



## **Berroqueña stone of Madrid (Spain). A traditional and contemporary building stone**

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In the Alpedrete monzogranite to granodiorite pluton (350 km<sup>2</sup>) at 45 km north of the city of Madrid, there are several quarries of Berroqueña stone. This stone has been widely used as building stone in well-preserved and significant buildings of the central area of Spain, such as the Nuestra Señora de la Asunción in Alpedrete (16th century), Royal Palace and Alcalá Gate in Madrid (18th century). This building stone is used, both for new construction and restoration work, like headquarter of the Banco de España in Madrid (19th century) and its restoration (20th century).

Alpedrete granite is compositionally classified as monzogranite. Petrographically, it is a medium (1-5 mm) grained subidiomorphic, and equigranular. This mineralogy consists chiefly of quartz (2-3 mm and 40-50% vol.), plagioclase (1-3 mm and 25-30% vol.), K-feldspar (microcline; 2-4 mm and 10-15% vol.) and biotite (1-2 mm and 10-15% vol.). Its accessory minerals are cordierite, apatite, zircon and monazite.

This grey granite has low amount of cracks, its open porosity (accessible to water) is 0,8 % and accessible to mercury is 0,50 %, with a diameter ranging mostly from 0.01 to 0.1  $\mu\text{m}$ . Water absorption is 0,3%. Its bulk density is 2668 kg/m<sup>3</sup> and its anisotropy grade (dM) is 6,5 %. its ultrasound propagation velocity ( $V_p$ ) is 4626 m/s and microhardness of Knoop test 4544 Mpa. Pressure strenght ,and flexure strength 136.9 Mpa and 8.88 Mpa, respectively.

Measurements obtained of petrophysical properties make this granite a high quality building material. Petrological and petrophysical characteristics of Berroqueña stone, with which have been used for many buildings from 16th century to present, provide a good answer to the decay agents, and therefore durability, possibility of different finishes and good cleaning. Currently widely used in restoration and paving streets, outdoor tiling and funerary art.

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