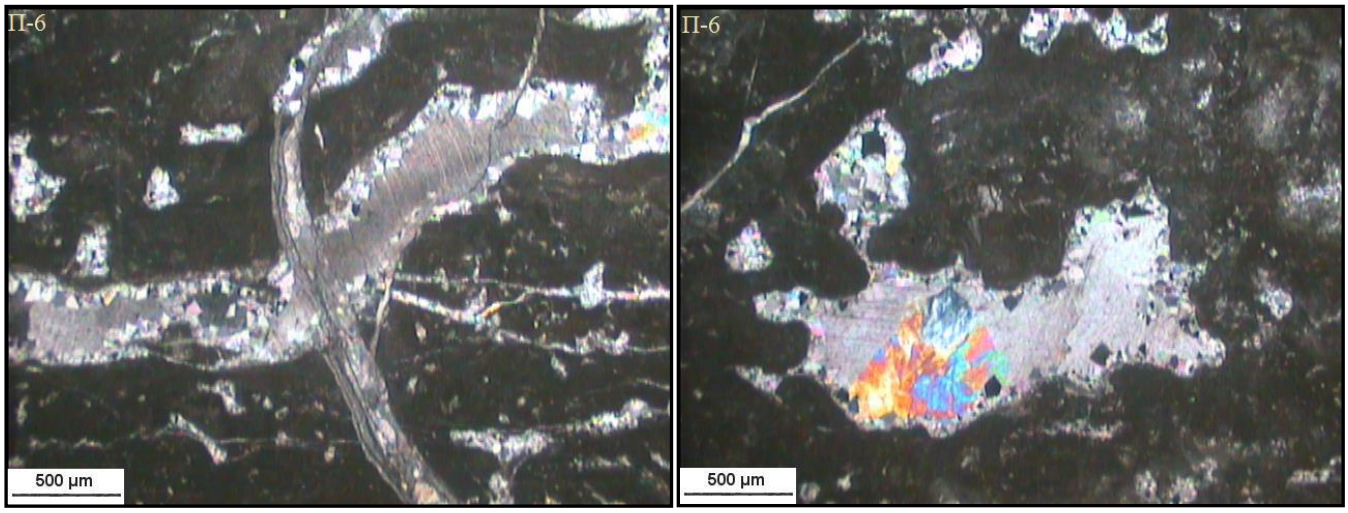
Geological age: Middle Triassic – Middle Lias
Geological unit: "Pantokrator limestones"

Application, use and heritage

Description: Didymon Beige is suitable for various interior and exterior uses and applications, such as interior wall cladding, floor covering, stairs, kitchens, fireplaces, bathrooms.

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Petrography



Description: Photomicrograph of thin section, showing many veins and calcite filled irregular shaped cavities, cavities filled with sparite alternating with micrite bands, and in places replaced by dolomite.

Source of information: Hellenic Survey of Geology and Mineral Exploration

Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Dolomite (%)	Calcite (%)	Opaque minerals (%)	Iron Oxides (%)			
91	9	AM	AM			

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2740	2,4	0,8	169	20,1

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa
-	-		

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
18,1	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
-	8	-	-	2800	3

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			3	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
<0,05	<0,05	0,10	<0,05	17,10	37,00	1,05	0,15	<0,05	-	-	44,55

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
4,0	15	14	3,0	13	4,0	21	3,0
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
177	<1,0	49	5,0	<1,0	2,0	<1,0	2,0
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
4,0	<1,0	<1,0	1,0	<1,0	2,0		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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Sources of more information

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Helikonas Pink



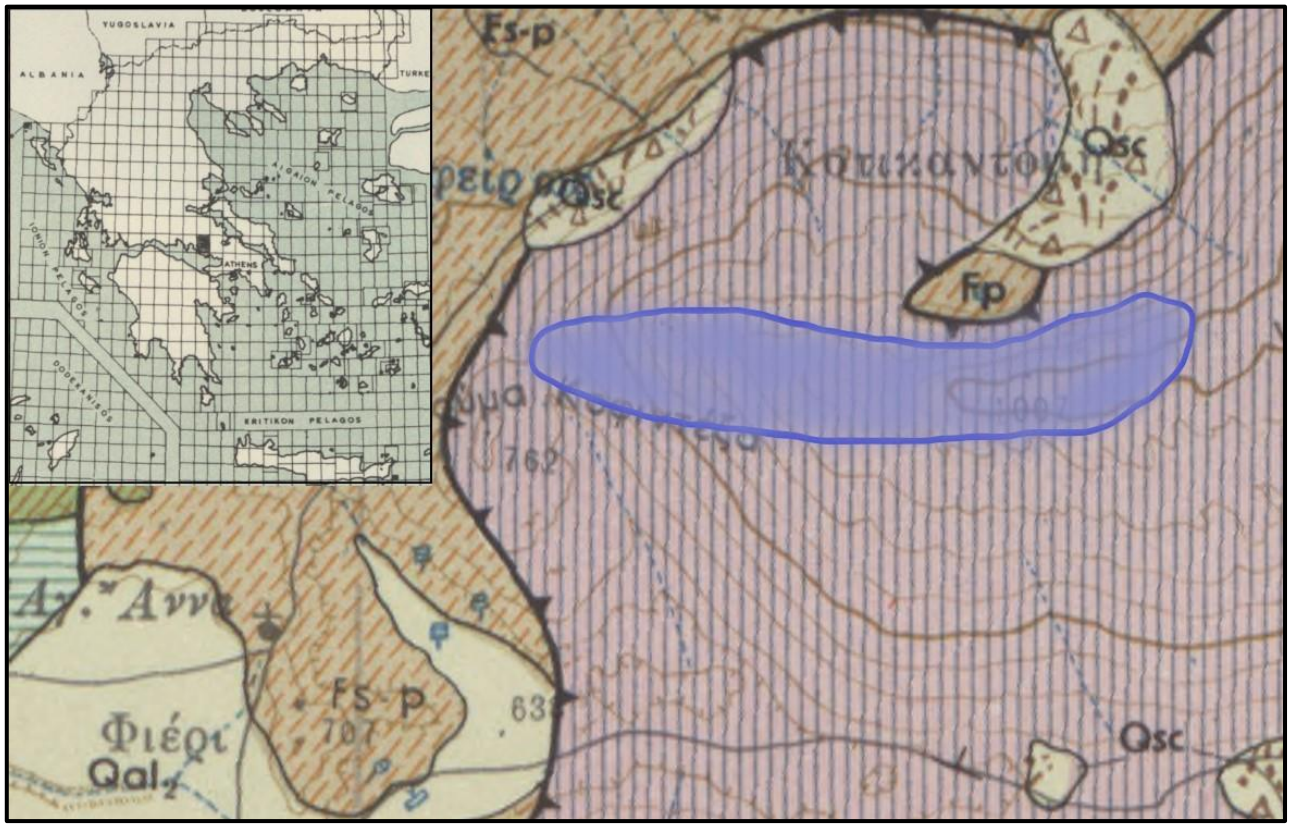
Scale 1:1

Short description: Fine-grained, off white, crystalline dolomite with light pink and grey agglomerates.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Limestone	Dolomite	Light-Pink	Greece	Central Greece	Levadia	Agia Anna

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Geological setting



Geology: Helikonas Pink (blue marking) belongs to the carbonate formations of Parnassos – Ghiona Unit. In the lower Jurassic horizons there are limestones and dolomites, grey, grey-brown, white-brown or white-rose, microcrystalline, sometimes compact, medium-bedded in general. There are also, in a small proportion, dolomites usually light – coloured (at Zagaras and others).
(Source: Geological Map of Greece 1:50000, Levadhia Sheet)

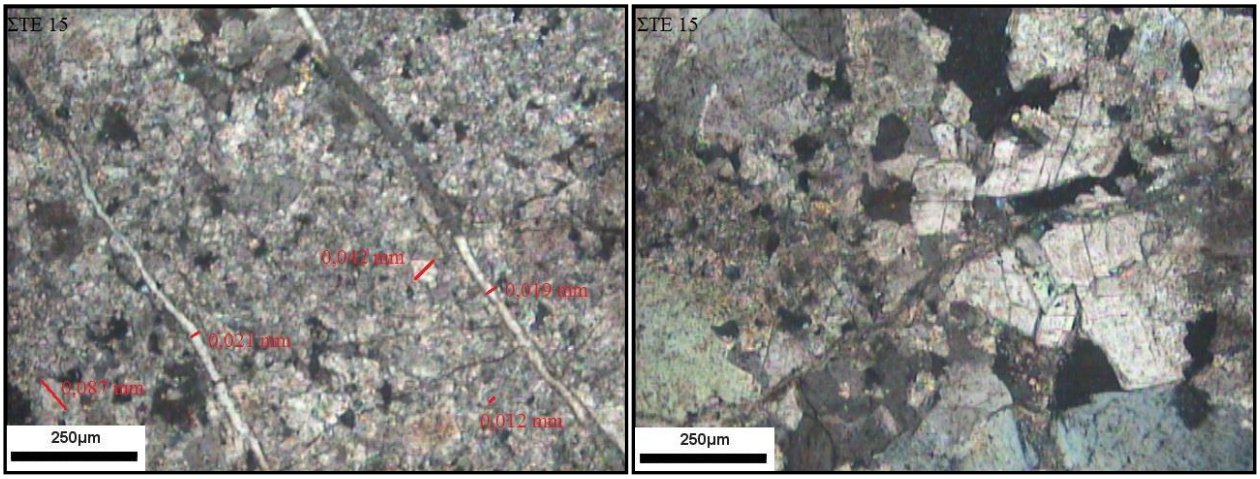
Production: The most important quarry area is near the village of Aghia Anna, in Livadeia (Central Greece).

Geological age: Upper Triassic – Lower Jurassic
Geological unit: Parnassos – Ghiona Unit

Application, use and heritage

Description: Helikonas Pink can be applied to many construction works, such as cladding, floors, stairs, bathrooms and it is acceptable to all processing that can get a marble.

Petrography



Description: Photomicrograph of thin section, showing second generation veins crosscutting the microcrystalline to medium crystalline dolomite. Dolomite crystals are hypidiomorphic while calcite occurs in veins.

Source of information: Hellenic Survey of Geology and Mineral Exploration

Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Dolomite (%)	**Albite (%)**	**Calcite (%)**				
92	5	3				

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2820	1,1	0,4	118	10,5

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
8,7	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
-	15	-	-	1700	3

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			4	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
0,85	<0,10	0,00	<0,10	20,14	31,60	0,80	0,20	-	-	-	45,86

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
2,0	26	60	1,6	9,0	4,0	20	0,9
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
20	0,5	5,0	18	0,5	1,7	<0,1	0,1
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
8,5	7,2	0,5	0,2	1,0	1,1		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

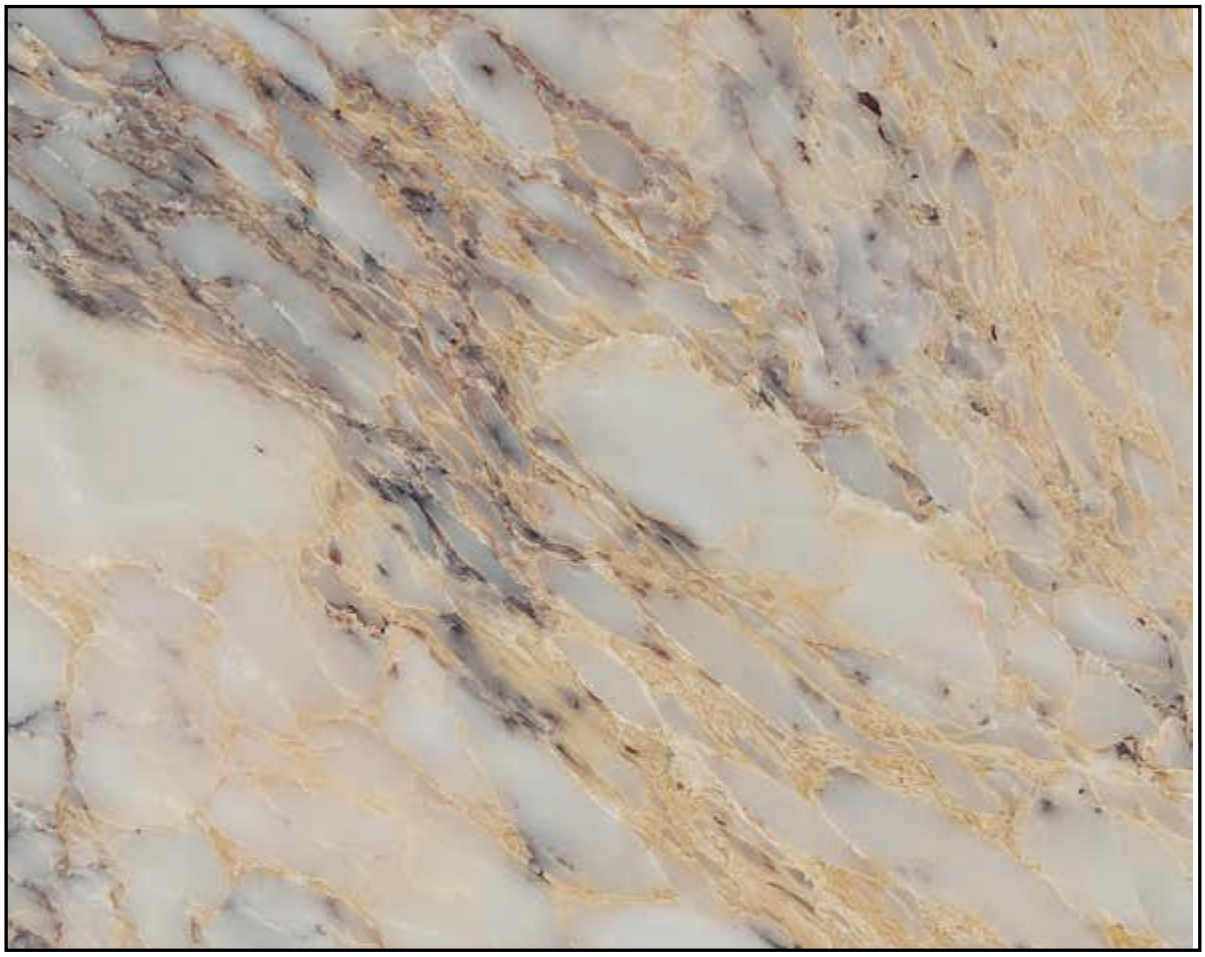
Sources of more information

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Skyros Breccia

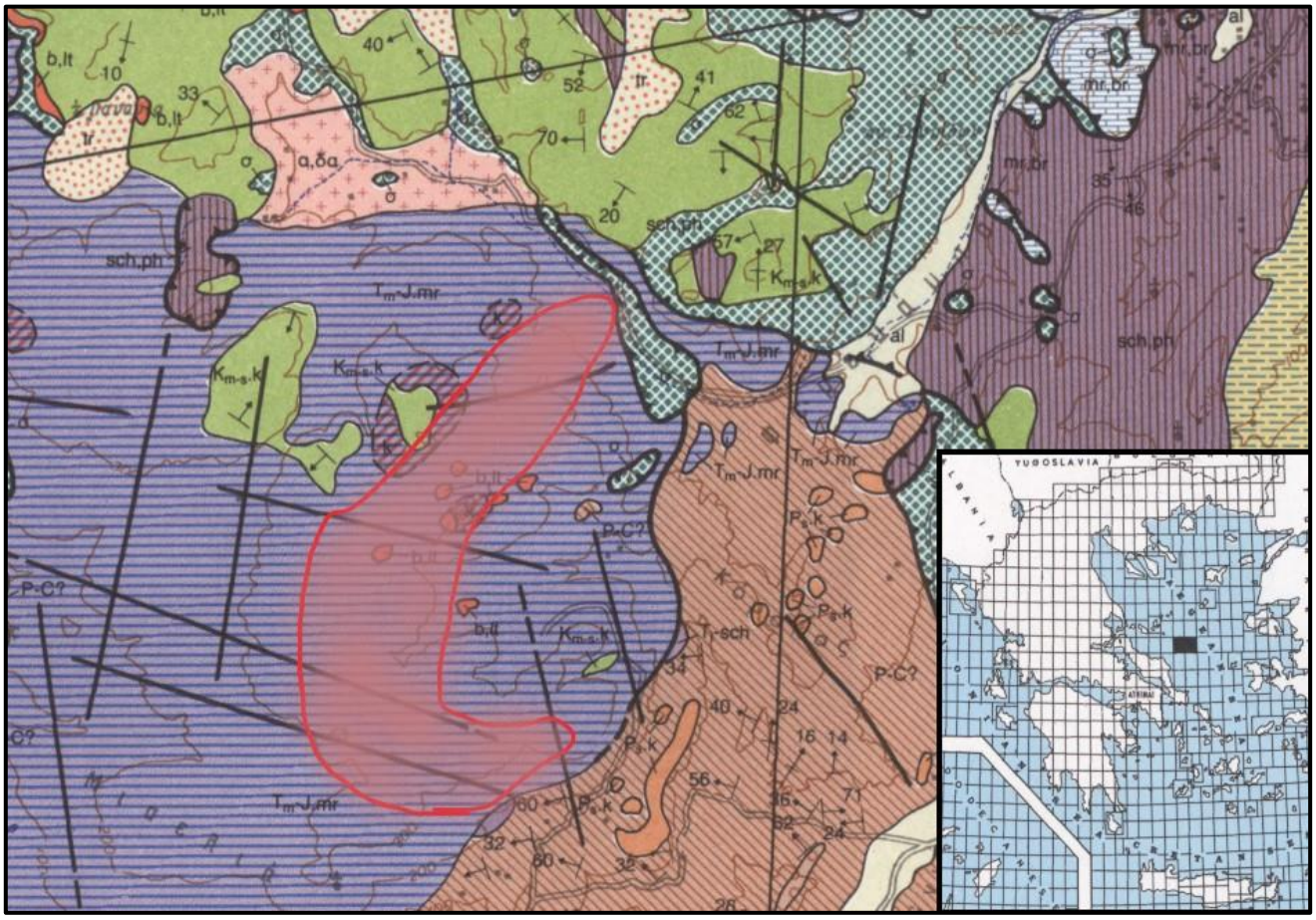


Scale 1:1

Short description: Medium to fine-grained, light grey to yellowish dolomite with off white agglomerates and network of off white to light yellow veins intersecting the crystalline mass of the rock. The off white veins are filled with secondary material while the light yellow ones are possibly due to copper oxides. There are also black spots.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Limestone	Dolomite	Multicoloured	Greece	Central Greece	Skyros	Skyros

Geological setting



Geology: Skyros Breccia is dolomite belonging to Calcite – dolomite marbles of Eohellenic Tectonic Nappe. Calcite – dolomite marbles are coarse – to fine-grained, thick – bedded with colour variety.

(Source: Geological Map of Greece 1:50000, Skyros Island)

Production: The most important quarry area is almost in the north to central part of Skyros Island.

Geological age: Middle Triassic - Jurassic

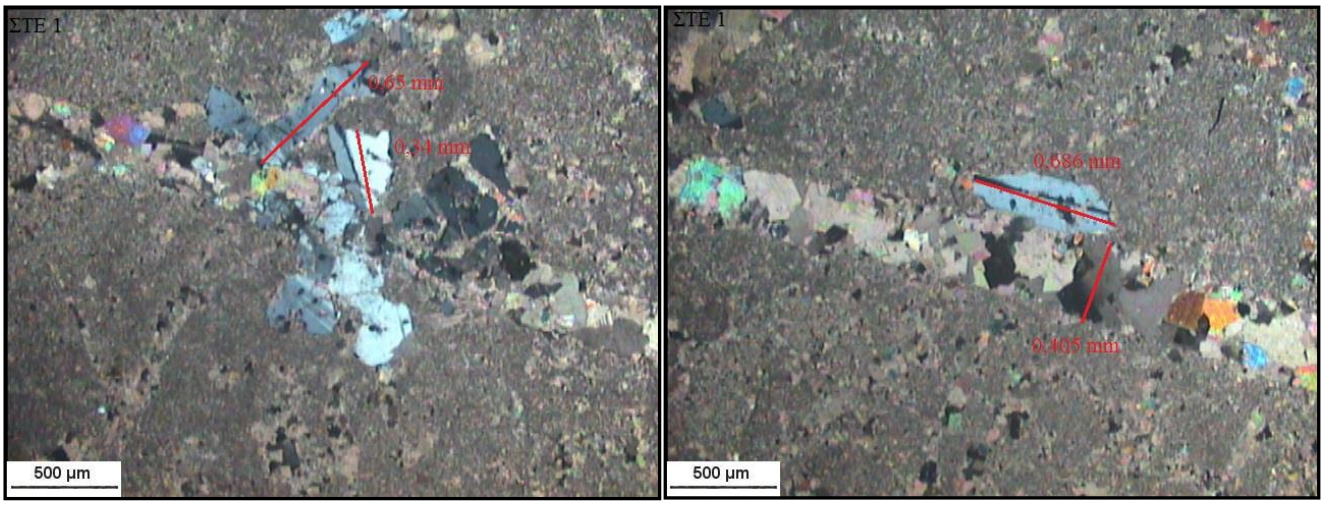
Geological unit: Eohellenic Tectonic Nappe

Application, use and heritage

Description: Skyros Breccia is ideal for flooring, cladding, vanity tops and wall covering. It is suitable for various interior and exterior uses and applications.

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Petrography



Description: Photomicrograph of thin section, showing veins of secondary calcite and possible clastic albite. Dolomite crystals are hypidiomorphic. Feldspar fragments are also present.

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Dolomite (%)	Calcite (%)	Feldspars (%)	Quartz (%)	Opaque minerals (%)		
95	3	2	AM	AM		

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2730	0,3	0,1	129	18,9

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa
-	-		

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
11,7	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
-	14	-	-	2250	3

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			3	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
0,50	0,03	0,42	-	20,20	32,40	0,25	0,06	0,05	-	-	46,95

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
1,2	18	15	1,4	17	16	41	310
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
190	0,2	4800	5,0	0,0	6,5	0,0	0,0
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
22	0,7	2,6	0,9	2,0	1,7		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
Non-commercial directory		
Commercial directory		
Scientific publication		
Other publication		

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Aghios Kyrillos Grey



Scale 1:1

Short description: Fine-grained grey dolomitic limestone with white veins.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Limestone	Dolomitic limestone	Grey	Greece	Crete	Heraklion	Agios Kyrillos

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Geological setting



Geology: Aghios Kyrillos Grey (red marking) belongs to the formations of Asteroussia Nappe, which are grey marbles with macrofossils of indefinite age in isolated Klippen.
(Source: Geological Map of Greece 1:50000, Andiskarion Sheet)

Production: The quarry area is near Aghios Kyrillos village in South Crete.

Geological age: Upper Jurassic – Lower Cretaceous
Geological unit: Allochthonous Series – Asteroussia Nappe

Application, use and heritage

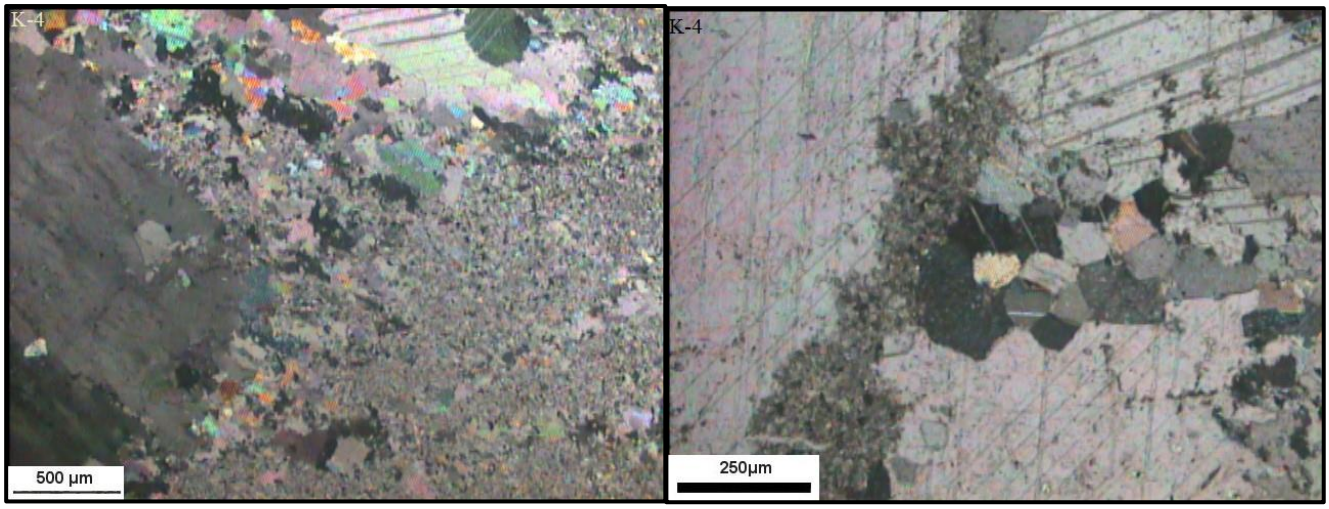
Description: Aghios Kyrillos Grey marble is known for its high quality and durability. It is ideally fitted for internal and external projects. It can decorate all areas of a house, bathroom benches, fireplace mantels, floors, stairs and it can be also used for wall cladding.





Systagma Station of Athens Metro: Wall cladding
(Photos: Wikipedia)

Petrography



Description: Photomicrograph of thin section, showing large calcite crystals which are fragmented in places, scattered dolomite agglomerates or veins crosscutting the rock mass. The texture is heterogranular and cataclastic.

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Calcite (%)	Dolomite (%)	Quartz (%)	Clay minerals (%)	Opaque minerals (%)		
88	11	1	AM	AM		

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2700	0,4	0,1	105	17,1

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
18,00	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
-	26	-	-	2050	3

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			3	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
<0,05	0,60	<0,05	<0,05	1,60	53,05	1,40	0,60	<0,05	-	-	43,00

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
2,0	4,0	22	5,0	10	3,0	10	9,0
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
345	0,0	135	7,0	0,0	3,0	0,0	1,0
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
12	2,0	1,0	0,0	4,0	1,0		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
Non-commercial directory	Wikipedia	https://en.wikipedia.org/wiki/Syntagma_metro_station
Commercial directory		
Scientific publication		
Other publication		

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Aloides Slate



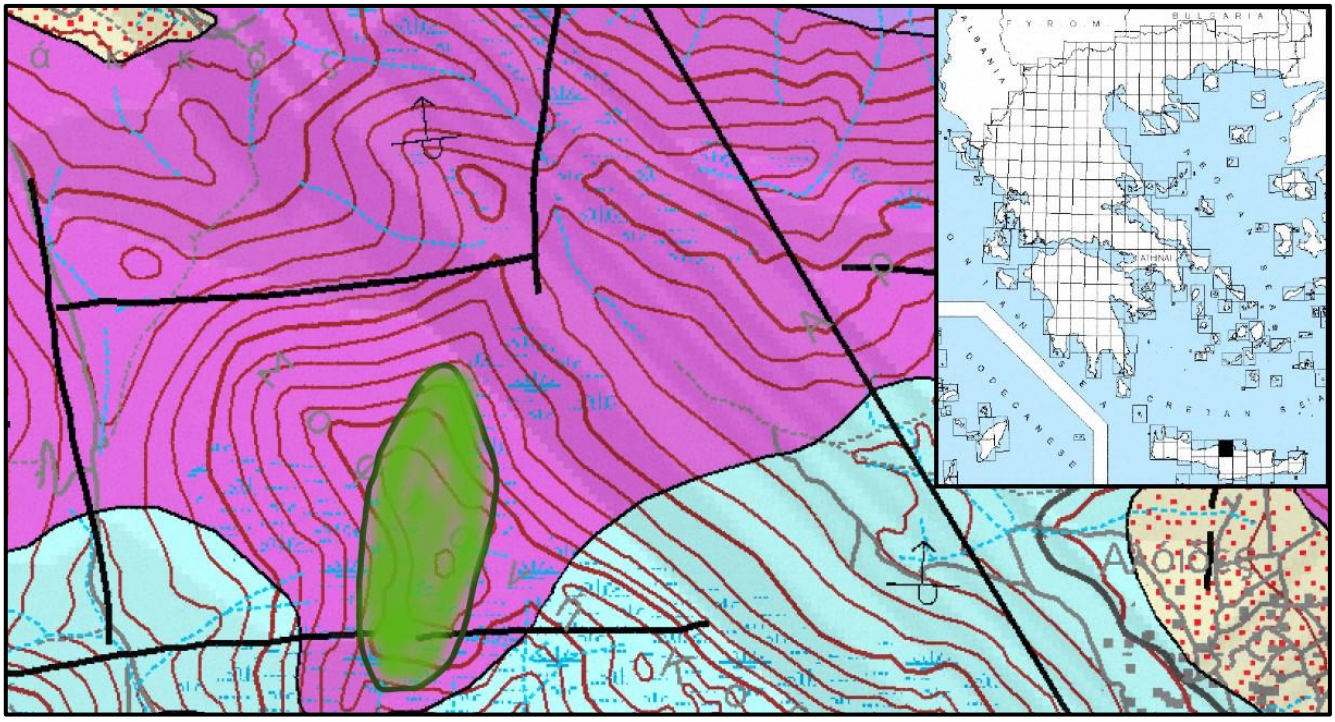
Scale 1:1

Short description: Fine-grained, grey - green crystalline limestone. The grey color is attributed to the participation of bituminous compounds.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Limestone	Dolomitic limestone	Grey-green	Greece	Crete	Rethymno	Aloides

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Geological setting



Geology: Aloides Slate (green marking) belongs to Pantokratora Limestones, which are grey-white, fine to coarse-grained, recrystallized, thick-bedded, massif and karstic limestones, with fossils (algae).
(Source: Geological Map of Greece 1:50000, Anoghia Sheet)

Production: The quarry area is near Aloides village in the Crete region of Greece.

Geological age: Triassic - Jurassic

Geological unit: Pantokratora Limestones

Application, use and heritage

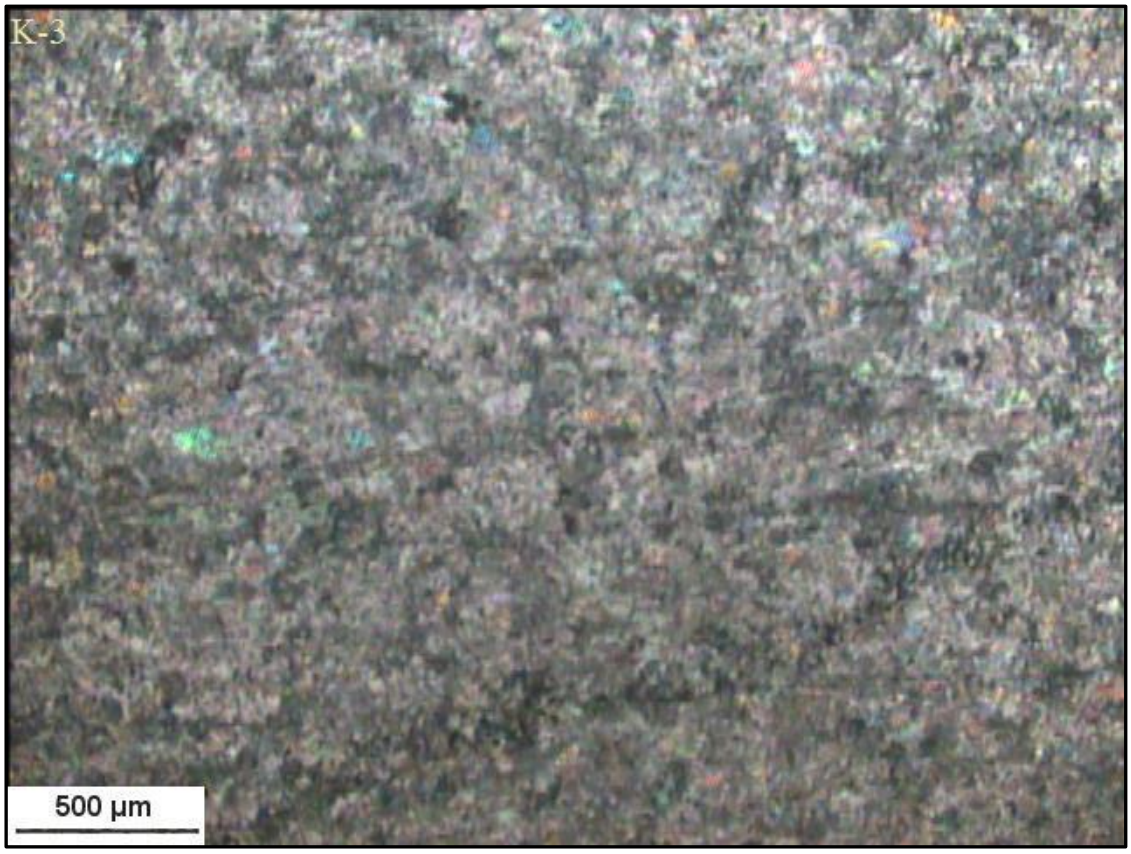
Description: Aloides Slate is ideally fitted for internal and external projects. It can be used for masonry and for wall cladding and it can decorate all areas of a house, bathroom benches, fireplace mantels, floors, stairs.



Masonry with Aloides Slate

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Petrography



Description: Photomicrograph of thin section, showing microsparitic to micrite calcite in areas, while dolomite is scattered through the mass.

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Calcite (%)	Dolomite (%)	Quartz (%)				
89	10	1				

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2710	1,0	0,4	-	15,2

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
14,4	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
22,0	-	-	-	-	-

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			4	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
<0,05	1,00	<0,05	<0,05	0,75	54,95	0,75	0,25	<0,05	-	-	43,17

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
2,0	3,0	22	2,0	8,0	2,0	40	267
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
375	0,0	4200	3,0	0,0	16	0,0	1,0
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
4,0	2,0	0,0	1,0	2,0	1,0		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
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Other publication		

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Candia Red



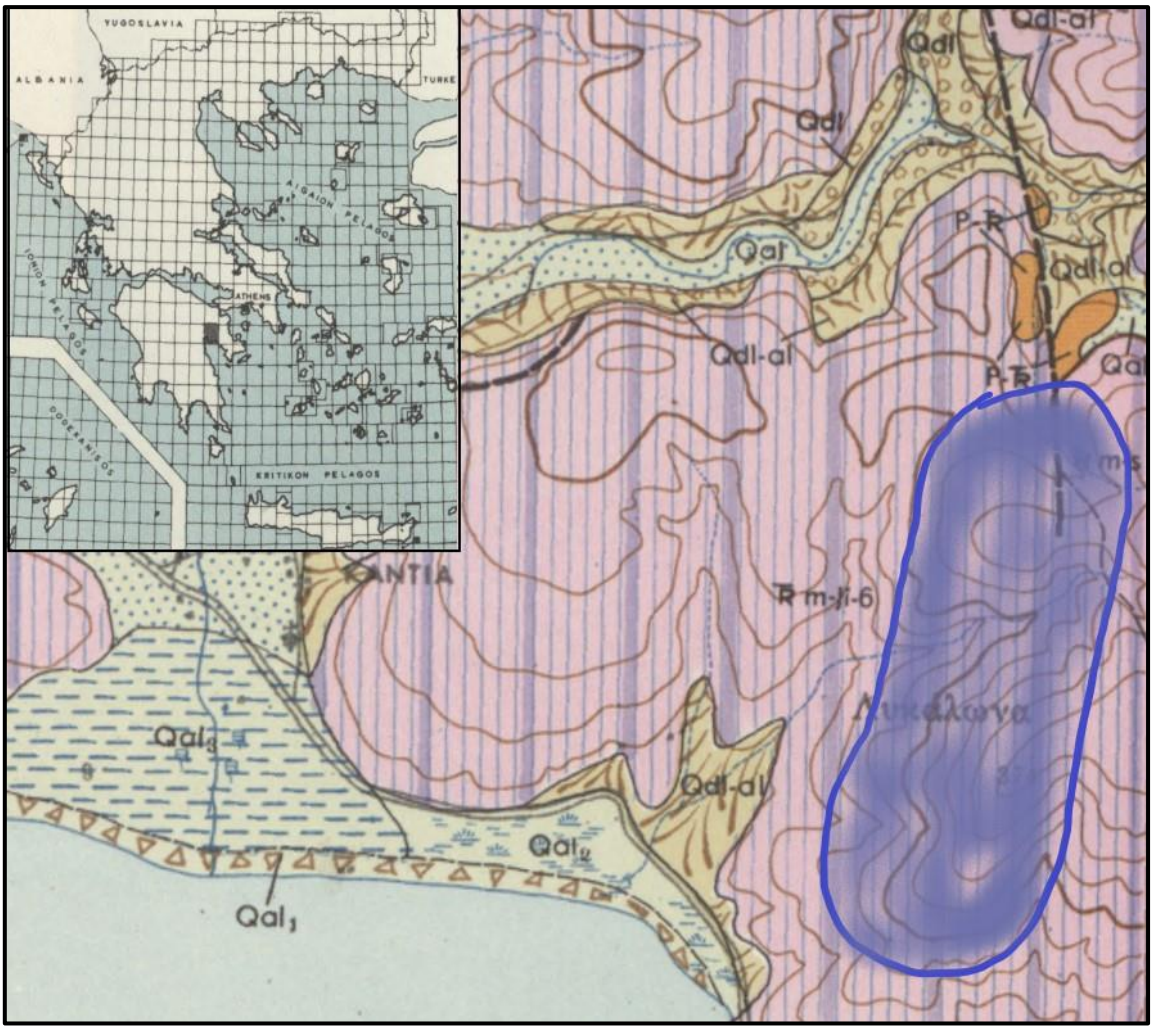
scale

Short description: Fine-grained reddish brown calcitic rock with red-grey veins.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Limestone	Limestone	Reddish Brown	Greece	Peloponnese	Nafplio	Candia

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Geological setting



Geology: Candia Red (blue marking) belongs to the group of predominantly carbonate rocks. The lower members which overly the keratophyric tuffs, sandstones etc., consist usually of reddish and mostly hard limestones with cherts and thin intercalations of marls. They contain Conodonts, Halobia Radiolaria and in places (Ag. Moni) the Ammonites and others.
(Source: Geological Map of Greece 1:50000, Nafplion Sheet)

Production: The quarry area is near Candia village, in Nafpio, Peloponnese.

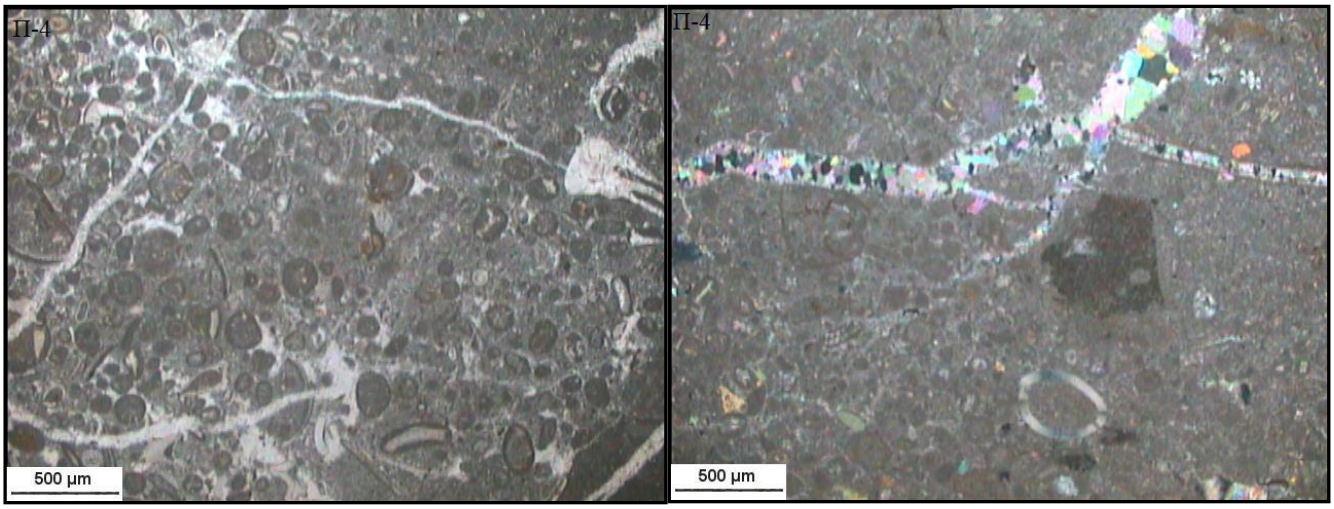
Geological age: Middle Triassic – Upper Lias
Geological unit: Group of predominantly carbonate rocks

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Application, use and heritage

Description: Candia Red is an ideal marble for both interior and exterior use with great mechanical properties.

Petrography



Description: Photomicrograph of thin section, showing calcite filled veins, peloids, ovaries and fossils (globotruncana, orbulina), stylolites. Red colour is due to iron present in the matrix of calcite, which is micrite to microsparitic.

Source of information: Hellenic Survey of Geology and Mineral Exploration

Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Calcite (%)	**Clay minerals (%)**					
100	AM					

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2700	0,3	0,1	145	13,5

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa
-	-		

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
13,6	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
-	11	-	-	1700	3

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			5	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
<0,05	0,20	0,15	<0,05	0,55	54,20	0,96	0,20	<0,05	-	-	42,59

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
2,0	116	160	6,0	61	7,0	28	4,0
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
132	1,0	62	10	1,0	3,0	<1,0	1,0
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
1,0	10	<1,0	1,0	2,0	2,0		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
Non-commercial directory		
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Other publication		

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Carnazeika Beige



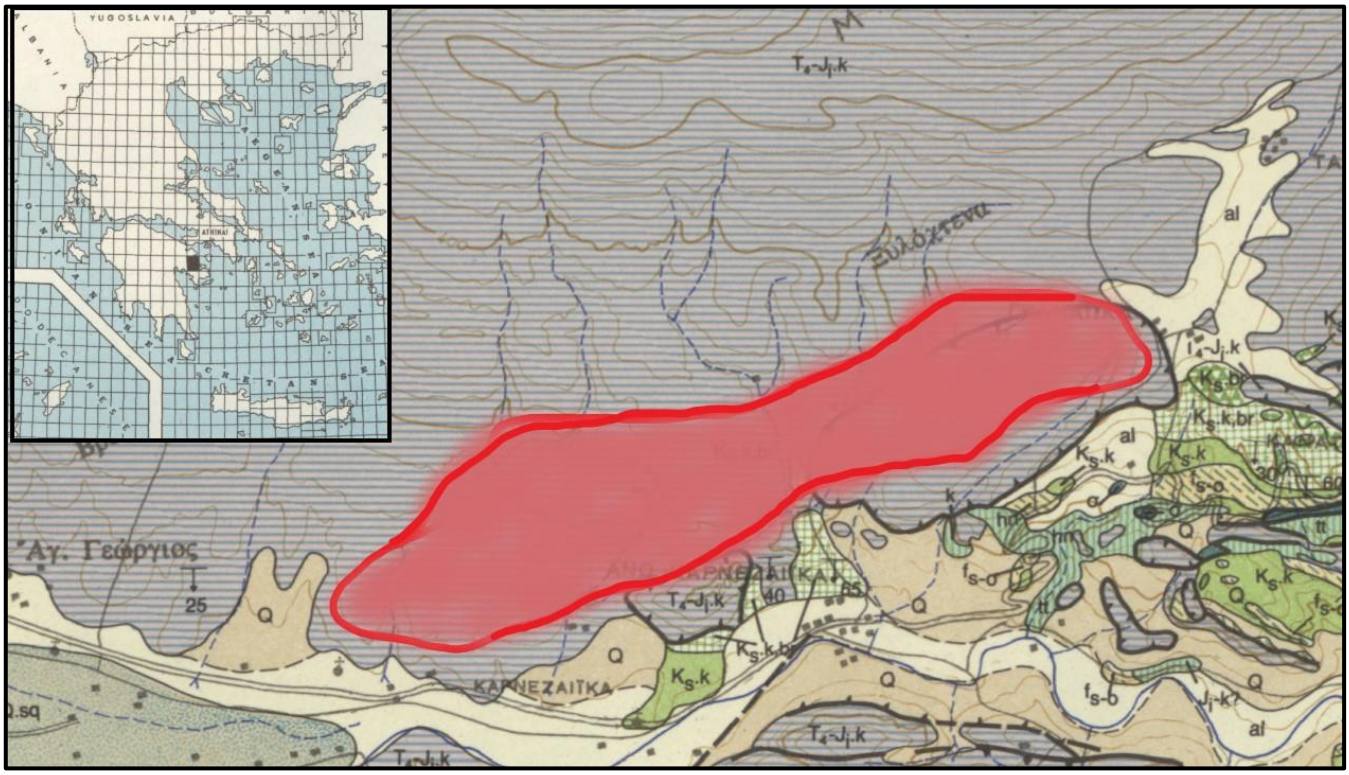
Scale 1:1

Short description: Fine-grained beige calcitic limestone with white and yellowish veins.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Limestone	Limestone	Beige	Greece	Peloponnese	Nafplio	Carnazeika

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Geological setting



Geology: Carnazeika Beige (red marking) is limestone belonging to “Pantokrator” limestone, which is light grey limestone with thin, white dolomite layers of several mm underlies the diabase – chert – tuffit formation. Rich fossil fauna as Pachymegalodus up to 0,5m in diameter and smaller Lamellibranchs like Pachyrisma and Durga have been described.
(Source: Geological Map of Greece 1:50000, Ligourion Sheet)

Production: The quarry area is near Karnazeika village, in Nafplio.

Geological age: Carnian - Lias
Geological unit: Pantokrator Limestone

Application, use and heritage

Description: Carnazeika beige limestone is an ideal marble for both interior and exterior use with great mechanical properties.



The Cove at Atlandis Resort: Flooring in the interior space of the building.
(Photo: Wikipedia)

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Petrography



Description: Photomicrograph of thin section, showing peloids, ovaries and fossils (globotruncana, orbulina, pecten), veins filled with micrite – microsparitic calcite, stylolites and calcite mesocrystals.

Source of information: Hellenic Survey of Geology and Mineral Exploration

Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Calcite (%)	**Iron Oxides (%)**					
100	AM					

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2690	1,7	0,8	147	13,9

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa
-	-		

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
11,3	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
-	11	-	-	2050	3

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			3	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
<0,05	0,05	0,10	<0,05	0,50	54,90	1,05	0,15	<0,05	-	-	43,14

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
2,0	14	29	4,0	13	7,0	21	4,0
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
208	<1,0	97	10	<1,0	2,0	<1,0	1,0
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
1,0	1,0	<1,0	1,0	2,0	2,0		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
Non-commercial directory	Wikipedia	https://en.wikipedia.org/wiki/Atlantis_Paradise_Island
Commercial directory		
Scientific publication		
Other publication		

Compiled by:	**Hellenic Survey of Geology and Mineral Exploration (H.S.G.M.E.)** https://www.eagme.gr/	

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Edessa Black



Scale 1:1

Short description: Fine-grained, black calcitic marble with dark grey agglomerates.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Limestone	Limestone	Black	Greece	Central Macedonia	Edessa	Edessa

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Geological setting



Geology: Edessa Black (pink marking) belongs to the series of Almopia Zone, comprised of crystalline limestones, grey – black and white coloured of the Margarita and Eklissiochori Units together with fragments of Echinoderms and Rudists.
(Source: Geological Map of Greece 1:50000, Edhessa Sheet)

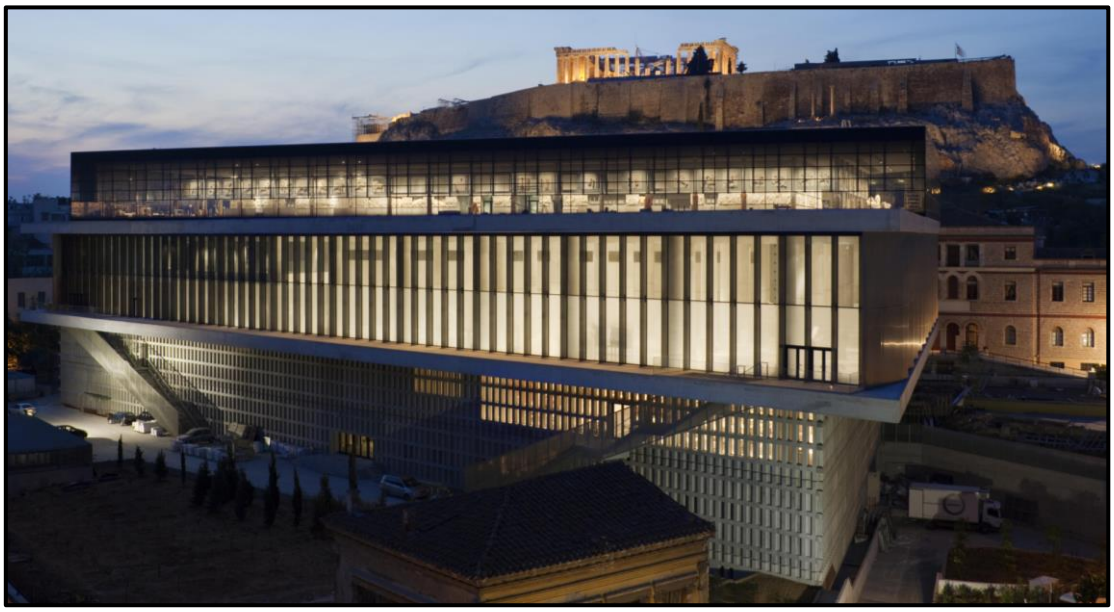
Production: The quarry site is near Edessa city in northern Greece.

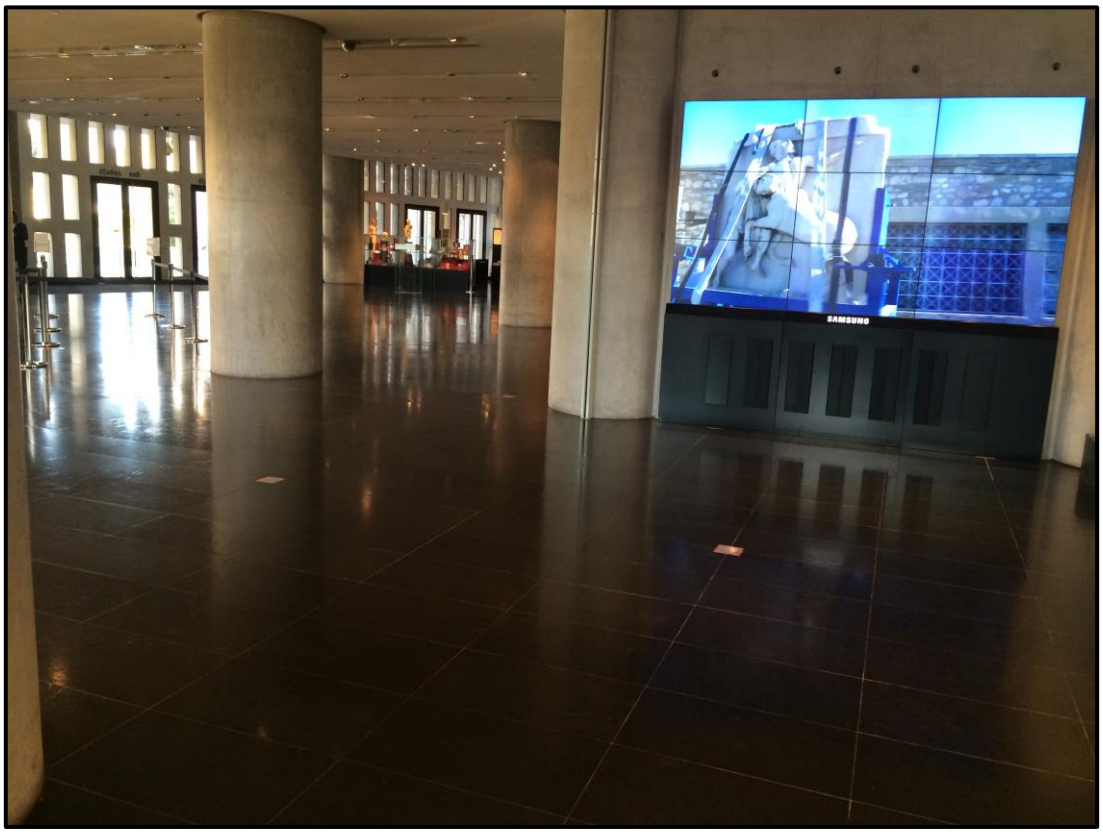
Geological age: Mesozoic - Upper Cretaceous

Geological unit: Series of Almopia Zone

Application, use and heritage

Description: Edessa black marble is suitable for interior and exterior uses, such as on wall and floor coverings, fireplaces, kitchens, public areas and for many renovation applications.





Acropolis Museum Athens: Interior flooring with Edessa Black marble.

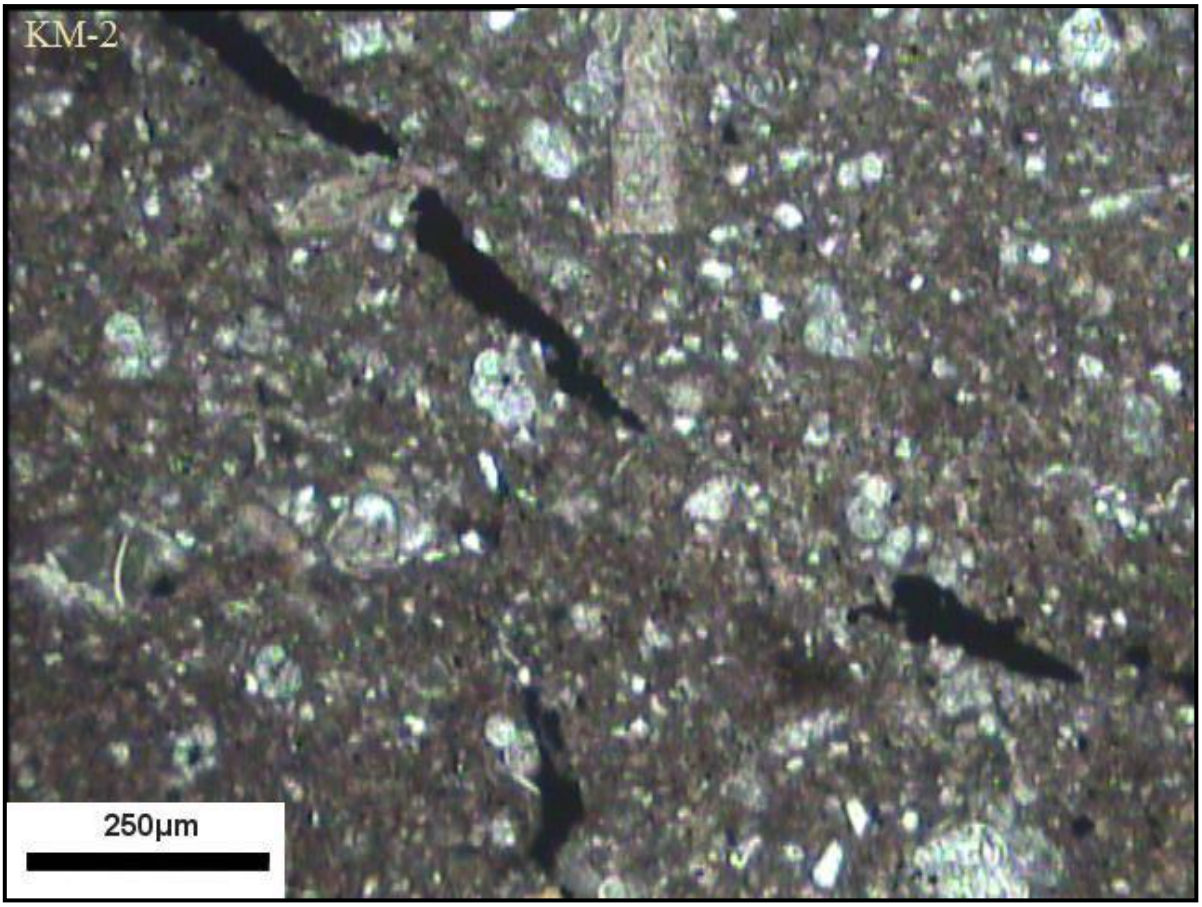
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Rich Reloaded Café Bar, Athens: Façade of the surrounding wall and flooring with Edessa Black marble.

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Petrography



Description: Photomicrograph of thin section, showing microsparitic to micrite texture, fossils, endoclastic and exoclastic fragments, and colloidal synthesis of iron pyrite. The black colour is due to the dominant presence of organic matter (bitumen). Several fossils have been replaced by sparite, iron oxides, manganese and chromium.

Source of information: Hellenic Survey of Geology and Mineral Exploration

Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Calcite (%)	Muscovite - Chlorite (%)	Quartz - Feldspars (%)	Barite (%)	Opaque minerals (%)		
85	5	10	AM	AM		

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2720	1,1	0,3	188	36,1

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
34,5	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
-	24	-	-	2400	3

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			6	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
28,95	1,55	3,60	0,35	2,35	31,90	0,70	1,55	0,05	-	-	27,55

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
75	105	390	12	100	18	75	7,0
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
925	0,4	220	15	1,0	65	0,7	2,0
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
10	1,6	0,7	1,6	0,5	4,5		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
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Scientific publication		
Other publication		

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Ligourio Beige



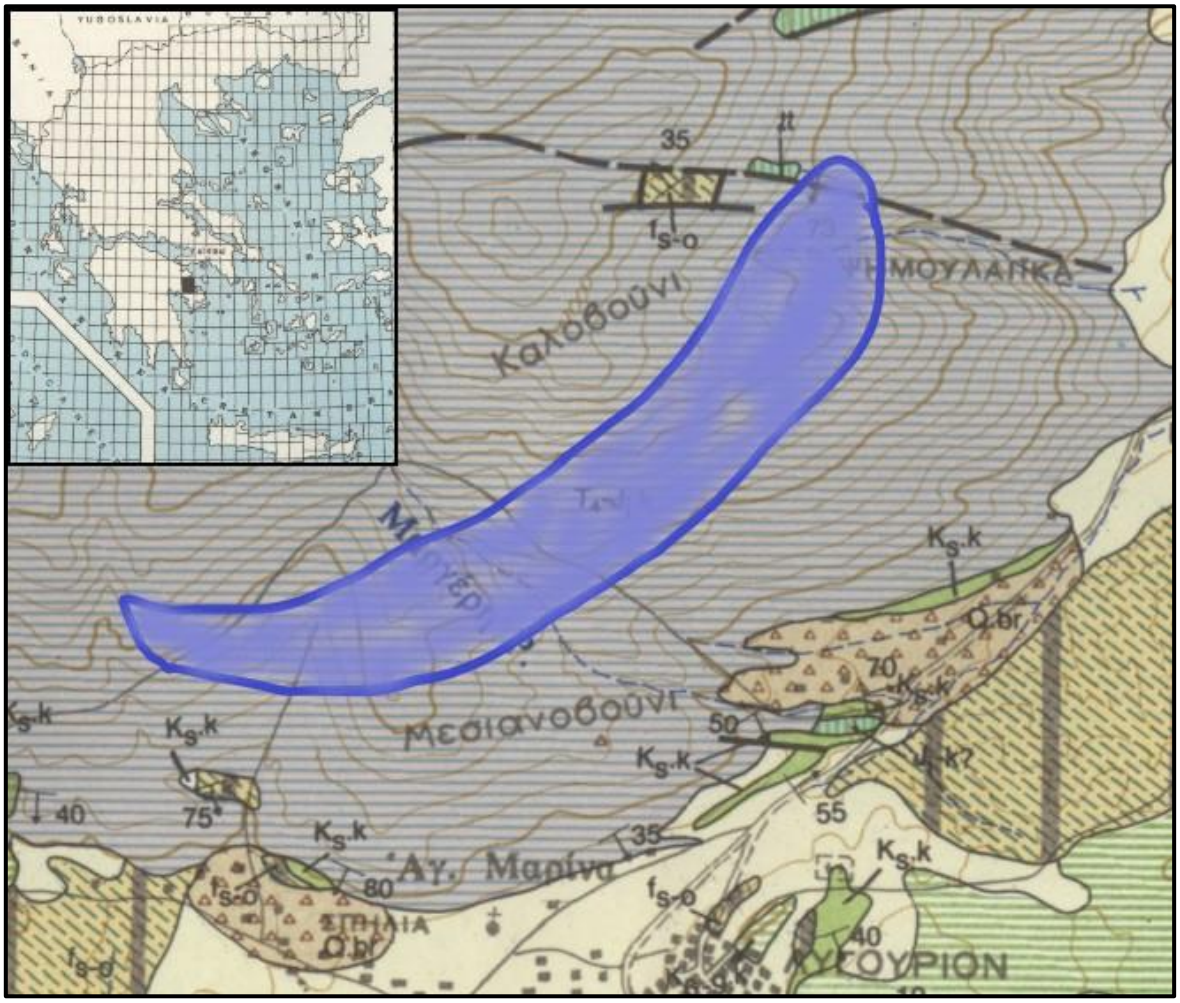
Scale 1:1

Short description: Fine-grained, beige limestone with yellow veins and white agglomerates.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Limestone	Limestone	Beige	Greece	Peloponnese	Epidaurus	Ligourio

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Geological setting



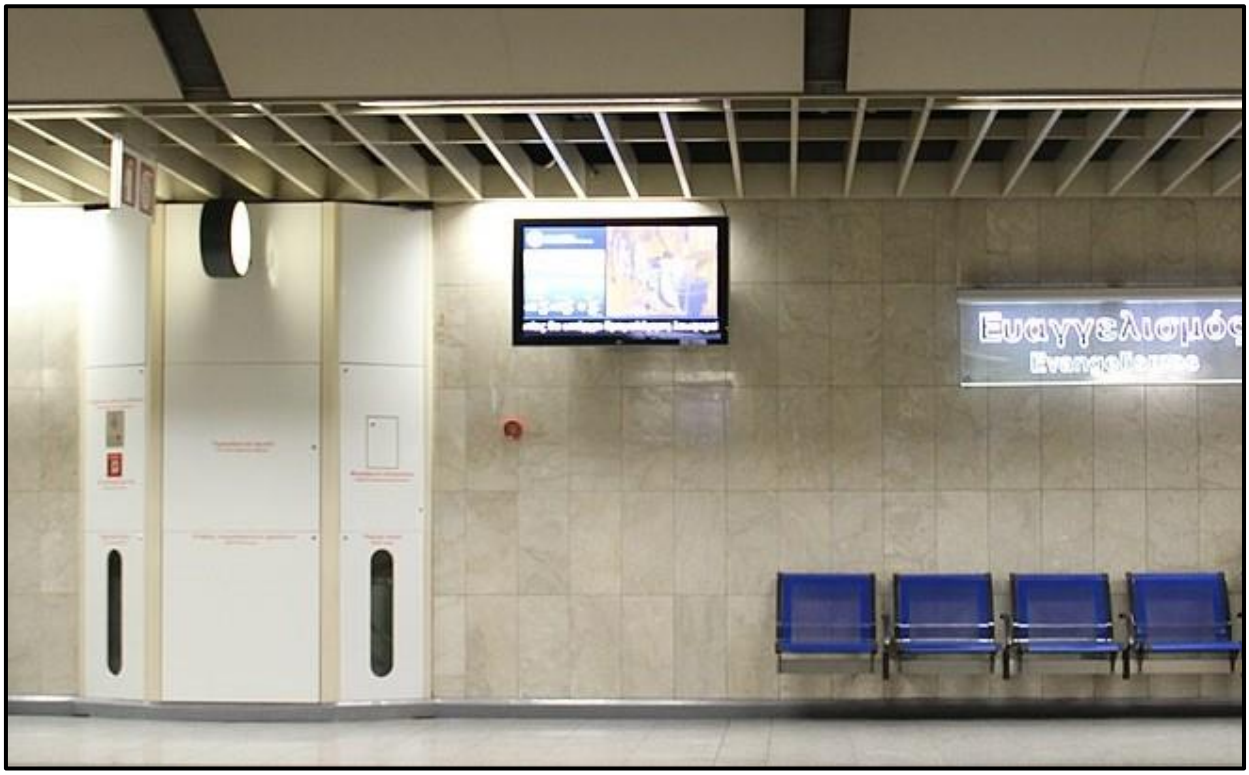
Geology: Ligourio Beige (blue marking) belongs to "Pantokrator" limestones, which are light grey with thin, dolomite layers of several mm underlies the diabase – chert – tuffit formation. Rich fossil fauna as Pachymegalodus up to 0,5m in diameter and smaller Lamellibranchs like Pachyrisma and Durga have been described (Dercourt, 1964).
(Source: Geological Map of Greece 1:50000, Ligourion Sheet)

Production: The most important quarry area is near Ligourio town, located about the middle of Argolis prefecture, in Peloponnese.

Geological age: Carnian - Lias
Geological unit: "Pantokrator" limestones

Application, use and heritage

Description: Ligourio Beige is suitable for various interior and exterior uses and applications, such as wall cladding, floor covering, stairs, kitchens, fireplaces, bathrooms.



Evangelismos Metro Station, Athens: Interior wall cladding

(Photo: Wikipedia)

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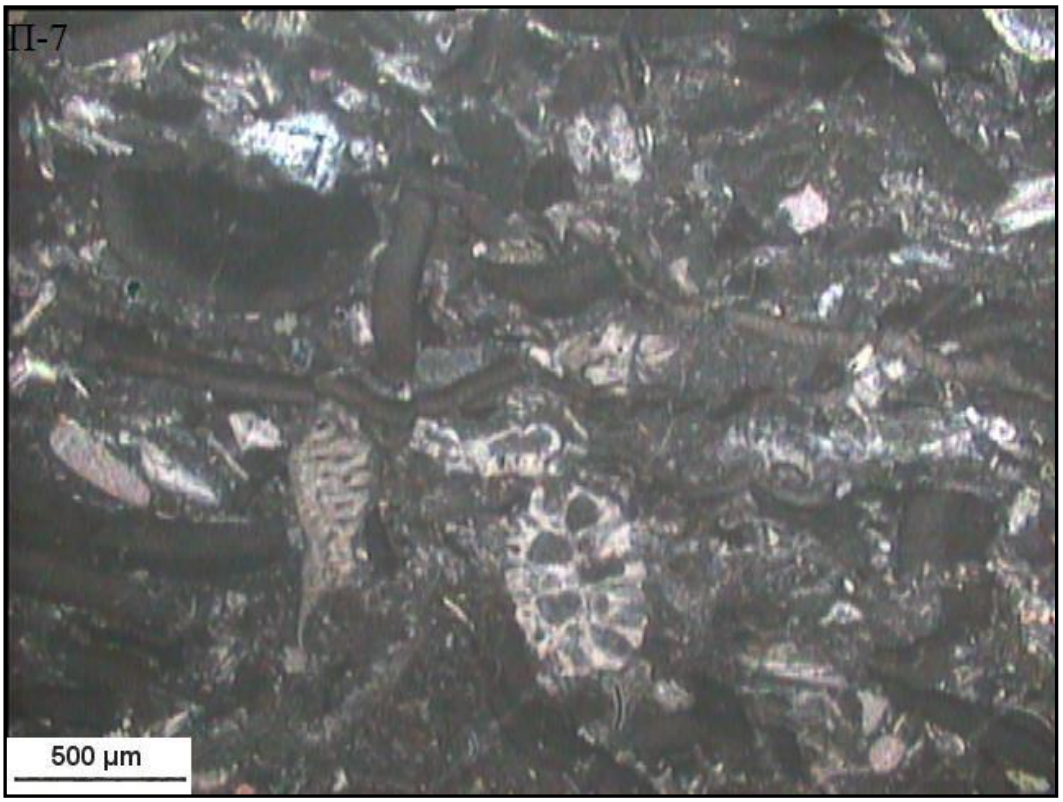


Monastiraki Metro Station, Athens: Wall cladding

(Photo: Wikipedia)

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Petrography



Description: Photomicrograph of thin section, showing many fossils and many veins filled with secondary calcite, stylolites consisting either of clay minerals or calcite which occurs in the form of micritic to microsparitic crystals.

Source of information: Hellenic Survey of Geology and Mineral Exploration

Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Calcite (%)	**Opaque minerals (%)**	**Iron Oxides (%)**				
100	AM	AM				

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2700	0,5	0,3	137	13,8

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
7,8	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
-	13	-	-	2200	3

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			3	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
<0,05	<0,05	<0,05	<0,05	0,65	54,00	1,30	0,02	<0,05	-	-	42,44

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
<1,0	45	65	3,0	30	7,0	25	2,0
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
158	1,0	67	5,0	<1,0	2,0	<1,0	1,0
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
4,0	2,0	<1,0	1,0	<1,0	1,0		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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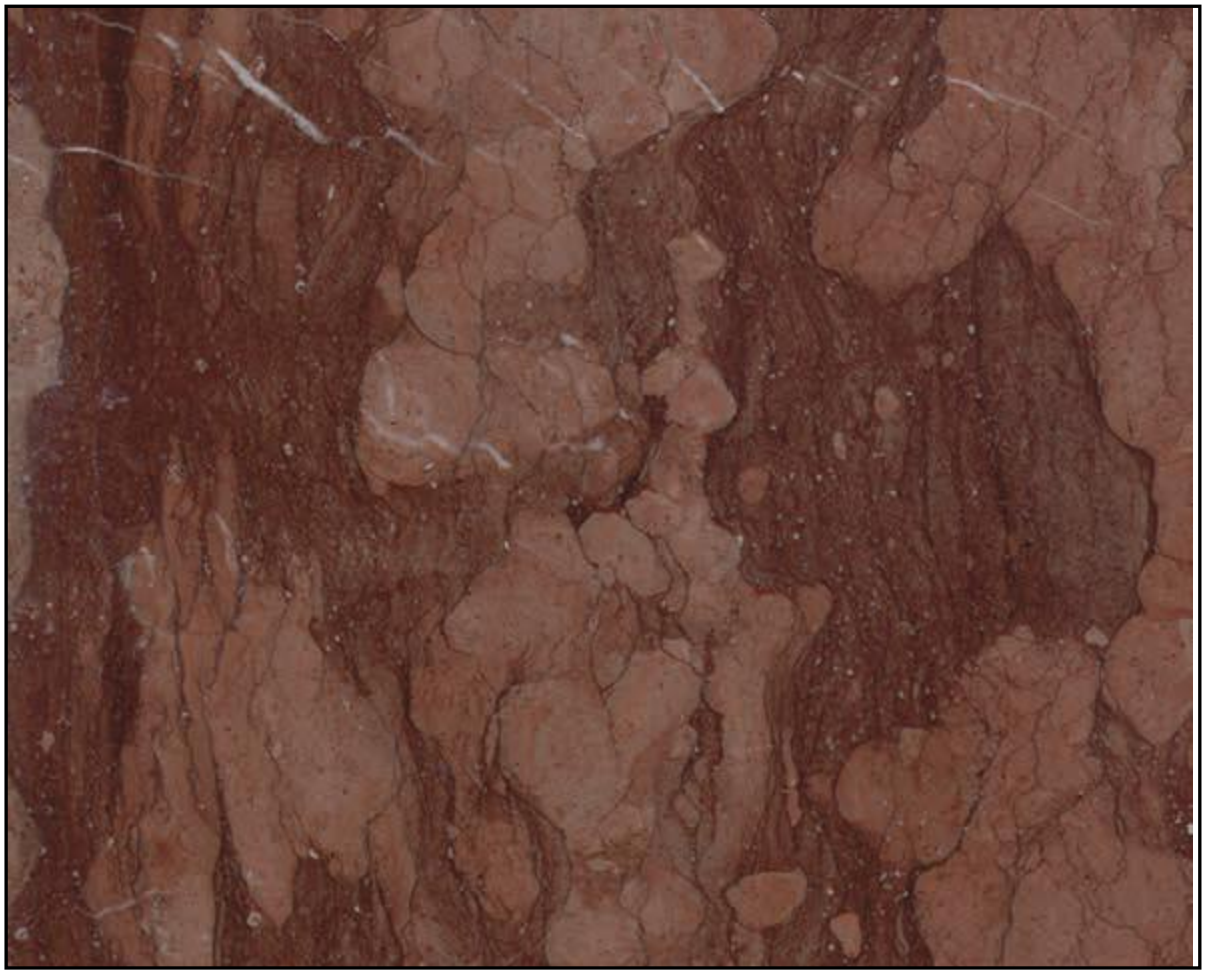
Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
Non-commercial directory	wikipedia	https://en.wikipedia.org/wiki/Evangelismos_metro_station
		https://fr.wikipedia.org/wiki/Monastiráki_(métro_d'Athènes)
Commercial directory		
Scientific publication		
Other publication		

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Fanari Trizinia Red



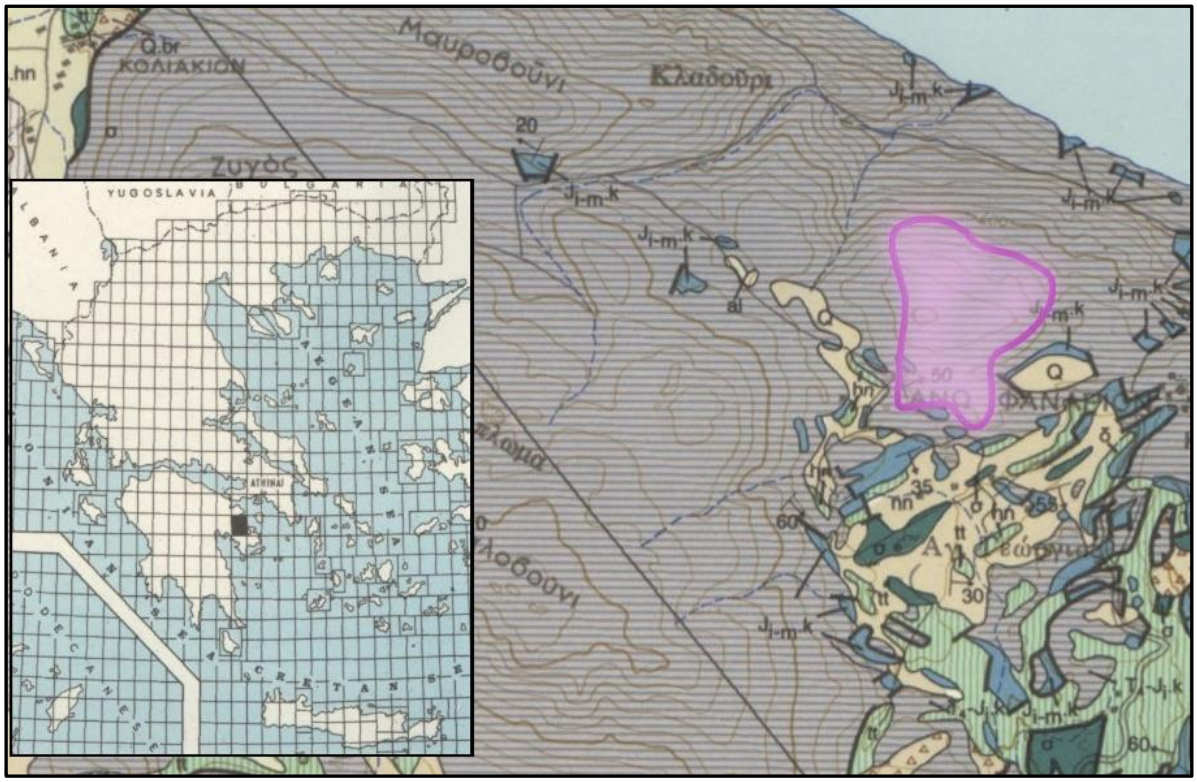
Scale 1:1

Short description: Fine-grained, semi-white crystalline limestone with red and white veins. Red colour is due to the presence of iron.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Limestone	Pelmicrite Limestone	Red	Greece	Attica	Piraeus/Troizinia	Fanari

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Geological setting



Geology: Fanari Trizina Red (pink marking) belongs to Asklepieion limestone "Hallstatt". These limestones and the variety of Aghios Andreas limestone are the red fossiliferous limestones of Alogomandra and Ag. Eleni. It is mostly thick-bedded with a colour ranging from pink to dark red.
(Source: Geological Map of Greece 1:50000, Ligourion Sheet)

Production: The most important quarry area is near Ano Fanari village in Troizinia-Methana municipality in northeastern Peloponnese.

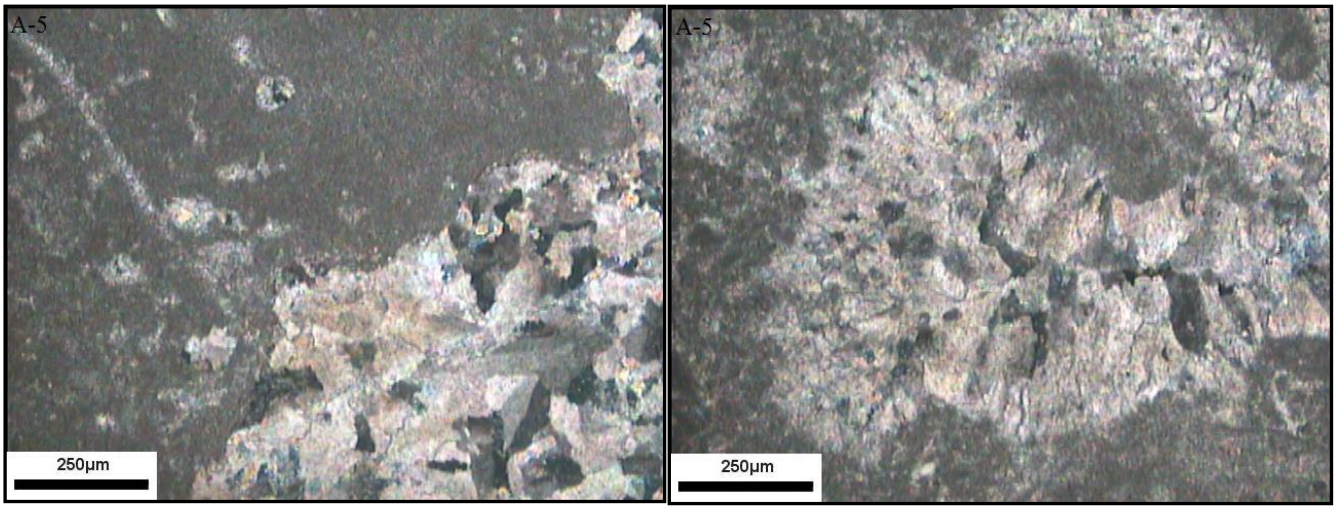
Geological age: Upper Anisian – Carnian

Geological unit: Asklepieion limestone "Hallstatt"

Application, use and heritage

Description: Fanari Trizinia Red is suitable for various interior and exterior uses, such as on wall and floor coverings, fireplaces, kitchens and for many renovation applications.

Petrography



Description: Photomicrographs of thin sections, indicating the presence of micritic-microsparitic calcite, the formation of calcite mesocrystals and many peloids, ovals and fossils. Veins filled with secondary calcite crosscut the rock.

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Calcite (%)	Dolomite (%)	Clay minerals (%)	Iron Oxides (%)			
98	2	AM	AM			

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2700	0,3	0,1	122	11,5

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa
-	-		

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
13,7	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
-	11	-	-	2100	3

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			3	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
<0,05	<0,05	0,05	-	0,80	53,80	0,95	0,17	<0,05	-	-	42,40

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
2,0	32	25	4,0	24	8,0	23	3,0
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
265	1,0	101	8,0	<1,0	2,0	<1,0	1,0
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
4,0	1,0	<1,0	1,0	<1,0	2,0		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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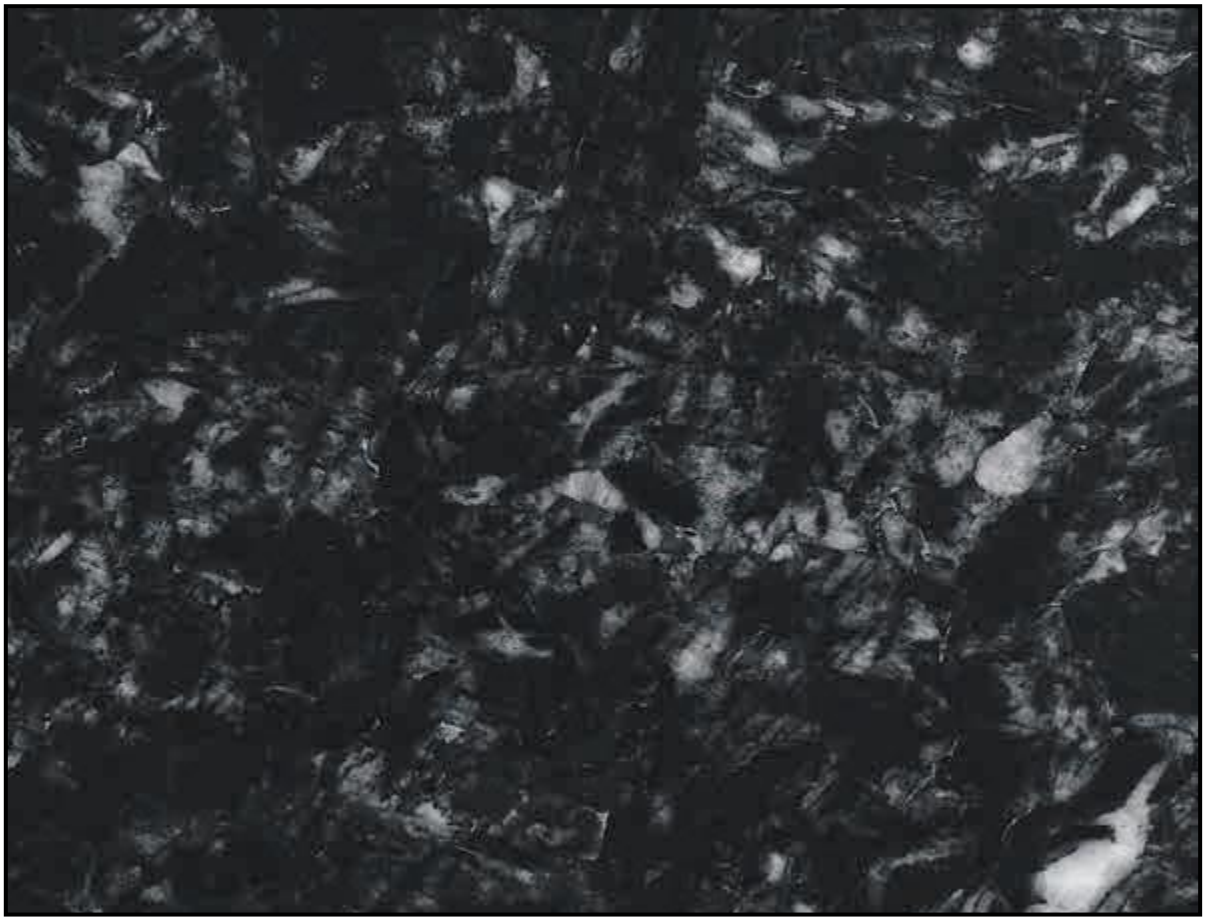
Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
Non-commercial directory		
Commercial directory		
Scientific publication		
Other publication		

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Levadia Black

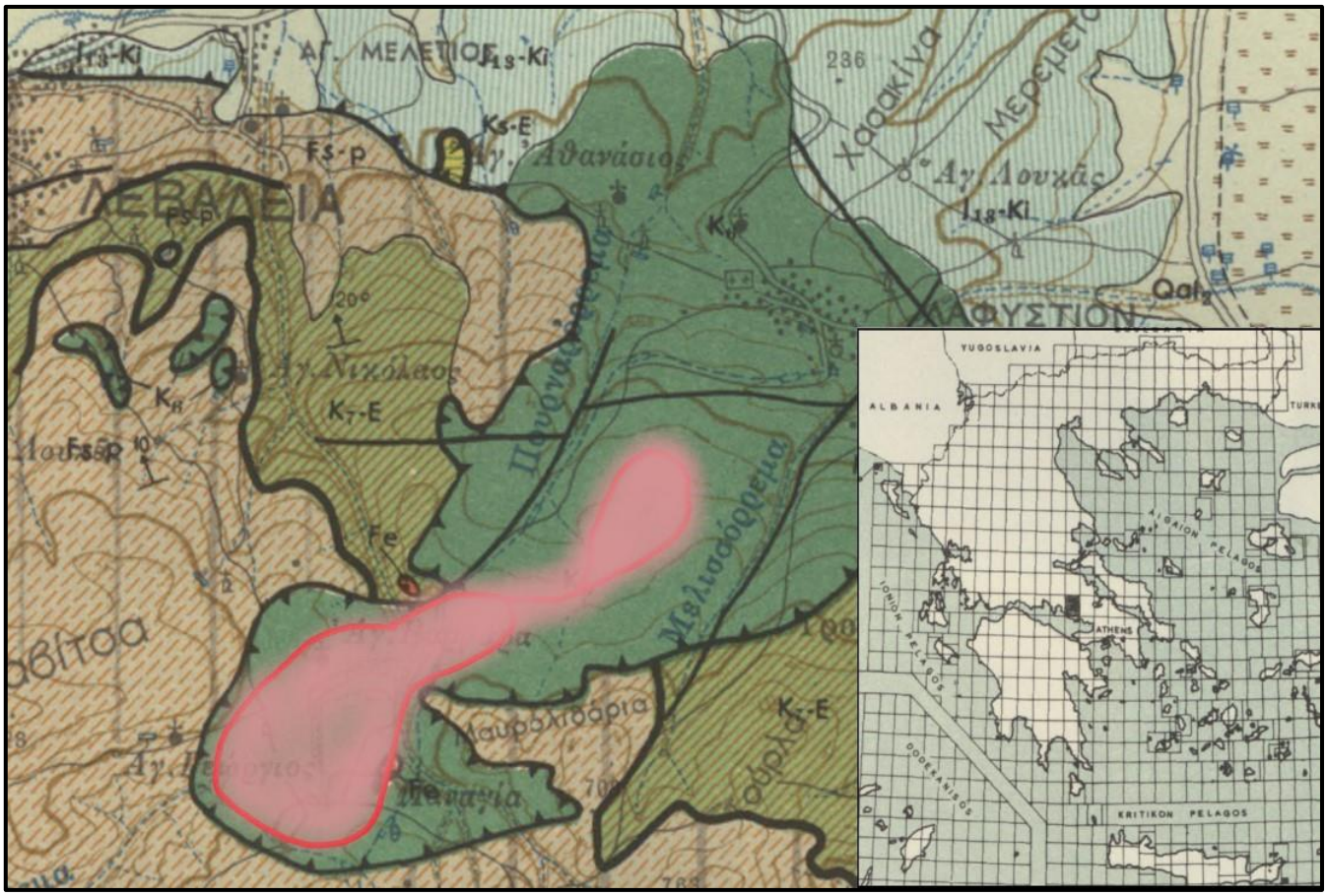


Scale 1:1

Short description: Medium to fine-grained white crystalline, limestone with grey-black veins. Black colour is due to the presence of organic matter. It is a bituminous limestone affected by hydrothermal fluids.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Limestone	Sparitic limestone	Black-White	Greece	Central Greece/ Boeotia	Livadeia	Livadeia

Geological setting



Geology: Levadia Black (red marking) belongs to the carbonate formations of Subpelagonian Zone, and precisely to limestones, usually dark-coloured to black bituminous, with or without clastic materials, sometimes marly, with or without flyschoid formations of shaly-marls, sandstones and conglomerates. They contain Caprinidae, Corals, Gastropodes, Algae, Orbitolina and others.
(Source: Geological Map of Greece 1:50000, Levadhia Sheet)

Production: The quarry area is near Lafysti village, in in Livadeia (Central Greece).

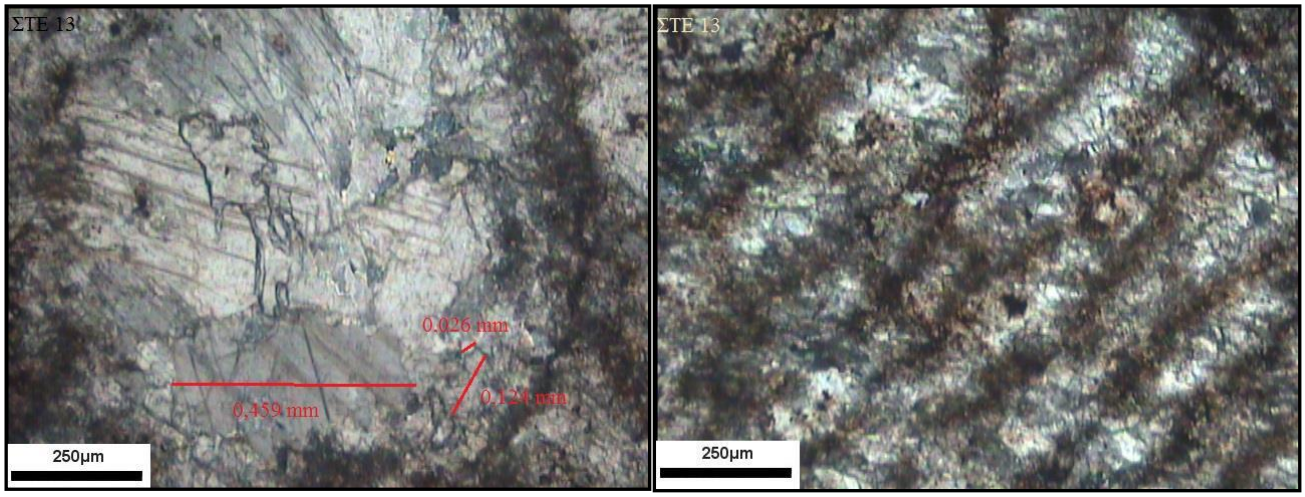
Geological age: Cenomanian

Geological unit: Eastern Greece Zone (Subpelagonic)

Application, use and heritage

Description: Levadia Black can be applied to many construction works, such as cladding, floors, stairs, bathrooms and it is acceptable to all processing that can get a marble.

Petrography



Description: Photomicrograph of thin section, showing agglomerates of large calcite crystals and veins of possibly organic matter occur in a dense mesh. Calcite crystals are hypidiomorphic to allotriomorphic, while dolomite occurs in veins. The rock has been highly affected by hydrothermal fluids, while black colour is due to the presence of bitumens.

Source of information: Hellenic Survey of Geology and Mineral Exploration

Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Calcite (%)	Aragonite (%)	Dolimite (%)	Opaque minerals (%)	Oxides (%)		
97	2	1	AM	AM		

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2700	0,5	0,2	105	14,5

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
12,7	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
-	17	-	-	2150	3

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			4	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
0,20	<0,10	<0,10	<0,10	1,72	50,80	0,85	0,33	-	-	-	44,90

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
8,0	28	13	1,0	8,0	2,8	17	1,0
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
325	0,2	18	16	<0,1	0,3	<0,1	1,2
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
5,2	0,3	0,2	0,5	0,8	0,8		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
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Other publication		

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LIMESTONES:

TRAVERTINES

Kapandriti Travertine



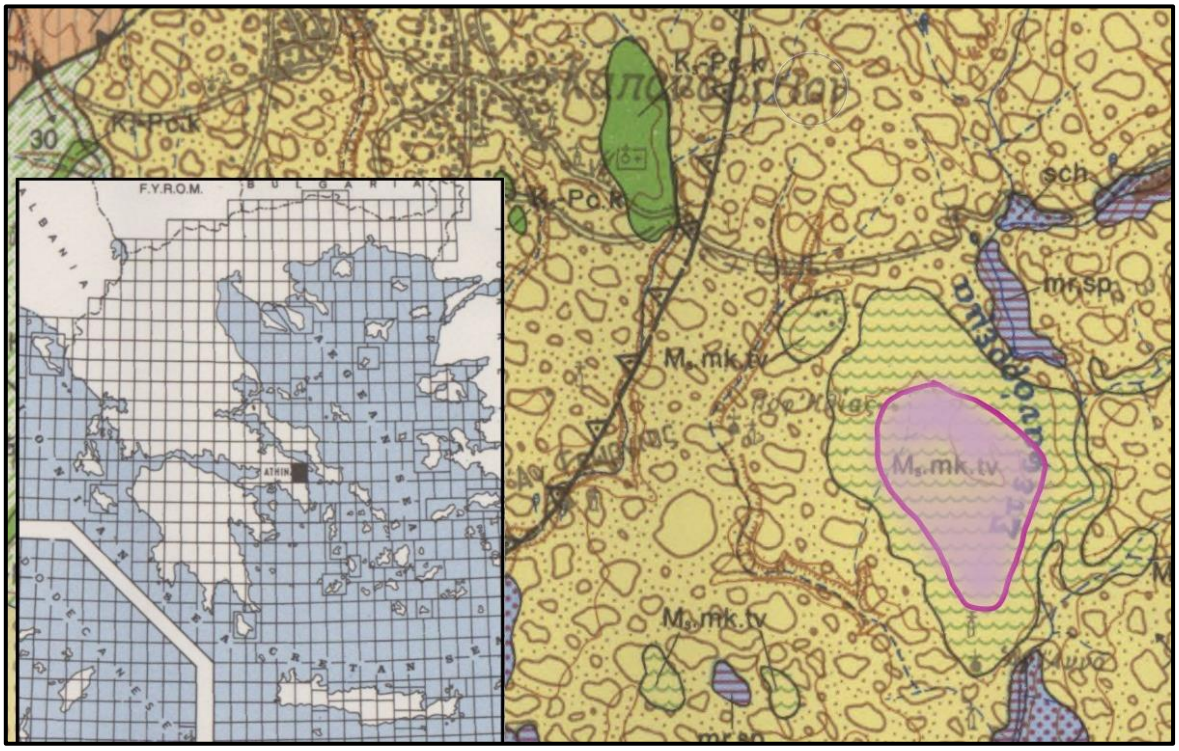
Scale 1:1

Short description: Fine-grained porous carbonate sedimentary rock.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Limestone	Travertine	Beige	Greece	Attica	Oropos	Kapandriti

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Geological setting



Geology: Kapandriti Travertine (pink marking) belongs to the Marly – Travertine Limestones. Marly – Travertine Limestone intercalations usually brecciated frequently occur, separated when found in big occurences. The deeper members of these formations in Rafina area contain lignite deposits, extensively excavated in the past.
(Source: Geological Map of Greece 1:50000, Kifisia Sheet)

Production: The most important quarry area is near Kapandriti town in the north of East Attica.

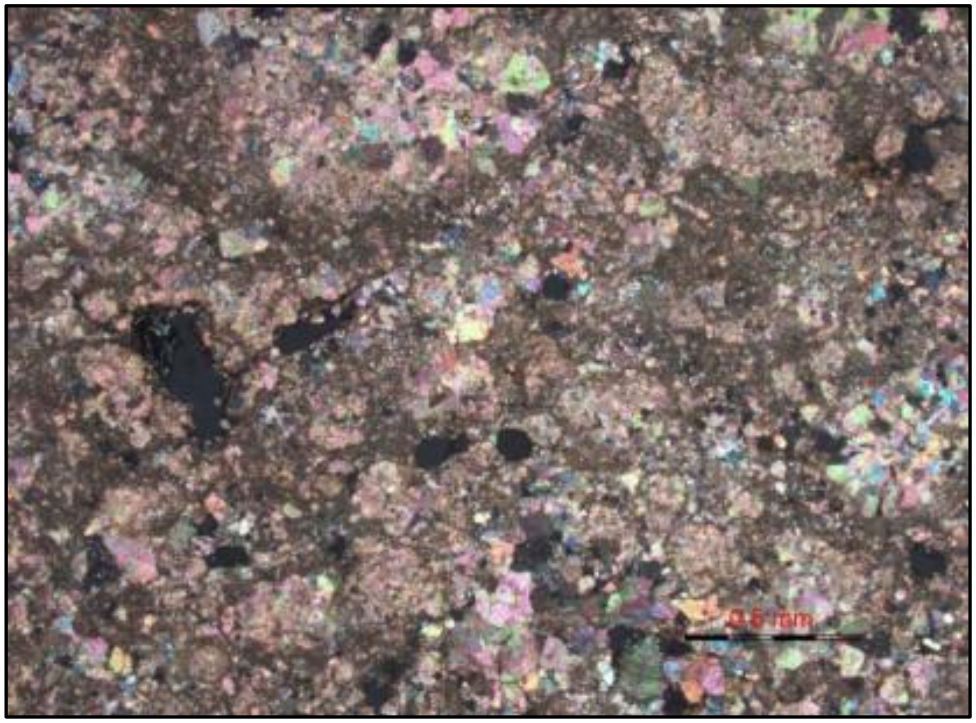
Geological age: Upper Miocene

Geological unit: Marly – Travertinoid Limestones

Application, use and heritage

Description: Kapandriti Travertine is suitable for indoor and outdoor use, such as fireplaces, stairs, sinks, monuments, pool coping, sills, ornamental stone, mosaic and as building stone. It may be either tiled or cladded.

Petrography



Description: Photomicrograph of thin section, showing beige sparitic limestone with scattered brown aggregates (intraclasts), as well as off-white sparite cavity fillings.

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Calcite (%)	**Quartz (%)**					
97	3					

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2490	6,5	2,0	-	14,5

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa
-	-		

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
12,4	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
25	-	-	-	-	-

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			4	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
0,95	0,40	0,24	-	0,54	53,85	0,33	0,12	<0,02	-	-	43,40

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
3,0	68	139	1,0	12	5,4	112	19,5
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
23	0,2	98	47	0,0	3,2	0,0	0,0
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
6,2	1,6	2,5	1,4	0,4	0,2		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
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Scientific publication		
Other publication		

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Pitsa Travertine



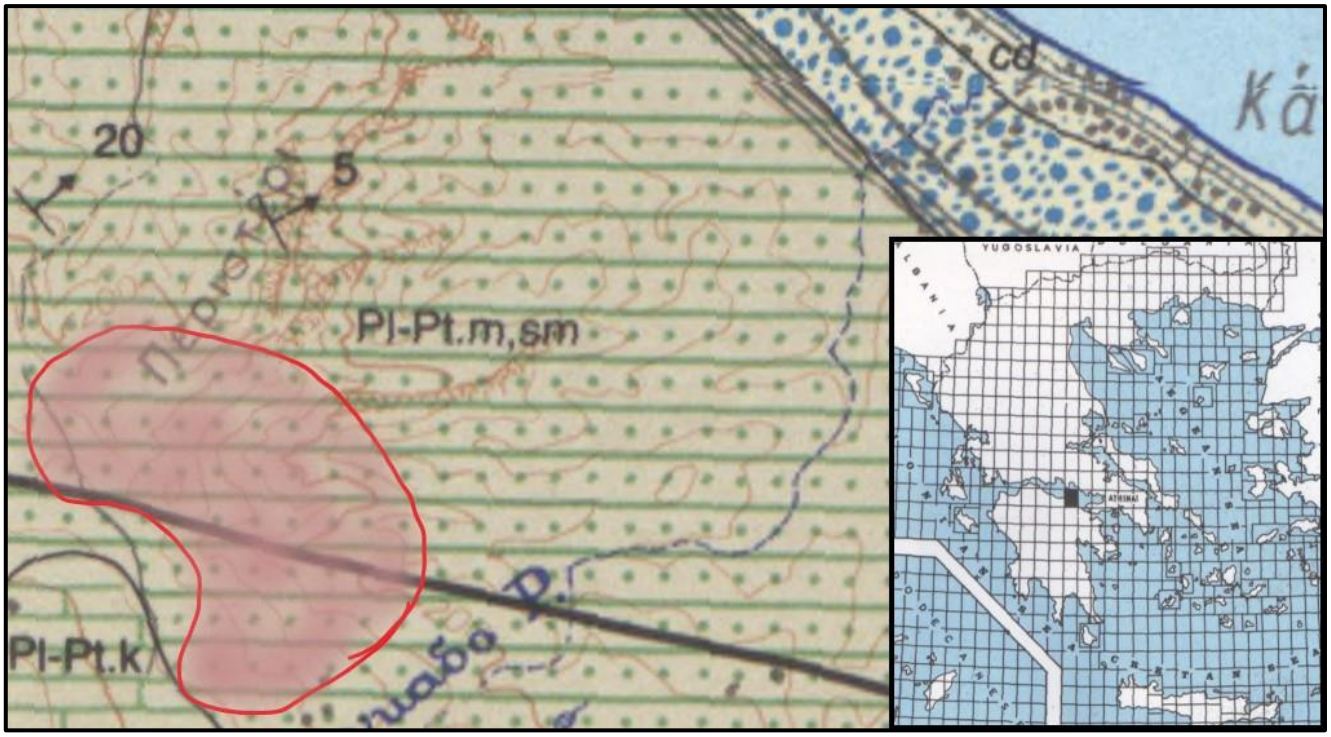
Scale 1:1

Short description: Fine-grained yellowish porous calcitic rock.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Limestone	Travertine	Yellow	Greece	Peloponnese	Corinth	Pitsa

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Geological setting



Geology: Pitsa travertine (red marking) belongs to the Loutro formations consisting of alternations of marls, of whitish to yellowish colour. In the upper members they develop in marine formations wherein, loose conglomerate and sand intercalations occur more than 80m thick. Eastwards the lower members of these formations pass into well-bedded marly limestones of lacustrine facies, ranging in thickness up to 60m. Fossils were found only in the upper members consisting mainly of Chlamys fragments.
(Source: Geological Map of Greece 1:50000, Xilokastron Sheet)

Production: Pitsa travertine quarry is near Xylokastro town, in Corinthia in the Peloponnese.

Geological age: Upper Pliocene – Lower Pleistocene

Geological unit: Loutro Formations

Application, use and heritage

Description: The mass of Pitsa Travertine has a characteristic cellular structure that includes voids in the form of large pores. Pitsa Travertine is suitable for interior and exterior uses.

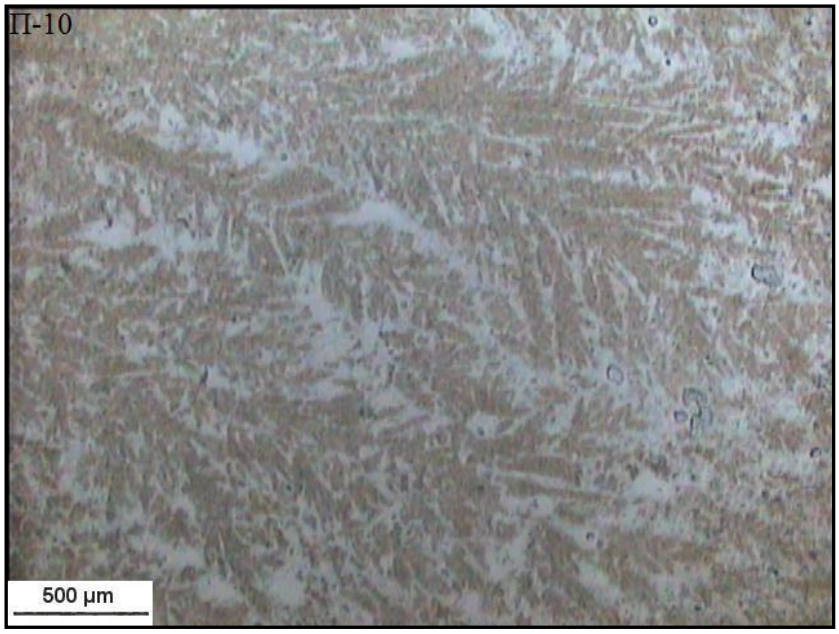




Restoration of The **Theatre of Dionysus** (or Theatre of Dionysos): It is an ancient Greek theatre in Athens. It is built on the south slope of the Akropolis hill,originally part of the sanctuary of Dionysos Eleuthereus (Dionysus the Liberator). The first works for the restoration of the Theatre started in the late 1970s.

(Sources: wikipedia and ελculture.gr)

Petrography



Description: Photomicrograph of thin section, showing many plant imprints, seaweed fossils and sparitic calcite. All fossils have been replaced by calcite. Clay minerals are found in stylolites.

Source of information: Hellenic Survey of Geology and Mineral Exploration

Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Calcite (%)	**Clay minerals (%)**					
100	AM					

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2400	6,5	0,1	46	9,6

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa
-	-		

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
9,3	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
-	23	-	-	1900	3

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			3	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
<0,05	<0,05	0,05	<0,05	0,45	55,00	1,00	0,16	<0,05	-	-	43,25

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
8,0	675	117	7,0	288	15	21	32
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
815	<1,0	95	8,0	<1,0	2,0	<1,0	<1,0
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
10	<1,0	<1,0	2,0	4,0	3,0		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
Non-commercial directory	Wikipedia	https://en.wikipedia.org/wiki/Theatre_of_Dionysus
Commercial directory		
Scientific publication		
Other publication	Hellenic Republic Ministry of Culture and Sports	https://www.culture.gov.gr/el/service/SitePages/view.aspx?iID=1330#prettyPhoto
	ελculture.gr	https://www.elculture.gr/blog/article/theatro-tou-dionysou-mia-mera-ston-simantikotero-gnosto-ypethrio-theatriko-choro-stin-archea-athina/

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Skra Travertine



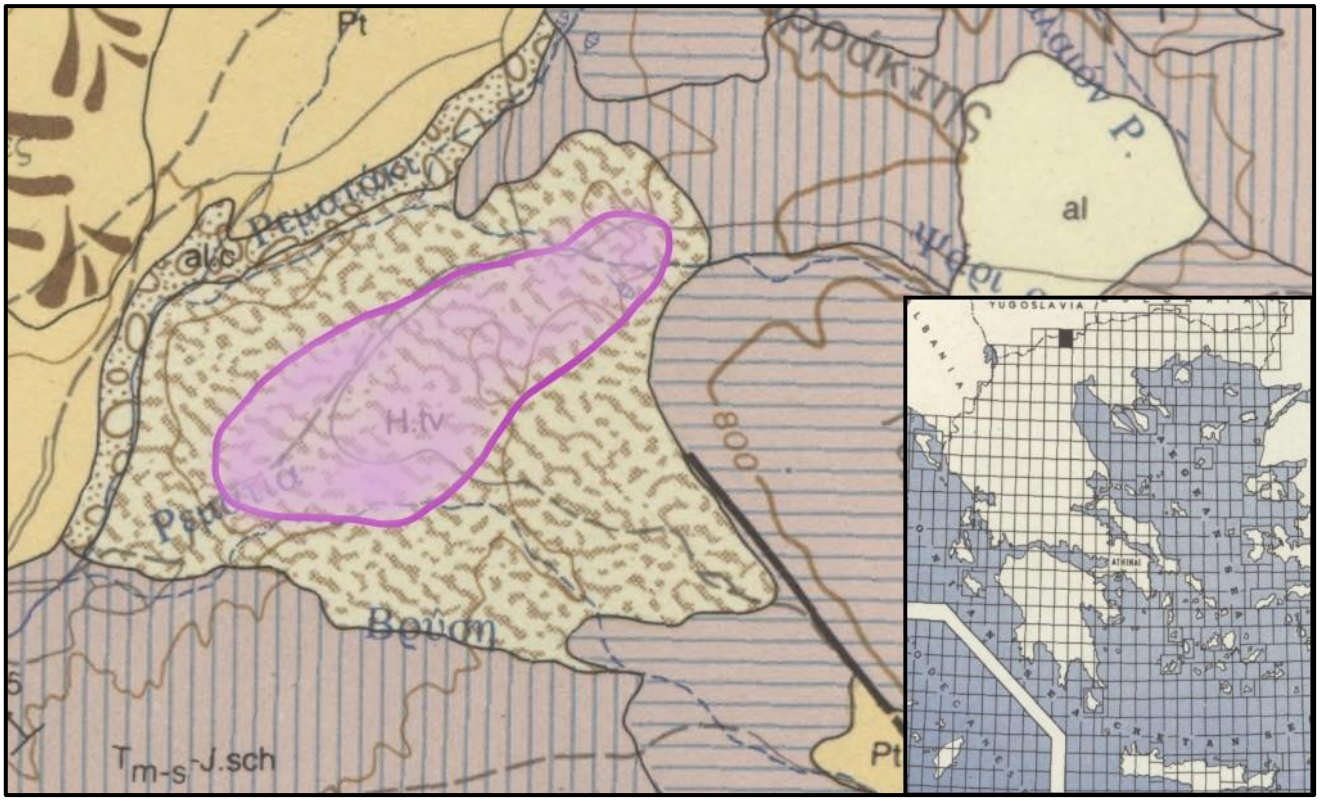
Scale 1:1

Short description: Fine-grained, beige, porous travertine with zones of light or darker beige colour.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Limestone	Travertine	Beige	Greece	Central Macedonia	Kilkis	Koupa Skra

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Geological setting



Geology: Skra Travertines (pink marking) are sedimentary rocks and precisely recent travertine deposits in swamps, near Periklia and Langadia villages.
(Source: Geological Map of Greece 1:50000, Skra Sheet)

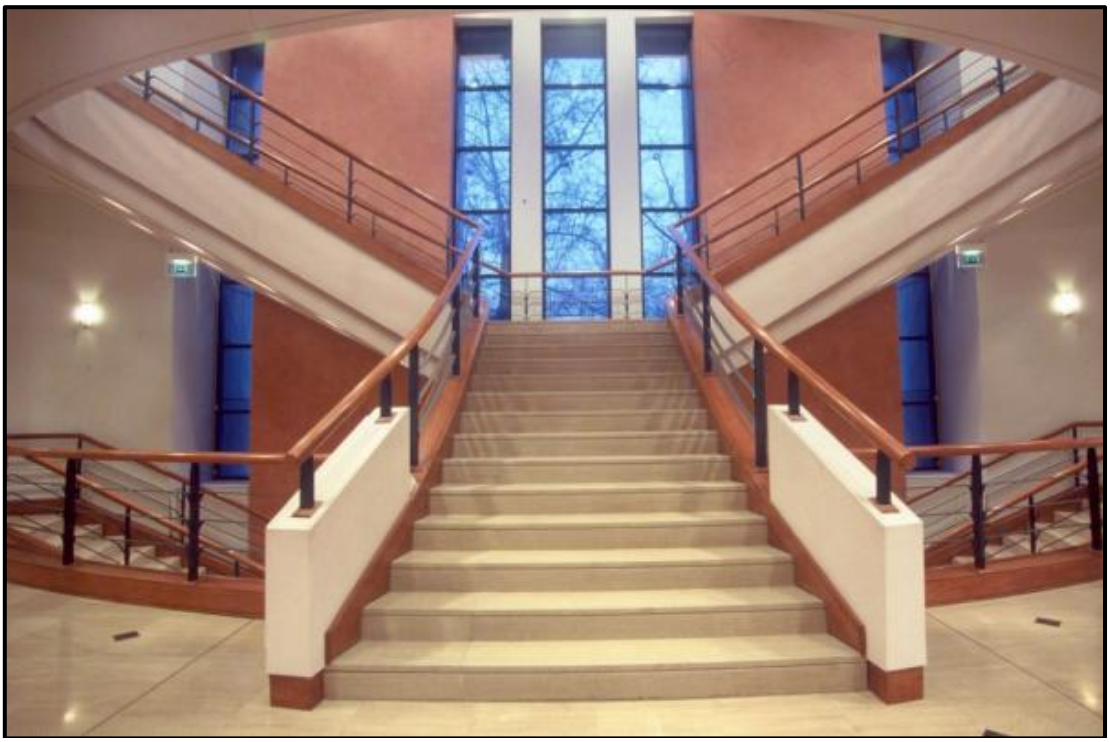
Production: The quarry area is near the Villages Koupa and Skra, belonging to the regional unit of Kilkis in Central Macedonia.

Geological age: Quaternary - Holocene
Geological unit: Sedimentary Rocks

Application, use and heritage

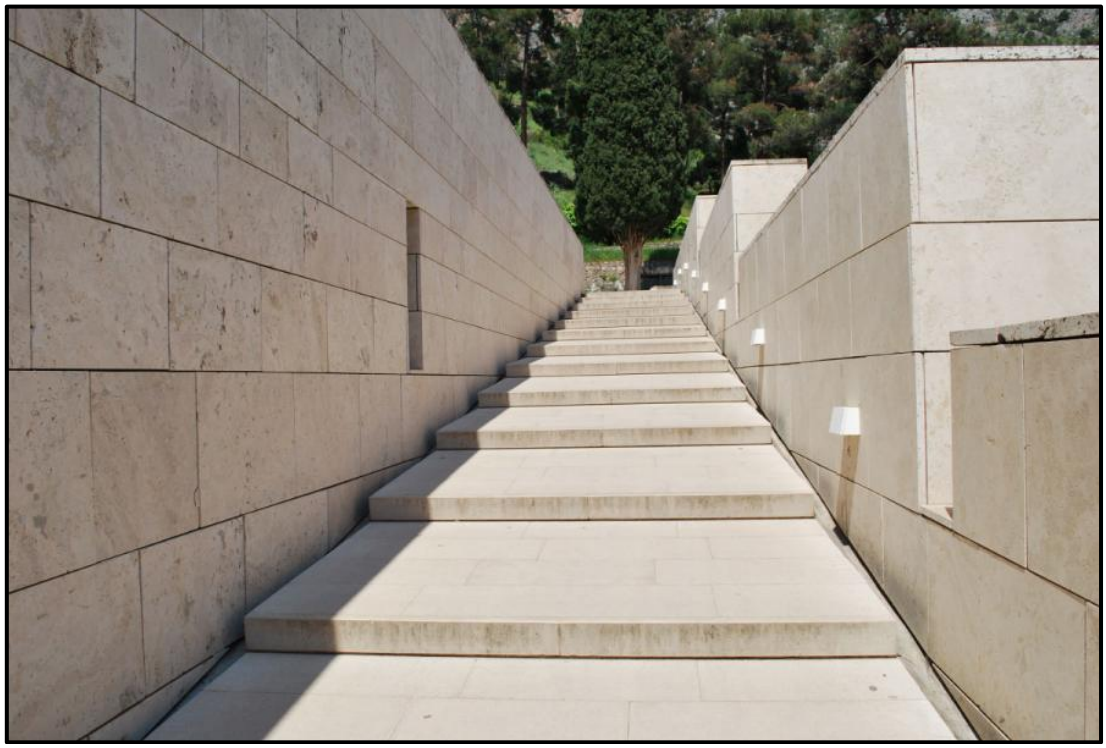
Description: Skra Travertine is suitable for interior and exterior uses, such as on wall and floor coverings**,** kitchens, bathrooms and as a construction material**.**





Thessaloniki Royal Theatre: Exterior facade and interior flooring and stairs with Skra Travertine

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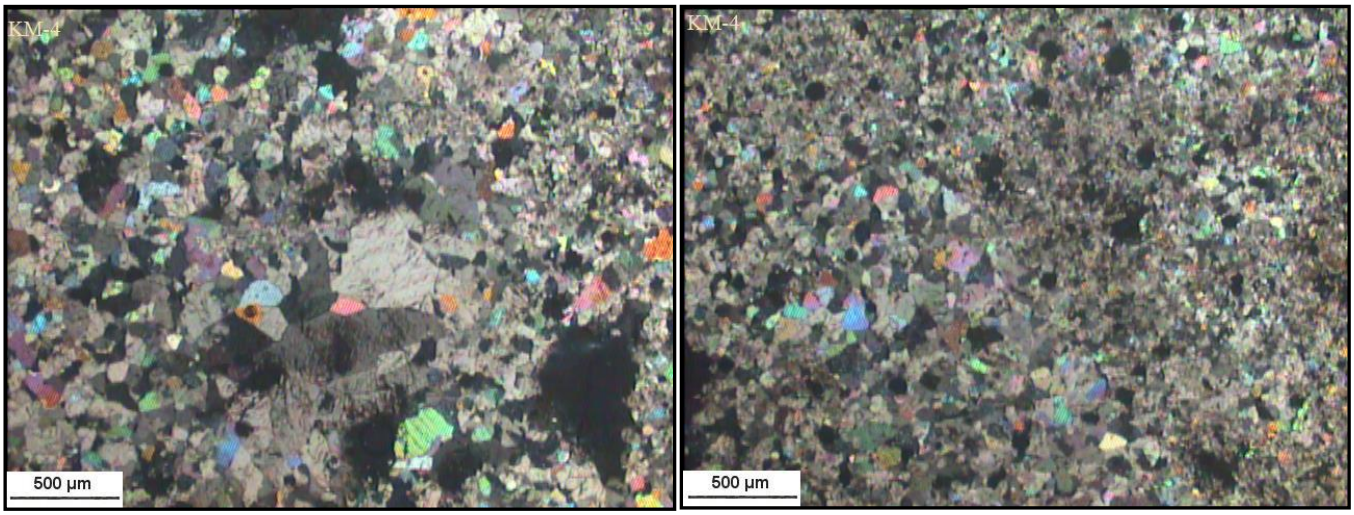




Archaeological Museum of Delphi: Covering surface of the exterior wall with Skra Travertine

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Petrography



Description: Photomicrograph of thin section, showing sparitic calcite, large calcite crystals with triple junctions.

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Calcite (%)	Dolomite (%)	Opaque minerals (%)				
100	AM	AM				

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2460	7,1	1,2	50	7,7

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
6,8	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
-	53	-	-	1450	3

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			4	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
0,20	<0,05	0,10	<0,05	0,15	54,60	0,10	<0,05	<0,05	-	-	43,70

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
0,5	8,0	10	1,0	8,0	4,0	25	100
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
90	0,2	40	6,0	1,0	0,8	<0,1	0,4
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
13	0,4	<0,1	4,4	0,5	1,1		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
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SANDSTONES

Demati Green



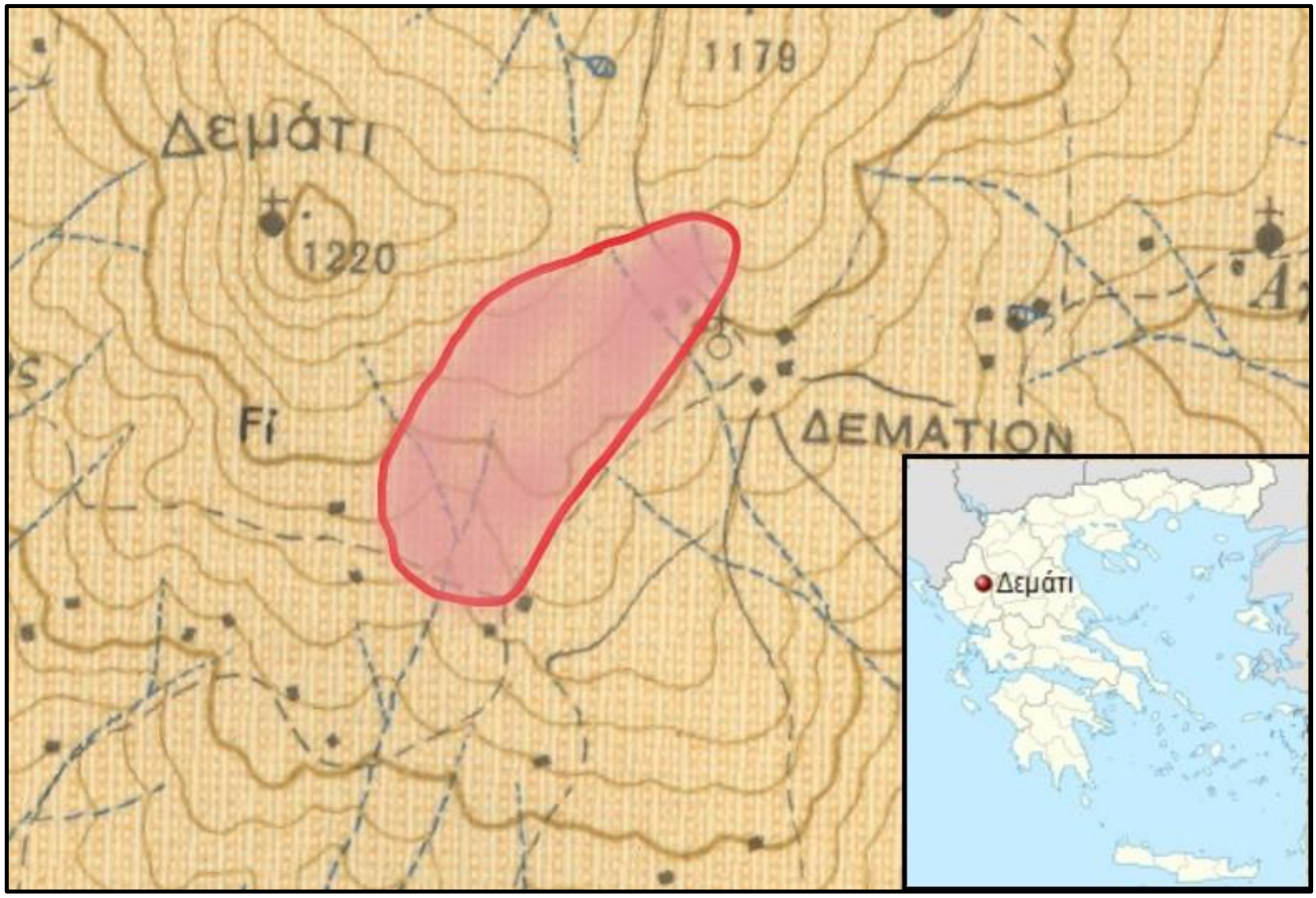
Scale 1:1

Short description: Medium to fine-grained, green – brown calcitic greywacke with white and black spots.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Sandstone	Calcitic graywacke	Grey-Green	Greece	Epirus	Ioannina	Demati

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Geological setting



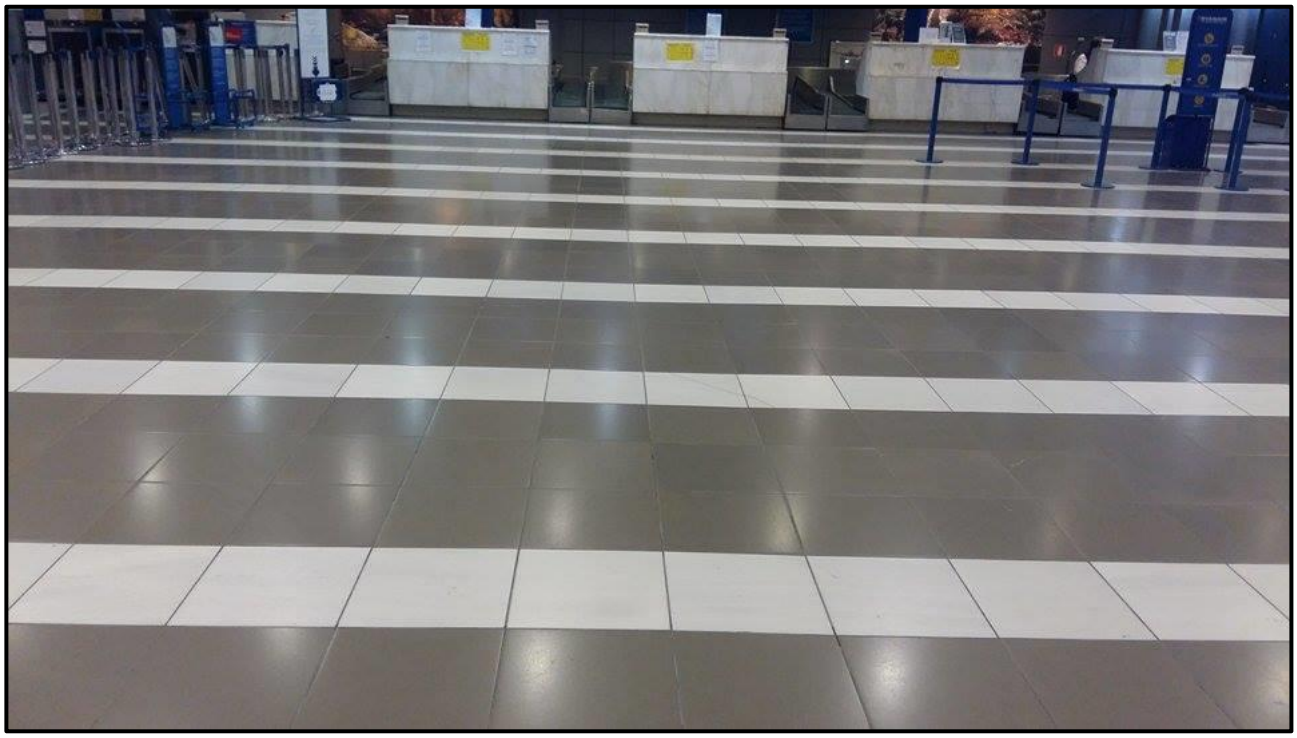
Geology: Demati Green (red marking) belongs to the sandstone formations of the Ionian Flysch.
(Source: Geological Map of Greece 1:50000, Pramanta Sheet).

Production: The quarry area is near the Village of Demati in the municipality of Ioannina unit.

Geological age: Upper Eocene – Aquitanion
Geological unit: Ionian Flysch

Application, use and heritage

Description: Demati Green is suitable for interior and exterior uses, such as on wall and floor coverings, fireplaces, kitchens, public areas and for many renovation applications**.**

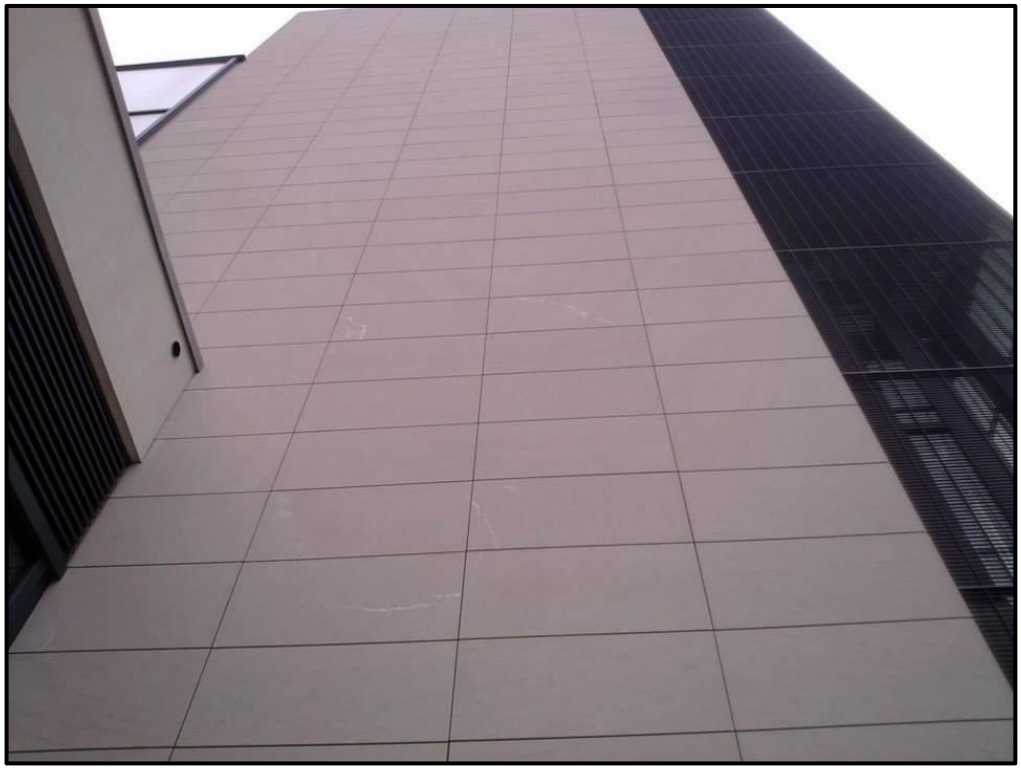


Thessaloniki Airport Makedonia: Interior flooring with Demati Green.

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Historic Center of Ioannina: Paving with Demati Green.
(Photo: Directory of Ornamental & Structural Stones / PREFECTURE OF EPIRUS - GREECE

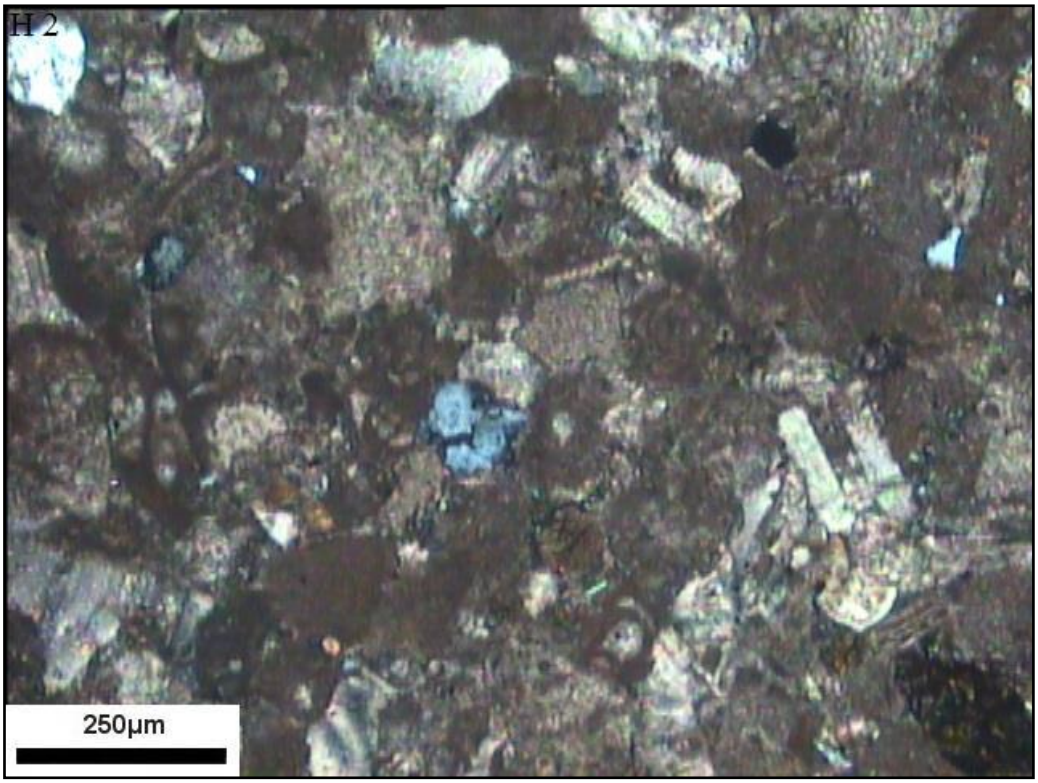




Various applications of Demati Green: Exterior and interior wall cladding and flooring

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Petrography



Description: Photomicrograph of thin section, showing off white and grey calcitic and quartz grains, which are angular and poorly-sorted. There are also fossils, broken fossils, fragments of quartz and calcite.

Source of information: Hellenic Survey of Geology and Mineral Exploration

Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Calcite (%)	Quartz (%)	Muscovite (%)	Feldspars - Albite (%)	Chlorite (%)	Chromite (%)	Iron pyrite (%)
83	11	6	AM	AM	AM	AM
Dolomite (%)	**Epidote (%)**					
AM	AM					

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2680	1,2	0,4	158	20,8

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
21,8	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
-	18	-	-	2200	3

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			4	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
3,95	1,10	0,56	0,05	1,16	50,30	0,64	0,28	<0,05	-	-	41,32

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
11	21	230	3,5	28	8,0	31	3,3
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
295	0,4	39	8,0	<0,1	9,0	<0,1	1,0
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
25	5,0	1,0	1,1	3,0	2,8		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
Non-commercial directory		
Commercial directory		
Scientific publication	Directory of Ornamental & Structural Stones / PREFECTURE OF EPIRUS – GREECE (2018)	
Other publication		

Compiled by:	**Hellenic Survey of Geology and Mineral Exploration (H.S.G.M.E.)** https://www.eagme.gr/	

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Achaia Sandstone

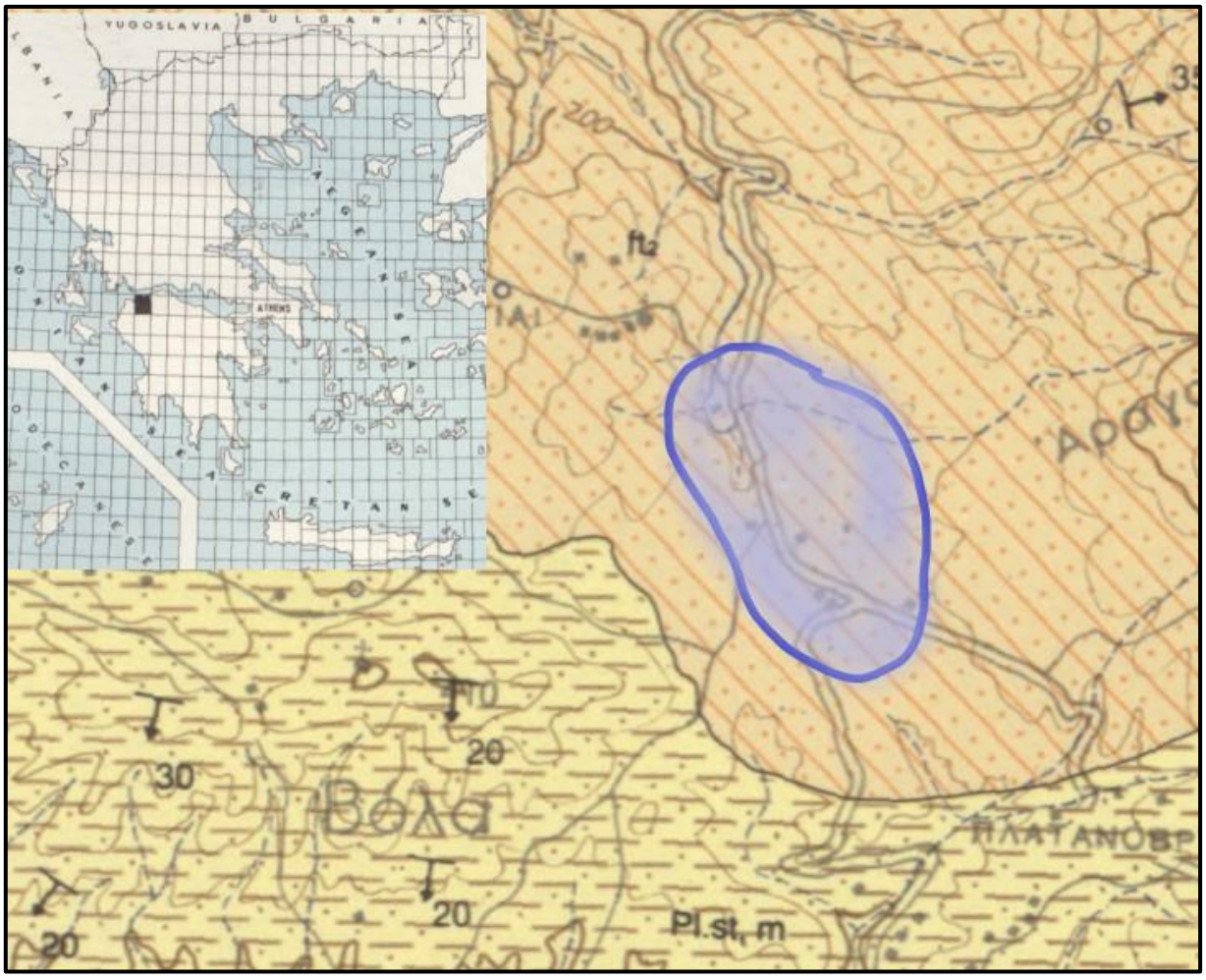


Scale 1:1

Short description: Medium to fine-grained, grey green litharenite with beige, brown and grey agglomerates and black spots.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Sandstone	Lithic feldspar arenite	Grey-Green	Greece	West Greece	Achaia	Vasiliko

Geological setting



Geology: Achaia Sandstone belongs to the Flysch formations of Gavrovon Zone. The specific formations contain alternating thin beds of sandstones, microbreccia and pelites of brown colour.
(Source: Geological Map of Greece 1:50000, Patrai Sheet)

Production: The quarry area is near Patra in Peloponnese.

Geological age: Upper Eocene - Oligocene

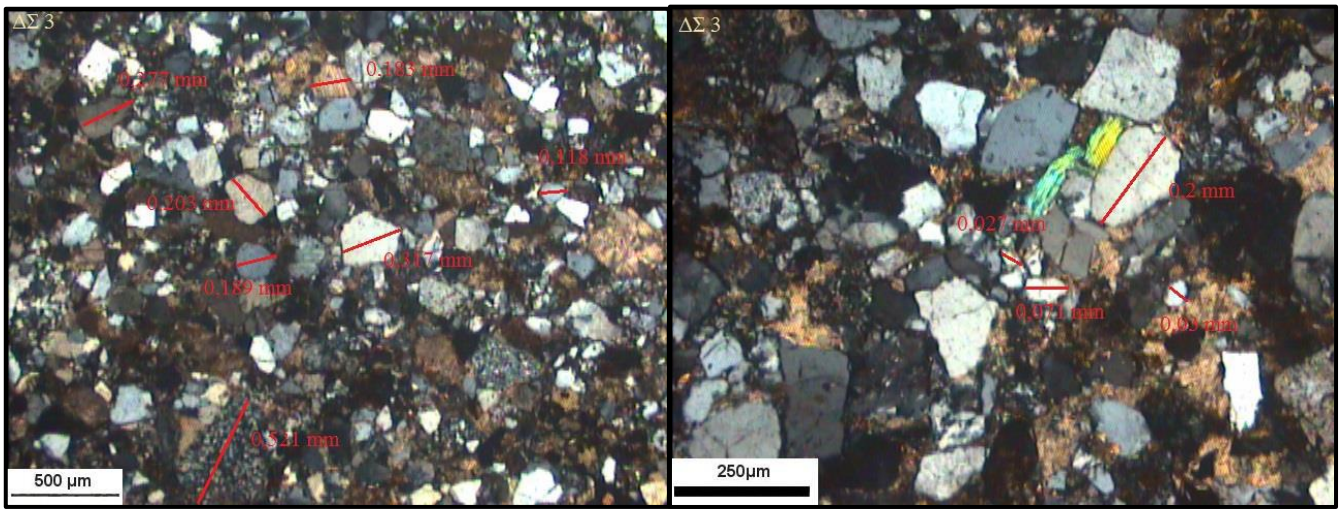
Geological unit: Flysch Formations of Gavrovon Zone

Application, use and heritage

Description: Achaia Sandstone is suitable for interior and exterior uses, especially for flooring and paving.

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Petrography



Description: Photomicrograph of thin section, showing the dominant presence of calcite and clay, as well as chlorite and sericite produced by the alteration of plagioclase. Grains are subangular and subrounded, moderately sorted.

Source of information: Hellenic Survey of Geology and Mineral Exploration

Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Quartz (%)	Calcite (%)	Albite (%)	Muscovite (%)	Montmorillonite (%)	Chlorite (%)	Biotite (%)
54	13	12	12	7	3	AM
Opaque minerals (%)	**Epidote (%)**					
AM	AM					

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2580	3,7	1,3	149	13,8

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
14,5	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
-	17	-	-	1950	3

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			5	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
59,80	7,90	2,25	<0,10	0,50	12,80	3,25	1,80	<0,05	-	-	10,39

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
30	75	1065	5,0	40	13	32	6,0
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
280	0,5	315	14	1,3	35	0,8	1,0
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
11	10	4,0	0,7	1,0	7,5		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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Sources of more information

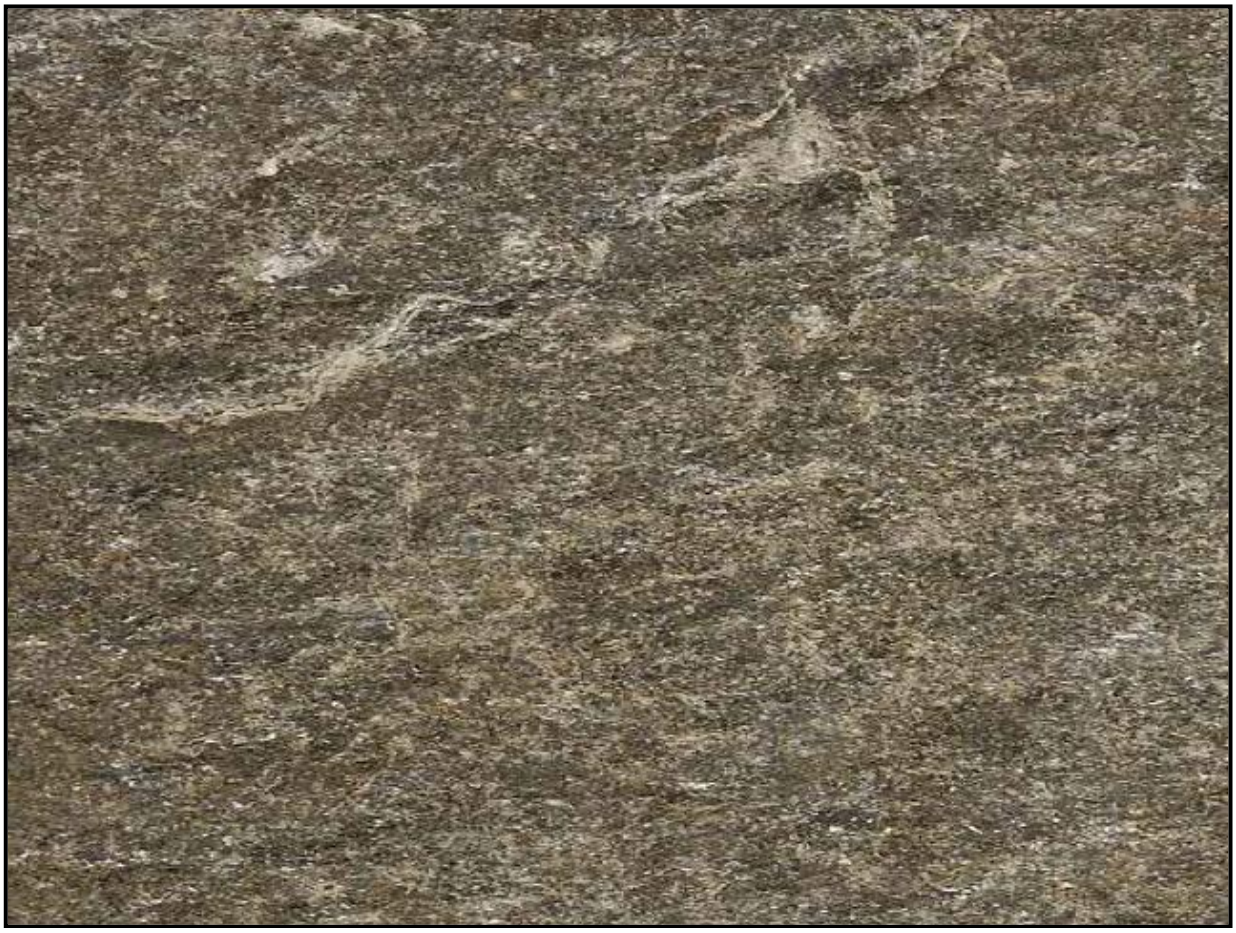
Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
Non-commercial directory		
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Scientific publication		
Other publication		

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SLATES

Paros Gneiss – Schist

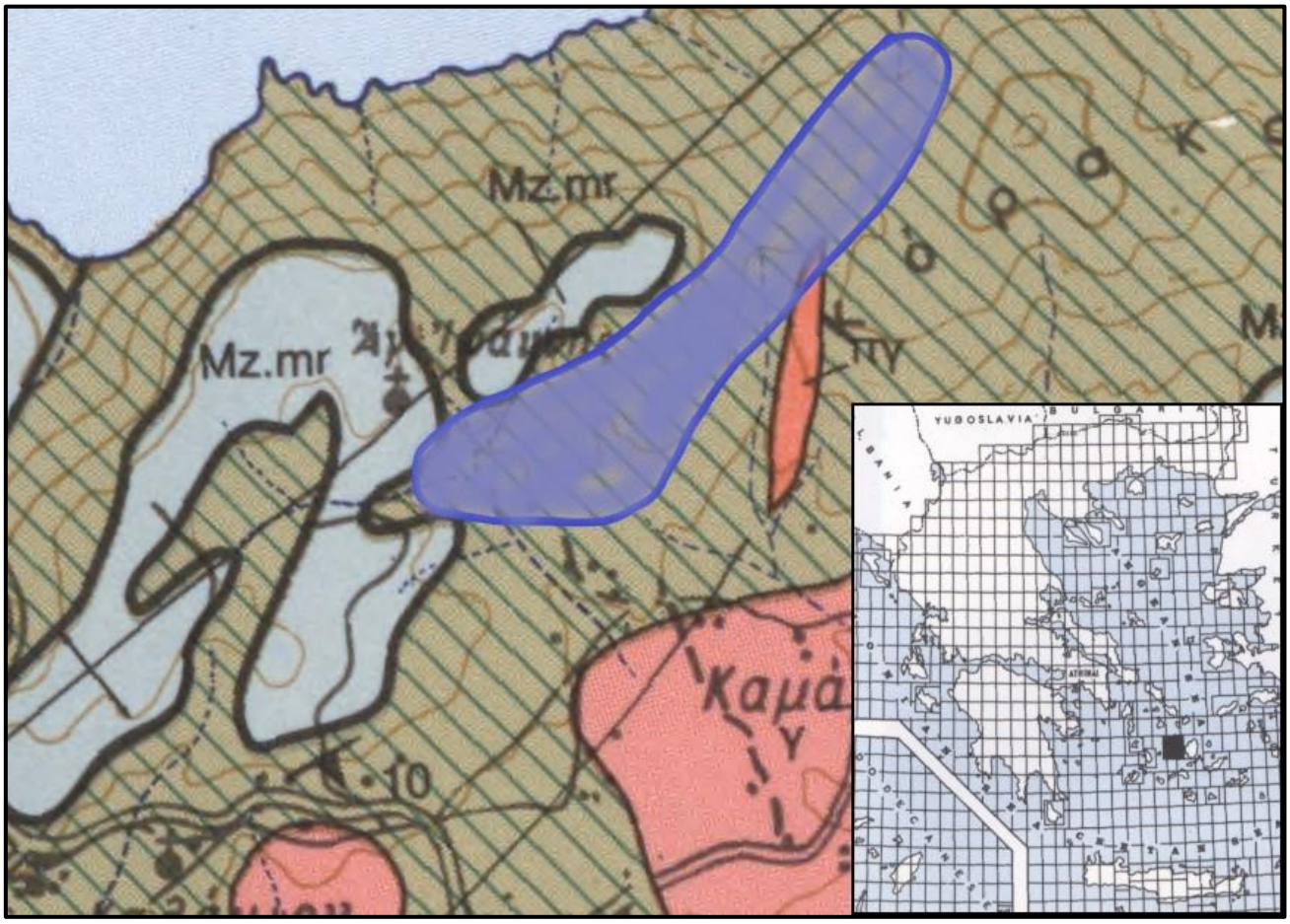


Scale 1:1

Shortdescription: Fine-grained, grey-green gneiss- schist with white spots. The grey-green colour is due to the presence of muscovite, biotite and chlorite, while quartz and feldspars occur in the white coloured spots.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Slate	Gneiss-Schist	Grey-Green	Greece	South Aegean	Paros	Paros

Geological setting



Geology: Paros Gneiss-schist (blue marking) belongs to gneisses of Parikia Unit, usually orthogneisses, with mineralogical composition: feldspars, quartz, biotite, and muscovite.

(Source: Geological Map of Greece 1:50000, Paros Island)

Production: The quarry area is near Kamares village, in the northern part of Paros Island.

Geological age: Paleozoic

Geological unit: Parikia Unit

Application, use and heritage

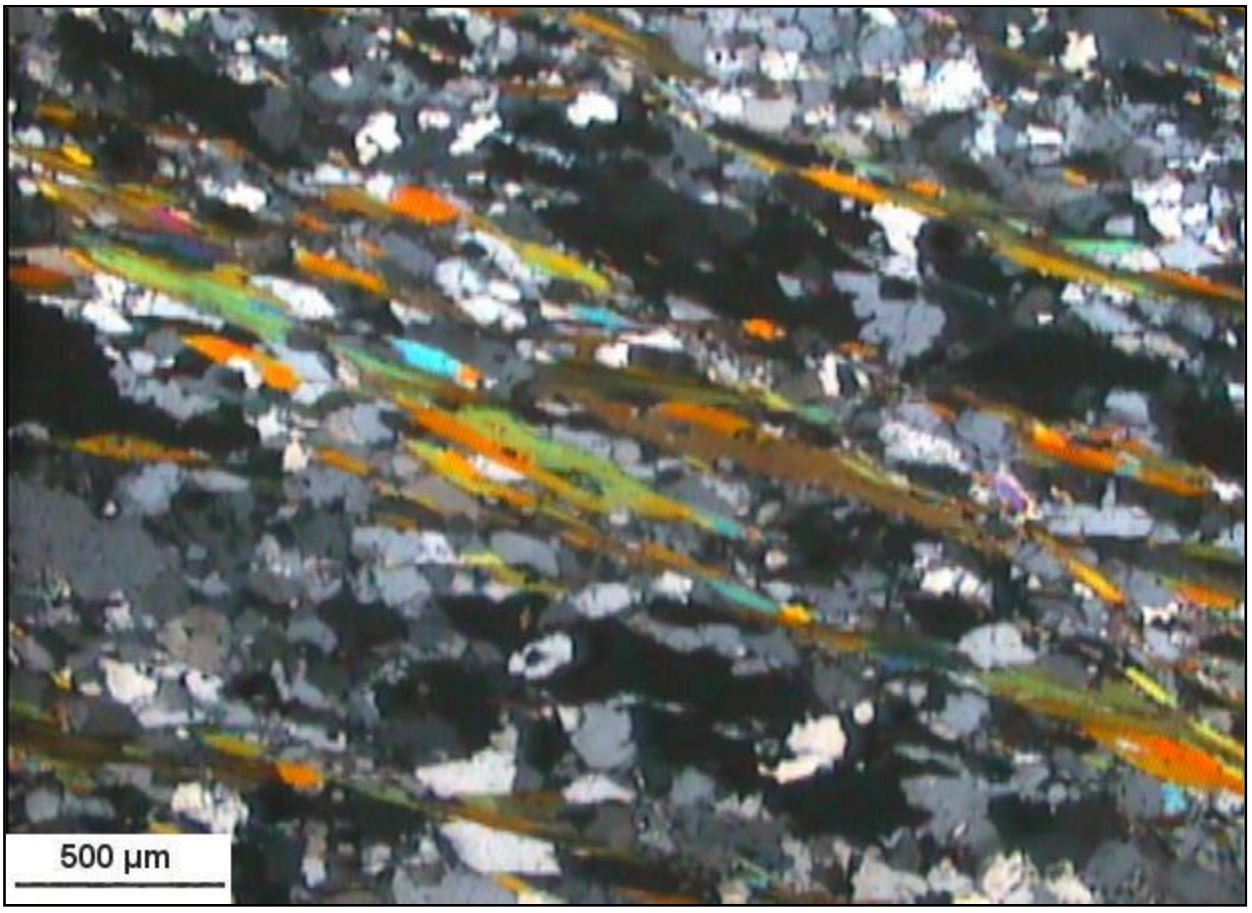
Description: Paros Gneiss-schistis ideal for various stone constructions used as building material, for masonry, terraces, gutters, benches and walls. It can be used for paving of roads and footpaths and for the construction of indoor and outdoor floors.



Paving with Paros gneiss-schist.

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Petrography



Description: Photomicrograph of thin section, showing quartz crystals with undulatory extinction, which are hypidiomorphic, elongated and oriented. Mica fish structures occur in muscovite and biotite. Schistosity planes are visible to the naked eye.

Source of information:Hellenic Survey of Geology and Mineral Exploration

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Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Quartz (%)	Albite (%)	Muscovite (%)	Microcline (%)	Mica (Flogopitis) (%)	Apatite (%)	Opaque minerals (%)
37	25	15	15	8	AM	AM

Source of information:Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2620	1,2	0,4	-	22,4

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa
-	-		

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
19,3	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
22,0	9	-	-	-	-

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			12	-

Source of information:Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3(%)	LOI (%)
61,10	11,80	2,50	<0,05	3,00	6,90	4,05	4,52	0,05	-	-	6,01

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
13	186	348	11	180	5,0	44	2,0
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
103	0,0	530	16	3,0	118	0,0	1,0
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
13	7,0	10	0,0	13	16		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
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Other publication		

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Pilion Schists - Kalamaki

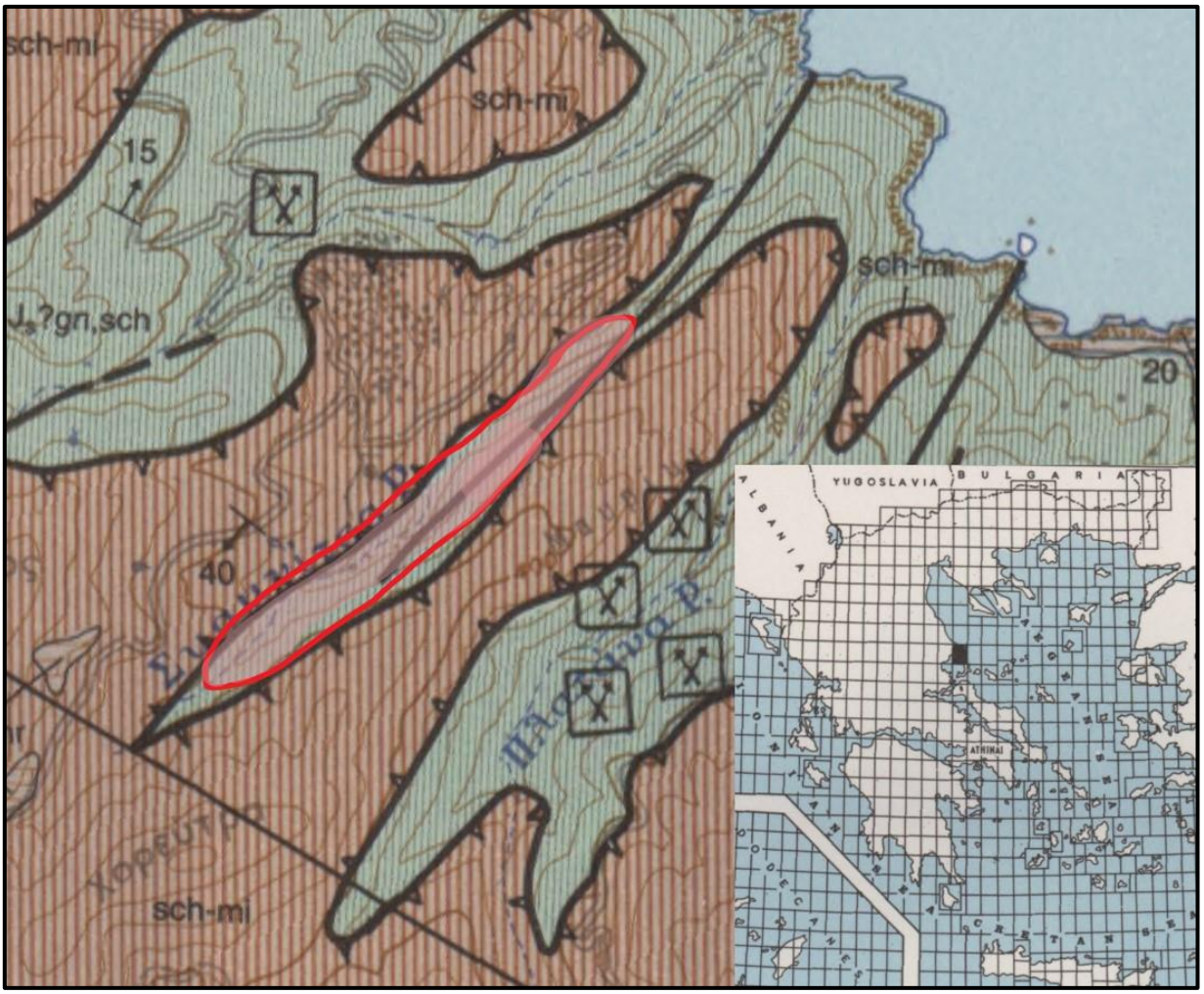


Scale 1:1

Short description: Fine-grained, green coloured mylonite with off white agglomerates and white spots. Foliation planes are visible to the naked eye.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Slate/Schist	Mylonite	Green	Greece	Thessalia	Volos	Kalamaki

Geological setting



Geology: Pilion Schists – Kalamaki (red marking) belong to the formations of Pelagonian Zone and precisely to Schists – gneisses – schistgneisses. They overlie normally the middle Triassic – upper Jurassic marbles. They are mainly gneisses and locally augen-gneisses, schistgneisses and less schists, greenish in colour. The gneisses are leucocratic, alternating with the schistgneisses and the schists. Their main mineralogical constituents are feldspars, chlorite, micas, calcite, quartz and epidotes. In the area of Kalamaki village, where they are being extracted, they are epidote-chlorite-muscovite-quartz schistgneisses.
(Source: Geological Map of Greece 1:50000, Zagora Syki Sheet)

Production: The most important quarry area is near Kalamaki village, in South Pelion.

Geological age: Upper Jurassic

Geological unit: Pelagonian Zone

Application, use and heritage

Description: Pilion Schists – Kalamaki are durable materials, ideal for masonry, paving of roads and footpaths, for the construction of floors (indoor and especially outdoor). They are also used for the construction of stone houses, wall claddings and stone roofing.



Stone roofing with Pilion Schists – Kalamaki.

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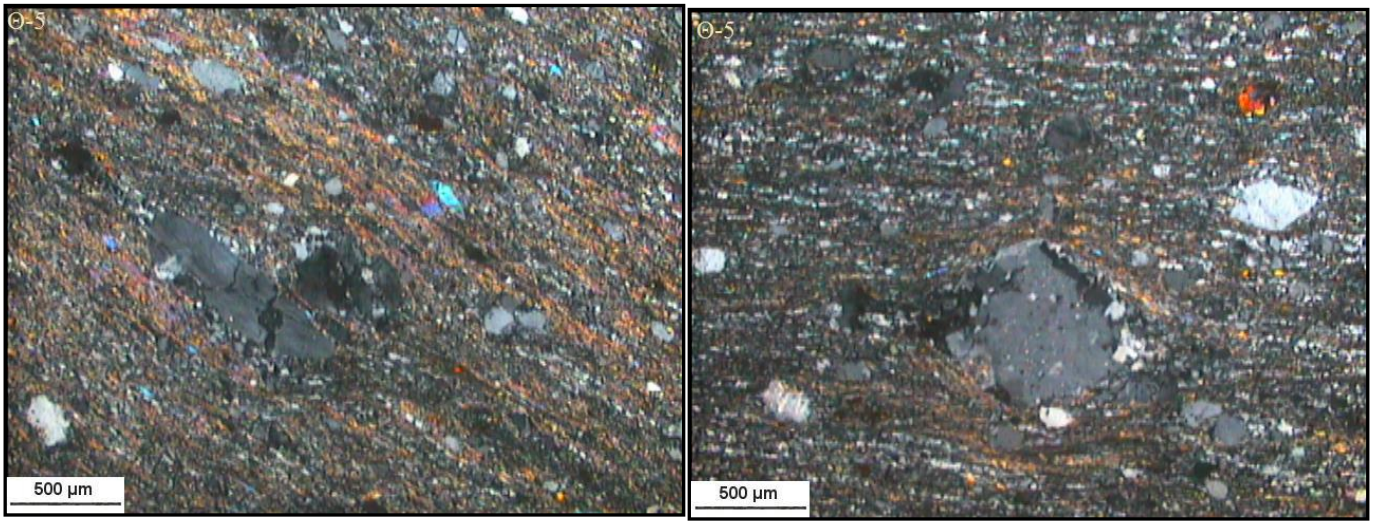




Table made of Pilion Schists – Kalamaki and exterior flooring.

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Petrography



Description: Photomicrograph of thin section, showing the hypidiomorphic, elongated and oriented crystals. Quartz crystals display undulatory extinction, often ophthalmitic structures, while muscovite crystals exist in the form of “micafish”. The green colour is due to muscovite presence, while the off white agglomerates and the white spots are due to quartz and feldspars.

Source of information: Hellenic Survey of Geology and Mineral Exploration

Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Quartz (%)	Feldspars - Albite (%)	Mica (%)	Haematite (%)	Apatite (%)	Opaque minerals (%)	Epidote (%)
47	22	30	1	AM	AM	AM
Allanite (%)						
AM						

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2670	1,7	0,5	-	32,6

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
32,8	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
24,5	-	-	-	-	-

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			7	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
70,10	14,95	2,30	<0,05	0,80	2,40	3,55	3,18	<0,05	-	-	1,65

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
24	78	285	3,0	37	8,0	65	6,0
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
213	<1,0	689	41	2,0	92	1,0	4,0
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
6,0	15	10	2,0	1,9	15,3		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
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Scientific publication		
Other publication		

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Pilion Schists Neochori



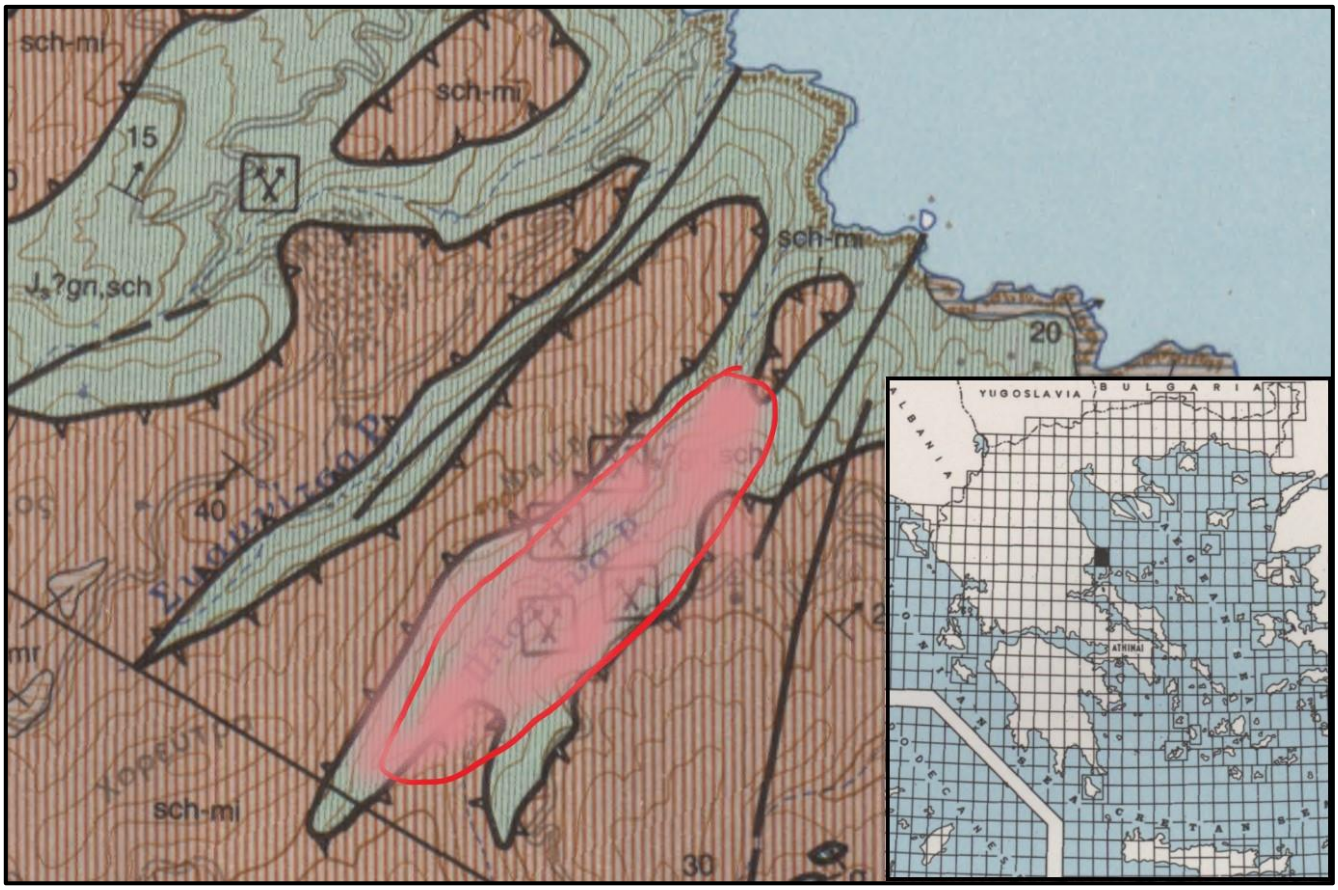
Scale 1:1

Short description: Fine-grained, green coloured mylonite with off white agglomerates and white spots. Foliation planes are visible to the naked eye.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Slate/Schist	Mylonite	Green	Greece	Thessalia	Volos	Neochori

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Geological setting



Geology: Pilion Schists – Neochori (red marking) belong to the formations of Pelagonian Zone and precisely to Schists – gneisses – schistgneisses. They overlie normally the middle Triassic – upper Jurassic marbles. They are mainly gneisses and locally augen-gneisses, schistgneisses and less schists, greenish in colour. The gneisses are leucocratic, alternating with the schistgneisses and the schists. Their main mineralogical constituents are feldspars, chlorite, micas, calcite, quartz and epidotes. In the area of Kalamaki village, where they are being extracted, they are epidote-chlorite-muscovite-quartz schistgneisses.
(Source: Geological Map of Greece 1:50000, Zagora Syki Sheet)

Production: The most important quarry area is near Kalamaki and Neochori villages, in South Pelion.

Geological age: Upper Jurassic
Geological unit: Pelagonian Zone

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Application, use and heritage

Description: Pilion Schists – Neochori can be used as building material for various stone constructions, such as terraces, gutters, benches and walls. They are ideal for paving of roads and footpaths, for the construction of floors (indoor and especially outdoor). They are also used for wall coverings.





Photos taken from Pilion Schists quarries

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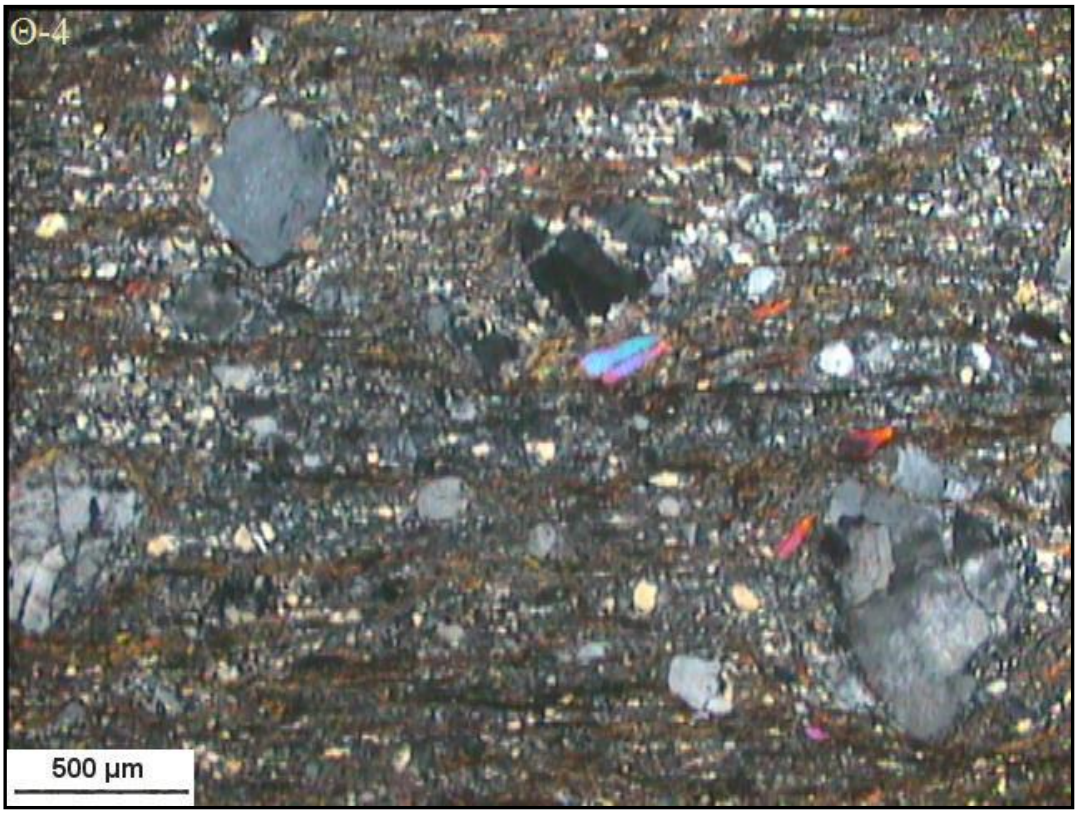
Pilion stones extracted from Pilion Schists quarries

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Outdoor and indoor flooring with Pilion Schists

Petrography



Description: Photomicrograph of thin section, showing the hypidiomorphic, elongated and oriented crystals. The foliation planes are visible to the naked eye. The texture is protomylonite. Quartz phenocrysts display undulatory extinction, while muscovite crystals exist in the form of “micafish”. The green colour is due to muscovite and chlorite presence, while the off white agglomerates and the white spots are due to quartz and feldspars.

Source of information: Hellenic Survey of Geology and Mineral Exploration

Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Quartz (%)	Feldspars - Albite (%)	Muscovite - Mica (%)	Kaolinite (%)	Chlorite (%)	Opaque minerals (%)	
36	32	30	1	1	AM	

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2690	1,1	0,3	-	34,3

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
37,6	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
20,5	10	-	-	-	-

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			9	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
71,5	14,65	1,85	<0,05	0,65	1,60	3,71	3,75	<0,05	-	-	1,12

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
18	35	289	2,0	17	5,0	52	2,0
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
179	<1,0	535	26	2,0	113	<1,0	2,0
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
5,0	15	9,0	1,0	2,3	15,1		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
Non-commercial directory		
Commercial directory		
Scientific publication		
Other publication		

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Eleftheroupolis Akrovouni Schist



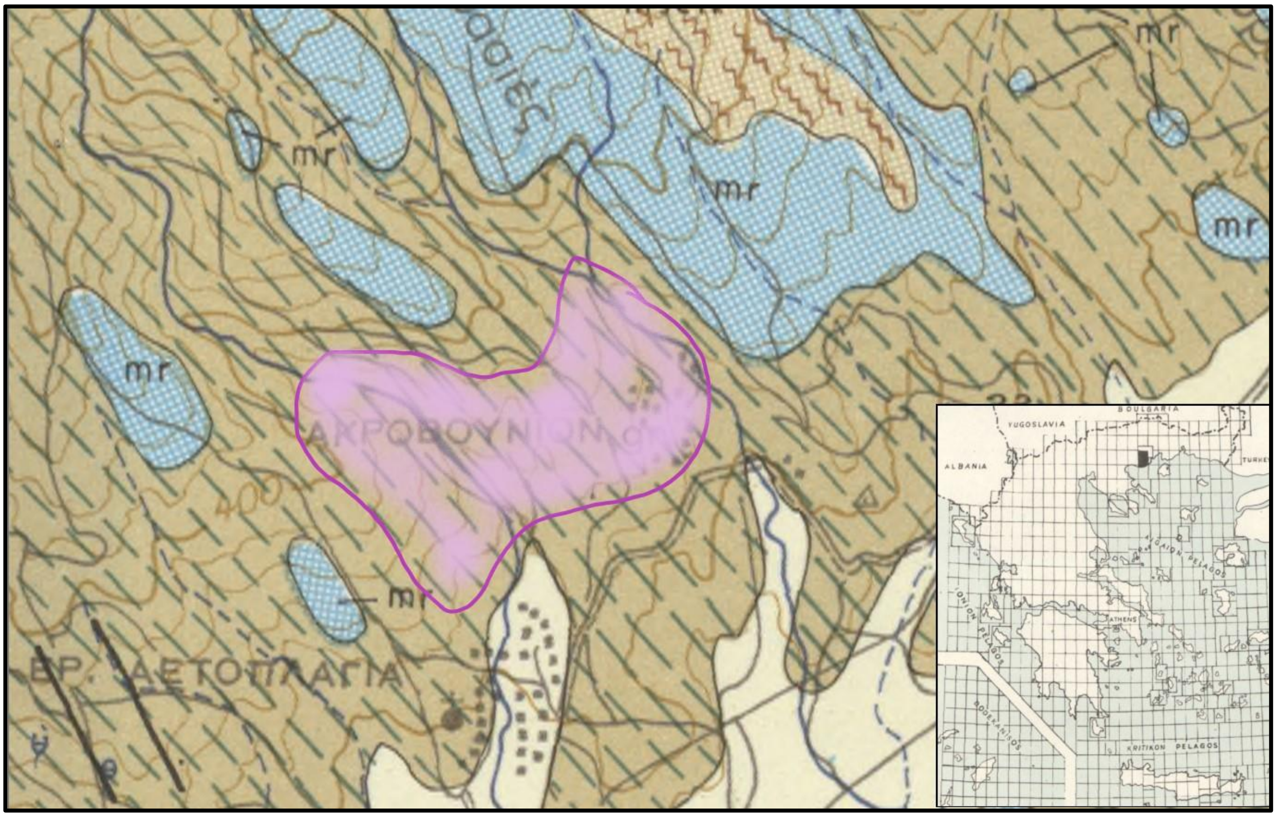
Scale 1:1

Short description: Medium – grained green schist with off-white agglomerates and white spots. The green colour is due to the muscovite and chlorite, while the white colour is due to the presence of quartz and feldspars.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Slate	Schist	Green	Greece	East Macedonia and Thrace	Eleftheroupolis	Pangeo

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Geological setting



Geology: Eleftheroupolis – Akrovouni Schist (pink marking) belongs to Rhodopi mass area and precisely to the Pangaion Unit. In the area, gneisses and gneiss-schists occur, fine to medium-grained, varying in colour, from grey to flesh to brown and texture, from gneissose to granulose and to schistose, according to their mineral content. Maim minerals are quartz, albite, epidote, biotite subfacies of the greenschist facies. There is no indication of polymetamorphism.
(Source: Geological Map of Greece 1:50000, Nikisiani-Loutra Elevtheron Sheet).

Production: The most important quarry area is near Akrovouni village and Eleftheroupoli town in Kavala regional unit.

Geological age: Tertiary - Pliocene
Geological unit: Crystalline rocks

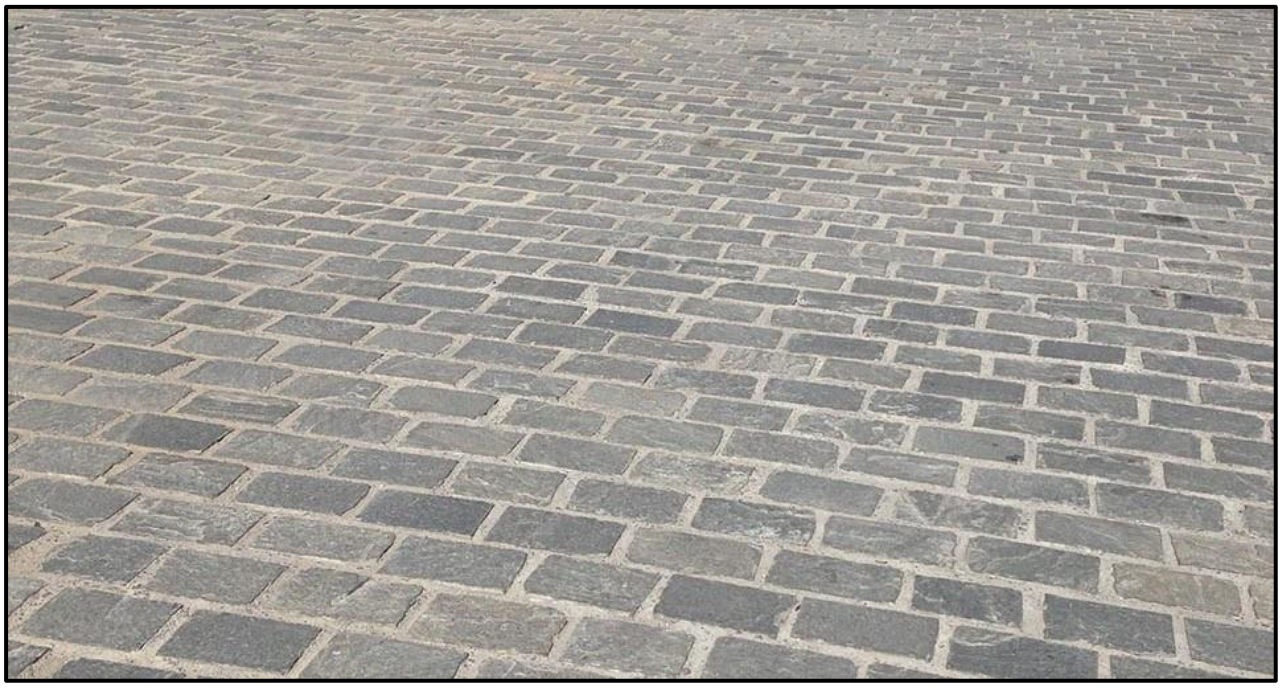
Application, use and heritage

Description: Eleftheroupolis - Akrovouni Schist is suitable for interior and exterior uses, especially for pavings and discontinuous roofing.



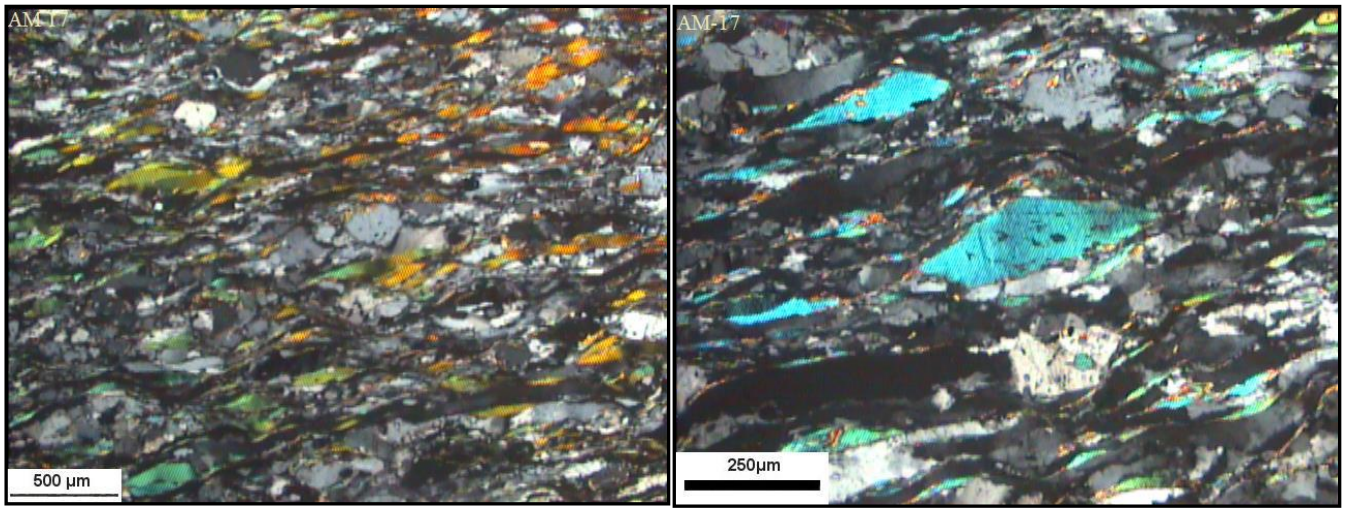
Discontinuous roofing with Eleftheroupolis - Akrovouni Schist.

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Paving with Eleftheroupolis - Akrovouni Schist.

Petrography



Description: Photomicrograph of thin section, showing the hypidiomorphic, elongated and oriented crystals, the schistosity, the fragmented quartz crystals due to tectonic processes and the presence of mica-fish of muscovite.

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Quartz (%)	Muscovite (%)	Orthoclase (%)	Albite (%)	Calcite (%)	Opaque minerals (%)	Biotite (%)
49	28	12	10	1	AM	AM
Epidote (%)	**Microcline (%)**					
AM	AM					

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2670	1,0	0,3	-	31,0

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
31,8	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
17	-	-	-	-	-

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			10	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
80,20	9,35	1,95	0,20	0,65	1,15	2,20	2,90	<0,05	-	-	1,25

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
17	38	200	2,0	8,0	7,0	38	4,5
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
4,0	0,8	100	22	2,5	65	1,3	1,6
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
7,0	8,5	10	1,4	2,7	19		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
Non-commercial directory		
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Other publication		

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MISCELLANEOUS ORNAMENTAL STONES

Thymiana Chios Stone



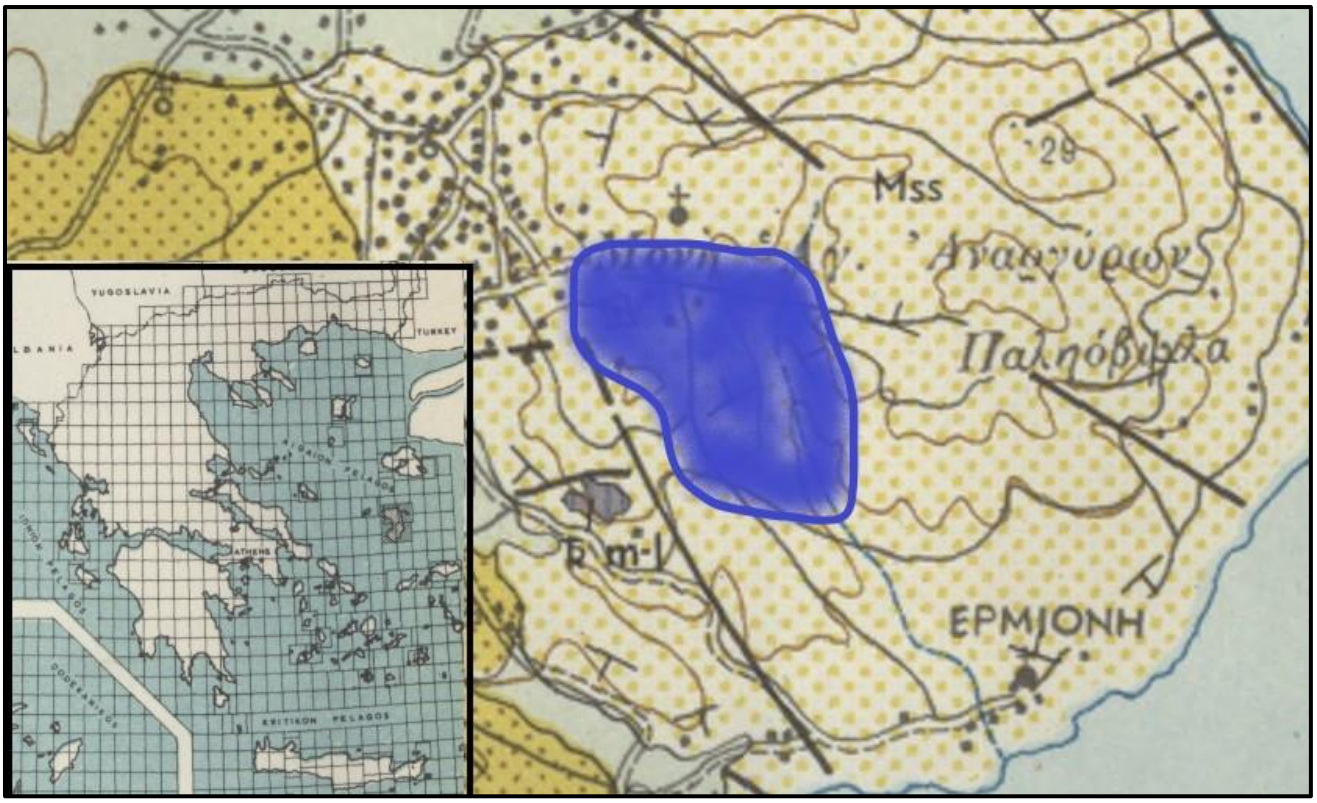
Scale 1:1

Short description: Fine-grained reddish pelitic rock with white veins.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Miscellaneous ornamental stones	Calcitic Pelite	Reddish-brown	Greece	North Aegean	Chios	Thymiana

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Geological setting



Geology: Thymiana Chios Stone (blue marking) belongs to Ferruginous sandstones brownish to red, rich in silt, slightly calcareous, some-times conglomeratic, with intercalated yellowish red silty marls. Fossils: internal molds of fresh-water Ostracods and Gas-tropods and carbonized plant remnants.

(Source: Geological Map of Greece 1:50000, Chios Sheet (Southern Part))

Production: The quarry area is located south of Chios town and includes the regions of Thymiana, Hermioni and Monastiri.

Geological age: Upper Miocene
Geological unit: Ferruginous sandstones

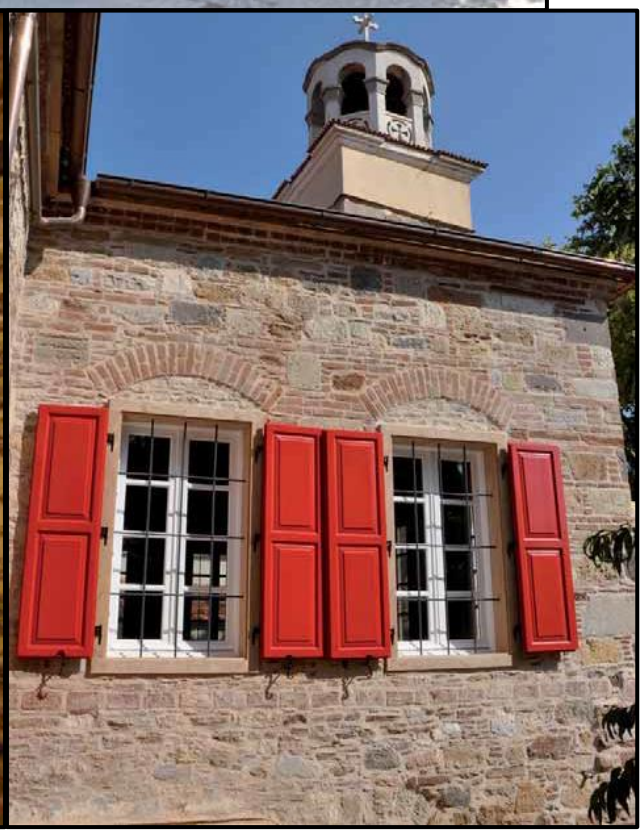
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Application, use and heritage

Description: Thymiana Chios Stone is widely used as building material for house masonry, for external wall cladding, internal cladding and flooring, as well as for paving of roads and footpaths, stairs and stone fences.







The Ottoman School in the Castle of Chios: Restoration with Thymiana Chios Stone.

(Photos: EPHORATE OF ANTIQUITIES OF CHIOS)



Panoramic view of a “Pétra Thymianón” quarry.

(Photo: “*THE “Pétra Thymianón” FROM CHIOS; ITS VARIOUS TYPES AND THE CORRELATION OF THEIR CHARACTERISTICS WITH POTENTIAL APPLICATIONS*” Bulletin of the Geological Society of Greece vol. XLVI, 95-107, 2012)

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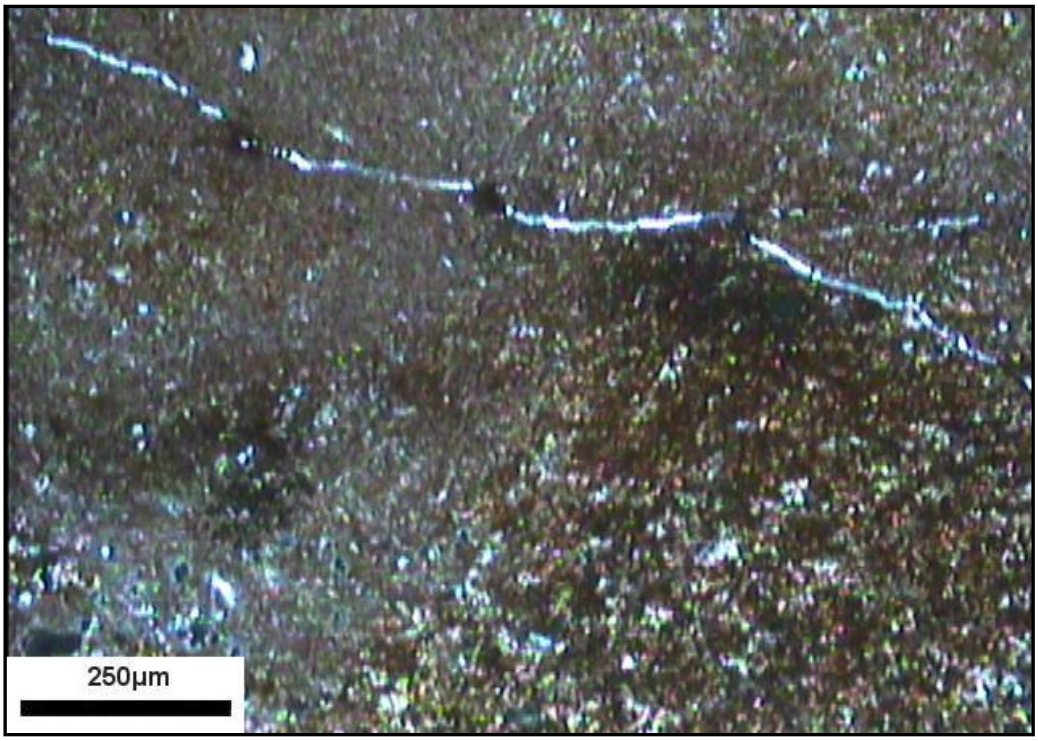




Various applications of Thymiana Stone

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Petrography



Description: Photomicrograph of thin section, showing quartz and muscovite, while the rest of its mass consists of carbonate material, such as ankerite. Calcitic vein is also observed.

Source of information: Hellenic Survey of Geology and Mineral Exploration

Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Quartz (%)	Ankerite (%)	Kaolinite – Illite (%)	Biotite (%)	Iron Oxides (%)		
48	31	14	7	AM		

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2220	19,7	8,4	-	13,0

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
12,6	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
33,5	22	-	-	-	-

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			3	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
33,50	8,10	4,00	<0,05	7,50	18,50	3,00	2,40	0,10	-	-	22,00

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
45	101	755	20	160	52	60	78
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
238	0,0	655	23	2,0	67	0,0	3,0
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
23	14	16	2,0	7,0	14		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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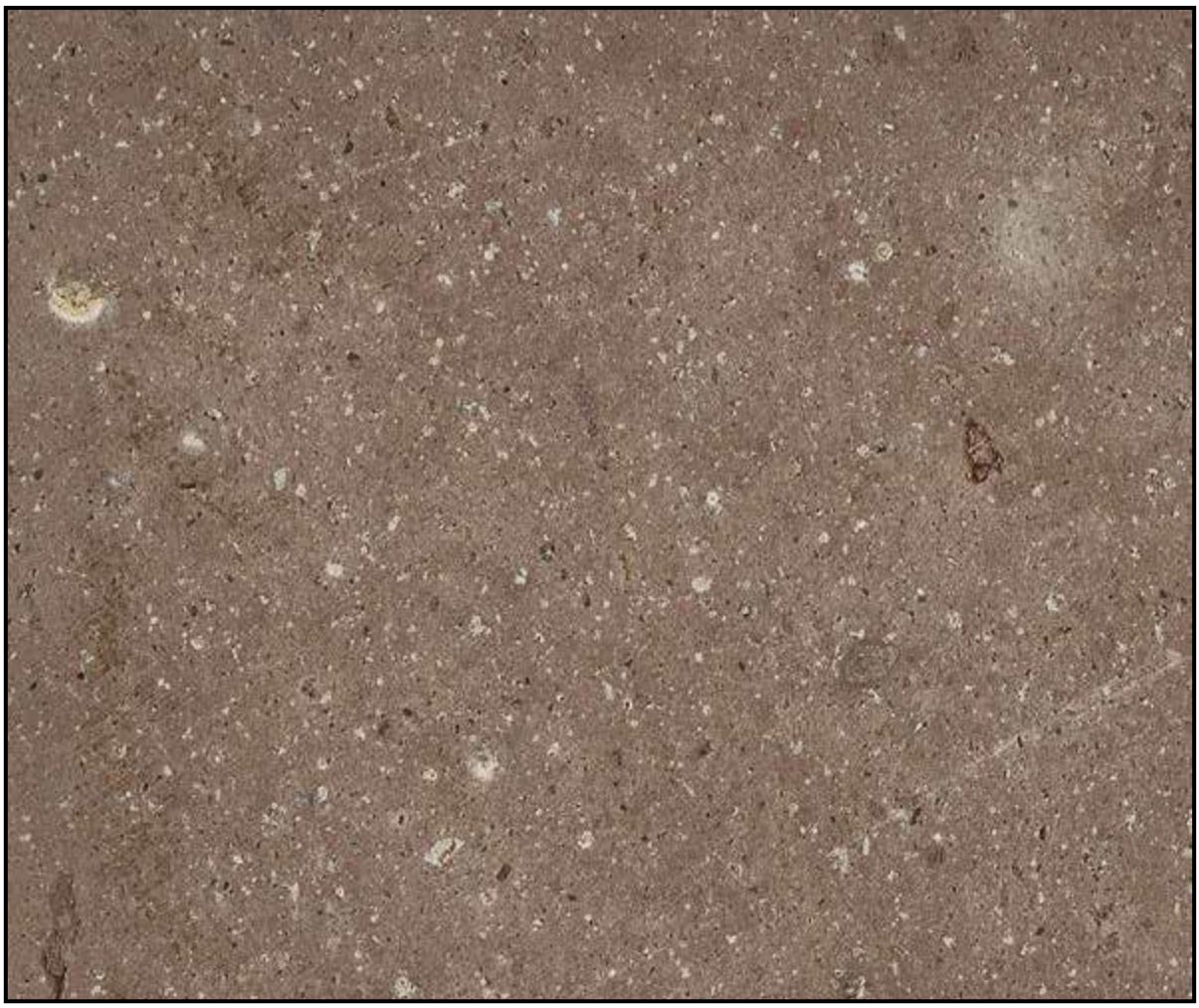
Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
Non-commercial directory		
Commercial directory		
Scientific publication	EPHORATE OF ANTIQUITIES OF CHIOS	https://efachi.gr/wp-content/uploads/2018/03/sxoleio.pdf
	Bulletin of the Geological Society of Greece vol. XLVI, 95-107, 2012	https://ejournals.epublishing.ekt.gr/index.php/geosociety/article/viewFile/10933/10975.pdf
Other publication		

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Mystegna Lesvos Ignimbrite



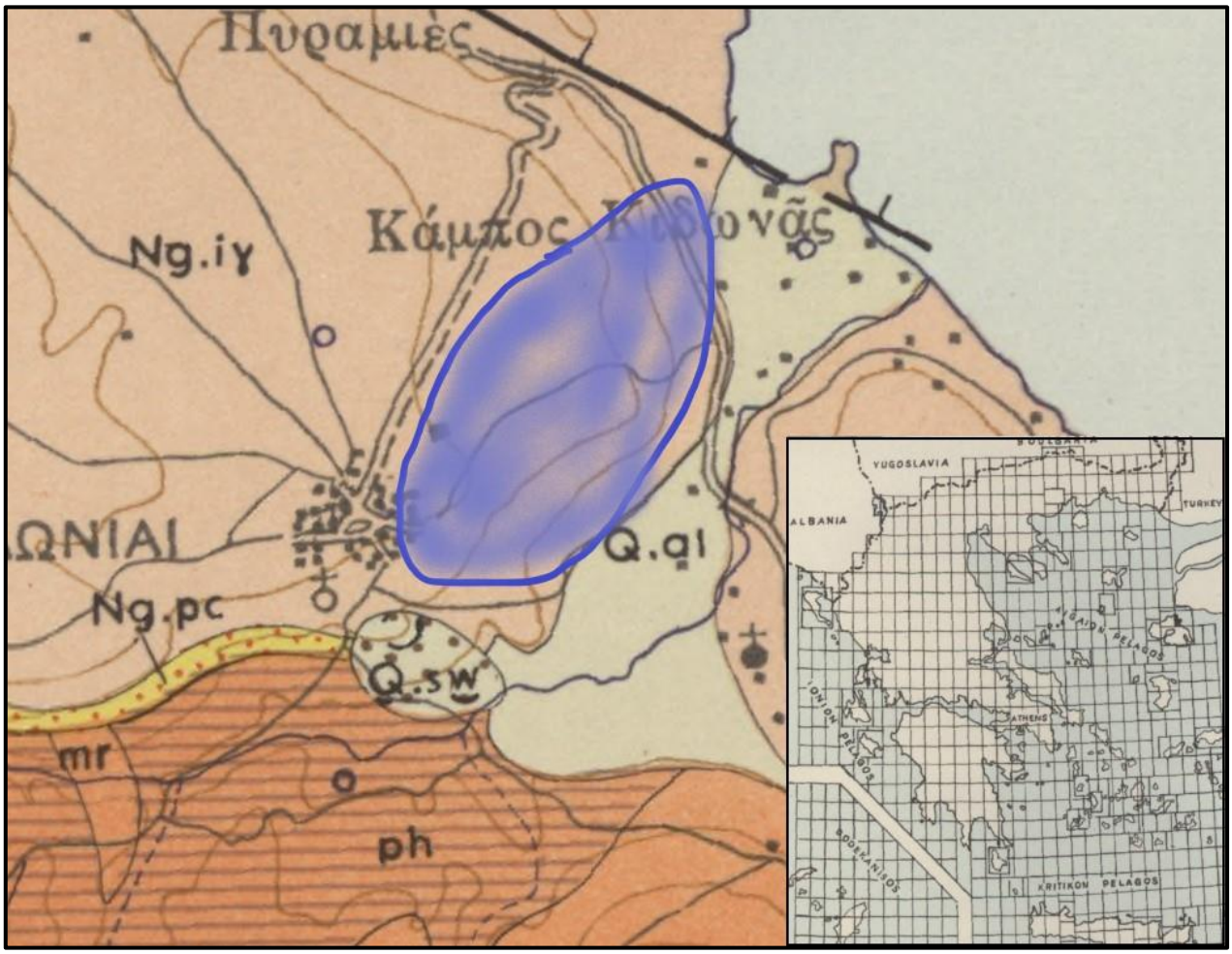
Scale 1:1

Short description: Fine-grained, reddish rock with white and grey spots, characterized by a porphyroclastic texture.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Miscellaneous ornamental stones	Ignimbrite	Reddish-Brown	Greece	North Aegean	Lesbos	Mystegna

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Geological setting



Geology: Mystegna Lesvos Ignimbrite (blue marking) is an extrusive rock, belonging to the ignimbrite layer, rhyolitic to rhyodacitic, in the upper parts more vitrophyric, in the lower parts more tuffitic with a lower degree of welding.
(Source: Geological Map of Greece 1:50000, Lesvos Island /Ayia Paraskevi Sheet)

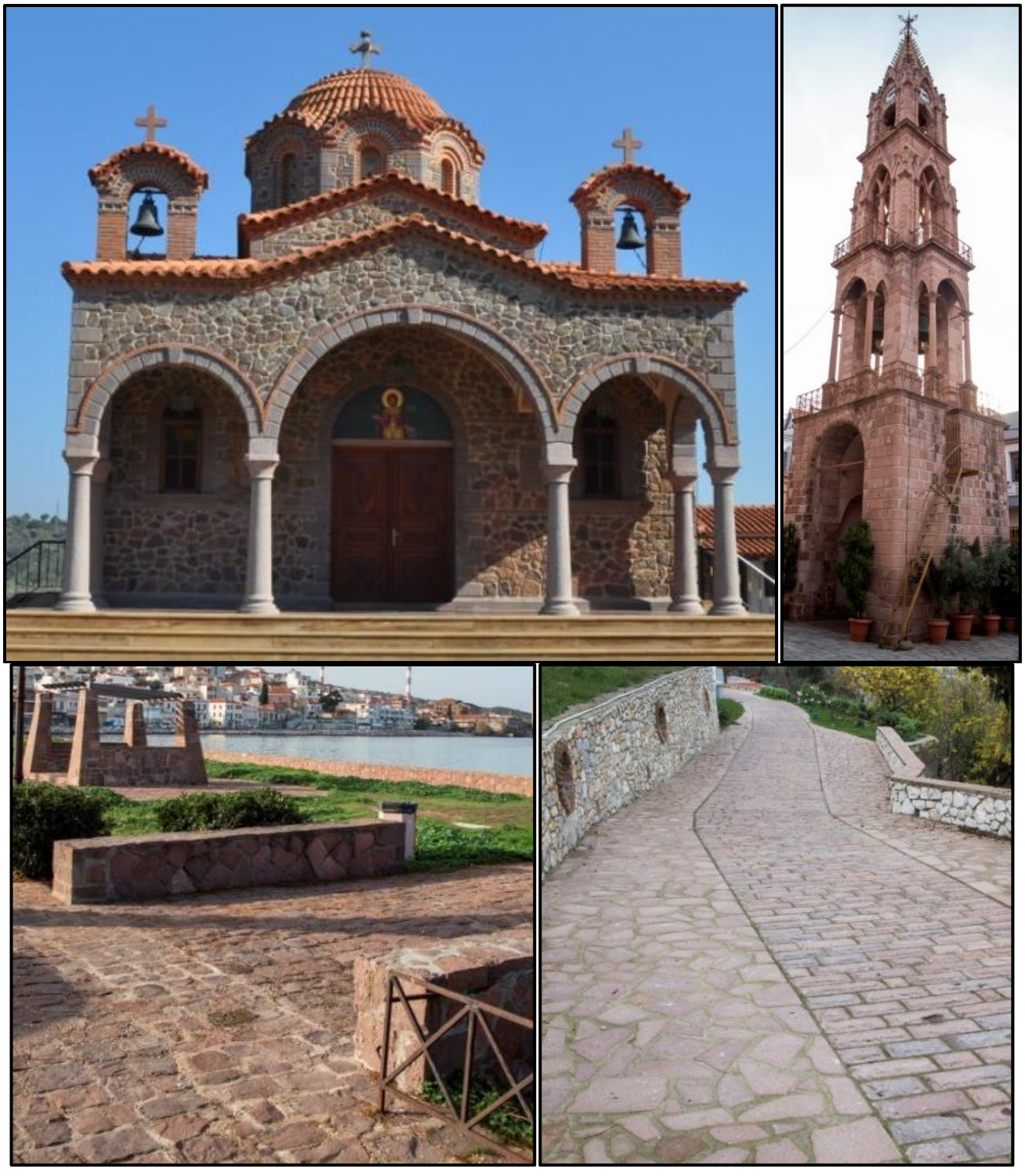
Production: The quarry area is near Nees Kydonies village, in the Northern part of Lesvos Island.

Geological age: Neogene - Pliocene
Geological unit: Extrusive Rocks – Ignimbrite layer

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Application, use and heritage

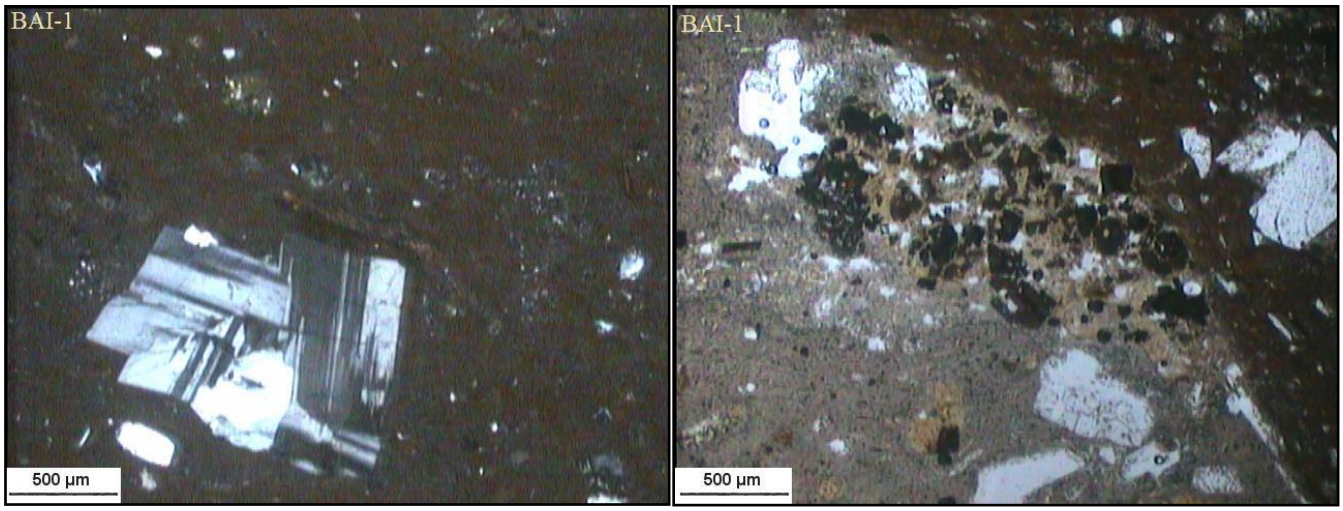
Description: Mystegna Lesvos Ignimbrite is ideal for various stone constructions used as building material, for masonry, terraces, gutters, benches and walls. It can be used for paving of roads and footpaths and for the construction of indoor and outdoor floors.



Various applications of Mystegna Lesvos Ignimbrite.

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Petrography



Description: Photomicrograph of thin section, showing mineral grains (quartz, feldspars, biotite, etc), consisting of hypidiomorphic to idiomorphic crystals, and less lithic fragments of volcanic origin, which are subangular to rounded. The reddish – brown colour is due to the presence of iron hydroxides and oxides.

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Albite - Sanidine (%)	Orthoclase (%)	Phlogopite (%)	Biotite (%)	Tosudite (%)	Anatase (%)	Apatite (%)
57	20	10	8	4	1	AM
Titanite (%)	**Opaque minerals (%)**					
AM	AM					

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2300	3,8	1,8	-	21,0

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
20,2	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
21,0		-	-	-	-

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			4	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
63,95	15,05	3,20	<0,05	0,90	2,50	5,60	5,80	<0,05	-	-	2,50

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
0,0	4,0	42	3,0	8,0	6,0	12	6,0
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
135	0,0	92	3,0	0,0	1,0	0,0	0,0
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
11	23	40	1,0	1,0	1,0		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Hellenic Survey of Geology and Mineral Exploration

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Sources of more information

Type of information	Name of provider	URL
This data sheet	Hellenic Survey of Geology and Mineral Exploration	https://www.eagme.gr/
Non-commercial directory		
Commercial directory		
Scientific publication		
Other publication		

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Tinos Green

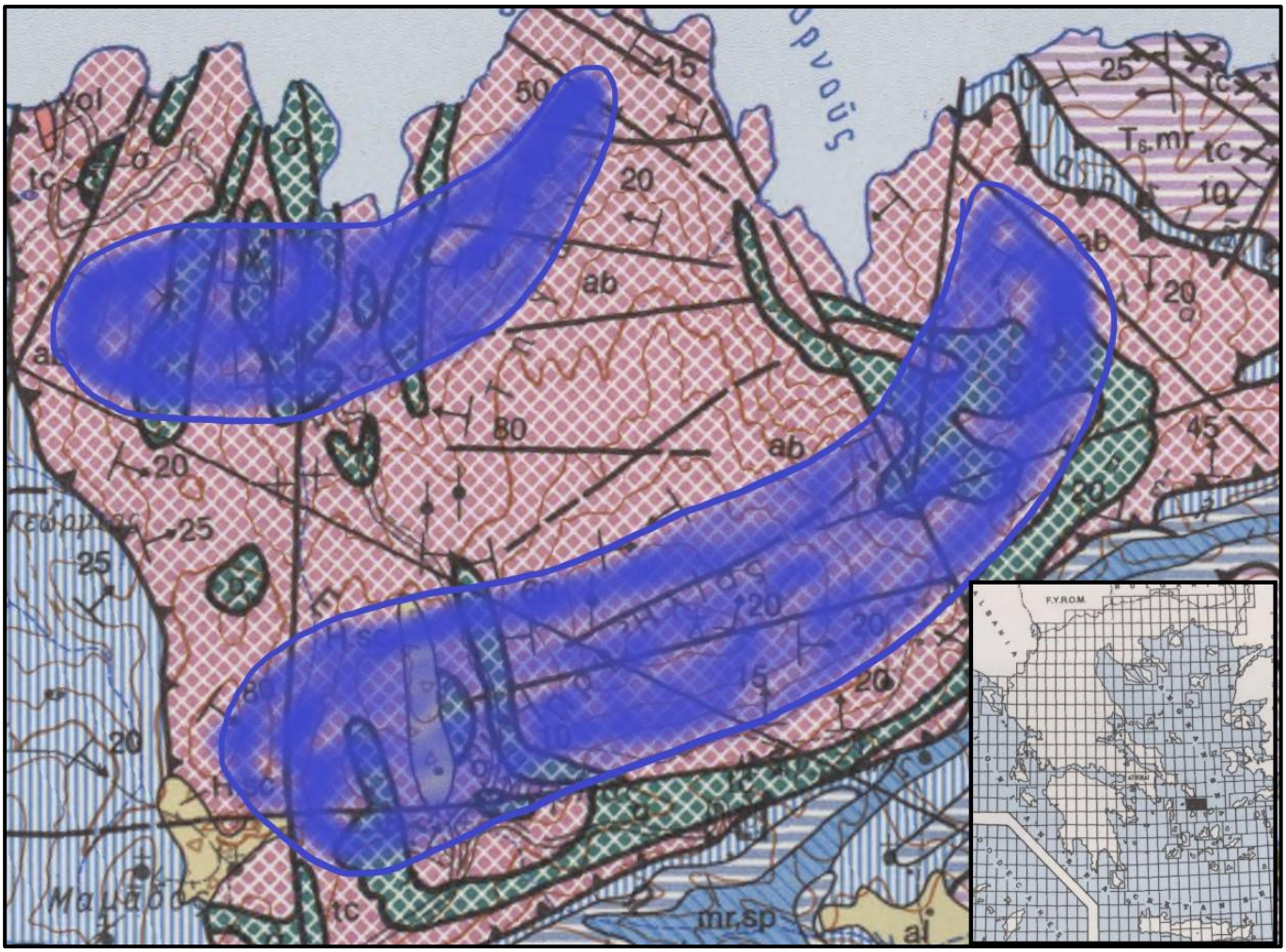


Scale 1:1

Short description: Fine-grained, green rock with white veins. Green colour is mainly due to antigorite while the white one is due to dolomite, calcite, chrysotile and tremolite. Calcite veins in serpentinite fragments give the rock a brecciated texture.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Miscellaneous ornamental stones	Ophicalcite	Green	Greece	South Aegean	Tinos	Pyrgos

Geological setting



Geology: Tinos Green (blue marking) belongs to Atticocycladic Complex, consisting of ophiolites, serpentinized olivinites, hornblendites, pyroxene peridotites, ophitocalcites and gabbros, tectonically occurring in the greenschists – prasinites of light to dark green colour with widely ranging dimensions, a few hundred of meters thick. Almost all of the upper unit occurences are accompanied by ophiolites. In the NW/ern part of the island, monomict serpentine breccias occur of various dimensions and thickness from 1 to a few tens of meters, which have been extracted and used as a decoration – construction material ever since the ancient times. That's the famous "Tinos Green Marble". It is surrounded by a crust of talc-chlorite-schists, from which talc was extracted and exploited in the past.
(Source: Geological Map of Greece 1:50000, Tinos – Yaros Islands)

Production: The most important quarry area is in the north part of Tinos Island.

Geological age: Permian

Geological unit: Atticocycladic Complex –Upper Unit

Application, use and heritage

Description: Tinos Green is suitable for interior and exterior uses, such as on wall and floor coverings, fireplaces, kitchens, public areas and for many renovation applications.



Various applications of Tinos Green marble.

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Petrography



Description: Photomicrograph of thin section, showing angular grains consisting of altered ophiolithic material (antigorite, chrysotile). The cement is composed mainly of calcite, dolomite and traces of tremolite.

Source of information: Hellenic Survey of Geology and Mineral Exploration

Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Antigorite (%)	**Chrysotile (%)**	**Calcite (%)**	**Dolomite (%)**	**Talc (%)**	**Chlorite (%)**	**Tremolite (%)**
MM	MM	MM	MM	MM	MM	MM
Actinolite (%)	**Opaque minerals (Chromite, Magnetite) (%)**					
MM	AM					

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Physical properties

Apparent density (EN 1936) kg/m^3	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2650	0,9	0,3	100	9,8

Real density (EN 1936) kg/m^3	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m^2 x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa
-	-		

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
10,8	48			

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
-		-	

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / 50cm^2	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
-	11	-	-	1500	3

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
			6	-

Source of information: Hellenic Survey of Geology and Mineral Exploration

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Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)
13,50	0,70	4,60	<0,05	14,45	31,80	1,64	0,35	0,10	-	-	32,55

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
31	1050	700	57	1050	9,0	33	5,0
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
165	0,0	29	3,0	0,0	1,0	0,0	0,0
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
28	2,0	0,0	2,0	3,0	1,0		
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

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