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# “Brecha da Arrábida”: an update summary including physical tests and mechanical properties

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The Arrábida Breccia is a carbonate conglomeratic breccia occurring only in the chain with the same name, located in the central-occidental part of Portugal, close to the Setúbal city. It has been used from the last 2.000 years, since the Roman occupation of the Iberian Peninsula, until the exploration was completely stopped after the creation of the Natural Park of Arrábida in 1976.
The uses of the Arrábida Breccia evolved along time, i) starting to be used by romans in the foundations of buildings and in the pavement of roads in the beginning of the first millennium, ii) then both as a structural and ornamental stone inside and outside the monuments that were regionally widespread built mainly the discoveries epoch of Portugal in the 15 and 16th centuries (the “Manueline’s style”) and finally, iii) as a decorative stone during the Baroque and Modern periods inside many palaces built during the following centuries. This evolution is related to the perception of the architects of the strong weatherability of the Arrábida Breccia when exposed to the external agents.
In this work we will present for the first time the physical-mechanical properties of this stone, since they were never performed and published because the interdiction of exploitation was before the publication in 1992 of the first Portuguese catalog of ornamental stones.
Special thanks to the company "ETMA – Empresa Transformadora de Mármores de Alentejo, S.A.” for the yield and preparation of the 129 test pieces necessary to carry out the tests, even more because it is a stone that although the company has in store, is available in small quantities. The scarcity of the material and its necessity for restoration works in buildings and other historical patrimonial assets requires that, with some urgency, a National inventory of available material be made since, as mentioned, the exploration from the known deposits is interdicted.
The tests performed were: abrasion test (mm); apparent porosity (%); bending strength (kg/cm2); breaking load at the level of the natural stone anchoring hole; coefficient of absorption of water by capillarity of natural stone; compression breaking load after freezing test (kg/cm2); compression breaking load (kg/cm2); impact test: minimum fall height (cm); petrographic analysis; resistance to aging by thermal shock of natural stone; resistance to slipping of natural stone by means of the friction pendulum; thermal linear expansion coefficient max. val. (per ºC); volumetric weight (kg/m3) and water absorption at N.P. conditions (%).
Tests that require the use of the thermal chamber to test the behavior before and after the ice-defrost cycles, due to technical issues, are still underway.
For all determined properties it was verified that the values are within the expected limits for carbonated ornamental rocks. The obtained values and a comparative analysis with other rocks will be presented in the work to which this summary corresponds.

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