

## Multidisciplinary study in Nozelos slates: Use as natural stone

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The main purpose of this work consists on petrographic, geochemical, petrophysic and technologic characterization of slates of Nozelos in order to promote its exploitation and use as a natural stone. Nozelos is located in Trás-os-Montes e Alto Douro region, NE of Portugal, in the NW sector of the Hesperian Massif of the Variscan Chain.

The studied site is located in Central Iberian Zone corresponding to an Autochthonous terrain of Variscan Orogeny and belonging to Desejosa Formation, included in the Douro Group.

The lithologies are fine grained and present a dark gray colour. Petrographically the samples present granoblastic to granolepidoblastic texture and are composed by quartz, white mica, biotite, plagioclase, chlorite, calcite, epidote, zircon, hematite, sphene and opaque minerals.

The content of major elements, particularly Al<sub>2</sub>O<sub>3</sub> and trace elements such as V, discriminate the relative abundance of pelitic component on the rock. Higher values of Al<sub>2</sub>O<sub>3</sub> (19.67%) and V (108 ppm) correspond to a significant involvement of a clay matrix. Petrographic and geochemical studies allow classifying the lithologies as chlorite phyllites.

The magnetic susceptibility is  $461 \times 10^{-6}$  SI, which is a value typical of a paramagnetic behaviour due to the presence of iron minerals. Magnetic lineation dip to N and magnetic foliation strikes NW-SE with strong dips to NE, being parallel to the bedding. The magnetic lineation is parallel to the intersection lineation. The magnetic susceptibility ellipsoid shape is prolate and points out the pencil structures observed in the field.

For settling the recommended applications, European standards for natural stone products were considered. The results of the physical and mechanical tests as compressive strength (78 MPa), flexural strength (40.1 MPa), apparent density (2740%), open porosity (1.3%), water absorption (0.6%), abrasion resistance (24.5 mm) and resistance to ageing by thermal shock (resistant) determined that the stone can be applied on rustic masonry units, resistant masonry units/pillars, on paving (moderate traffic) and on cladding and lintels.

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