

# Dionyssos White

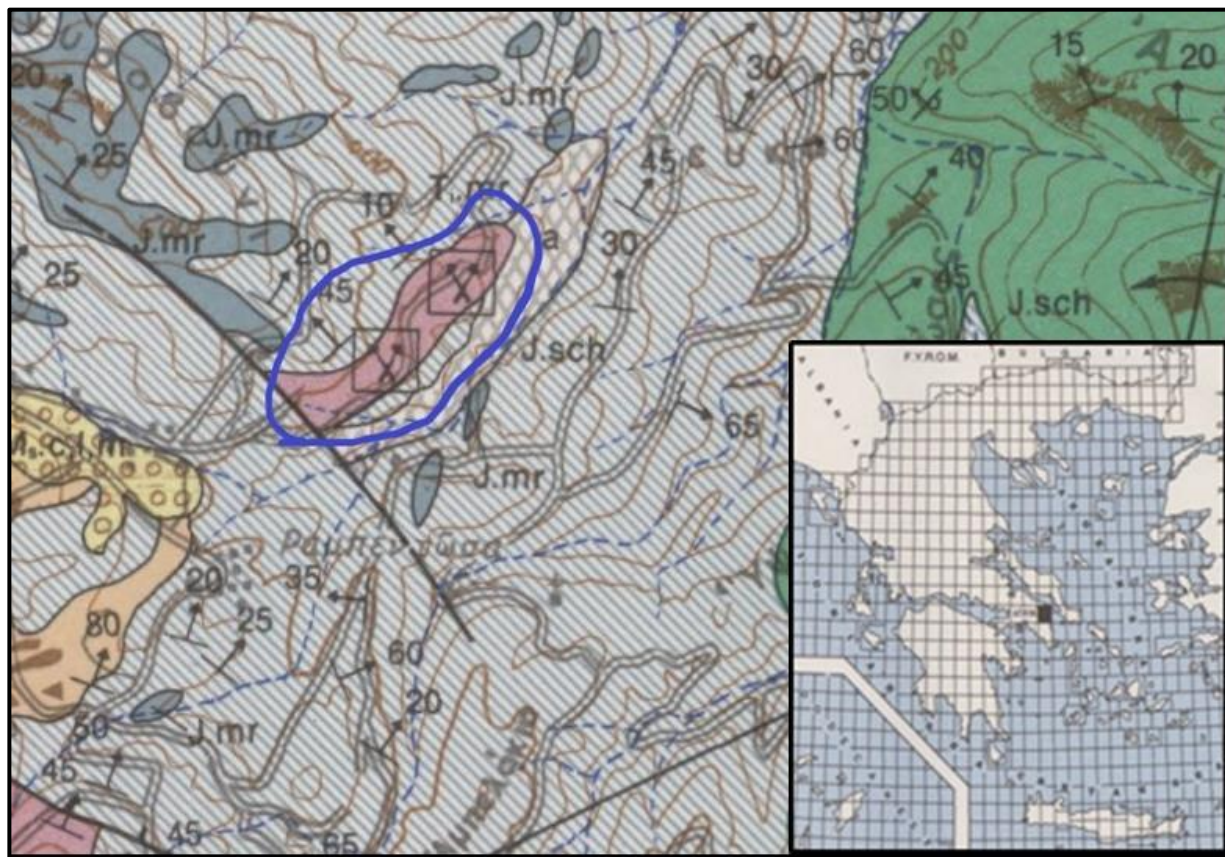


Scale 1:1

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

| Commodity<br>(vocabulary) | Lithology<br>(vocabulary) | Typical<br>colour<br>(code list) | Place of origin |                                 |                             |                         |
|---------------------------|---------------------------|----------------------------------|-----------------|---------------------------------|-----------------------------|-------------------------|
|                           |                           |                                  | Country         | County / District /<br>Province | Municipality /<br>Community | Place/town /<br>Village |
| Marble                    | Calcitic<br>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.

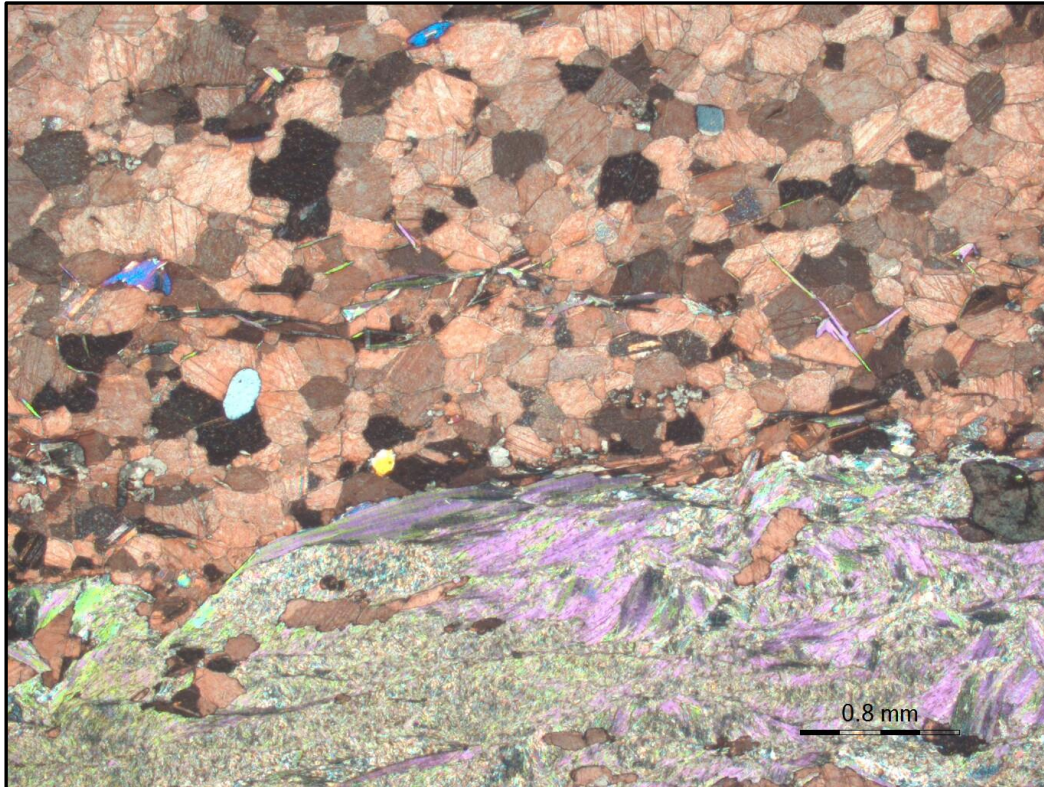
(Source: Acropolis Restoration Service)



Hotel Grande Bretagne: Cladding with dionyssos marble.

(Photo: wikipedia)

# 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

# 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

# Physical properties

| Apparent density (EN 1936) kg/m <sup>3</sup> | 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 <sup>3</sup> | Total porosity (EN 1936) % vol | Water absorption coefficient by capillary (EN 1925) (g/m <sup>2</sup> x s <sup>0,5</sup> ) | 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 <sup>3</sup> / 50cm <sup>2</sup> | 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<br>(EN 14231 / CEN/TS 16165) |                             |                    | Rupture energy<br>(EN 14158),<br>Joule | Thermal Conductivity (EN<br>1745),<br>W/m·K |
|------------------------------------------------------------------------------|-----------------------------|--------------------|----------------------------------------|---------------------------------------------|
| Tested<br>surface<br>finish                                                  | Slip Resistance Value — SRV |                    |                                        |                                             |
|                                                                              | Dry test condition          | Wet test condition |                                        |                                             |
|                                                                              |                             |                    | 6                                      | -                                           |

**Source of information:** Hellenic Survey of Geology and Mineral Exploration

# Chemical properties

## Main elements

| SiO <sub>2</sub><br>(%) | Al <sub>2</sub> O <sub>3</sub><br>(%) | Fe <sub>2</sub> O <sub>3</sub><br>(%) | TiO <sub>2</sub><br>(%) | MgO<br>(%) | CaO<br>(%) | Na <sub>2</sub> O<br>(%) | K <sub>2</sub> O<br>(%) | MnO<br>(%) | P <sub>2</sub> O <sub>5</sub><br>(%) | SO <sub>3</sub><br>(%) | LOI<br>(%) |
|-------------------------|---------------------------------------|---------------------------------------|-------------------------|------------|------------|--------------------------|-------------------------|------------|--------------------------------------|------------------------|------------|
| 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

# Sources of more information

| Type of information      | Name of provider                                   | URL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------------------|----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| This data sheet          | Hellenic Survey of Geology and Mineral Exploration | <a href="http://www.eagme.gr">www.eagme.gr</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Non-commercial directory | Wikipedia                                          | <a href="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://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</a><br><br><a href="https://de.wikipedia.org/wiki/Hotel_Grande_Bretagne#/media/Datei:Hotel_Grande_Bretagne_Balkone.jpg">https://de.wikipedia.org/wiki/Hotel_Grande_Bretagne#/media/Datei:Hotel_Grande_Bretagne_Balkone.jpg</a> |
| Commercial directory     |                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Scientific publication   |                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Other publication        | Acropolis Restoration Service                      | <a href="https://www.ysma.gr/en/monuments/parthenon/">https://www.ysma.gr/en/monuments/parthenon/</a><br><br><a href="https://www.ysma.gr/en/the-service/fields-work/restoration/">https://www.ysma.gr/en/the-service/fields-work/restoration/</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

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| Compiled by: | <b>Hellenic Survey of Geology and Mineral Exploration (H.S.G.M.E.)</b><br><a href="https://www.eagme.gr/">https://www.eagme.gr/</a> |  |
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