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Proposal of classification for roofing slates

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Roofing slate is an important natural construction stone, widely used all over the World since historical times. When properly installed and in optimal climatic conditions, roofing slate may last for hundreds of years. There are evidences of use of roofing slates since the Roman's time, but it was during the Middle Age that slate became a popular roofing material. Since then, many historical buildings in Europe have slate roofs. Nowadays, most of the production comes from Spain, but in the last 20 years, new outcrops in Brazil and China have begun to produce slate in huge amounts.

Roofing slates are classified by the industry according to commercial terms, frequently referring to a specific brand. The market distinguish three main qualities or choices (first, second and third), but there are also specific qualities (Cofina, Historical Monuments, Scottish, etc.). The characteristics of these qualities are more or less accepted by the market, but these criteria are not universal, which usually leads to misunderstandings. This does not happen for other dimension stones, (e.g. Marble, Limestone, Sandstones), that are categorized in their correspondent standards. The categorization gives important information to both producers and purchasers, and also allows to use specific test methods for each category.

The proposed classification is based in two main distinguishing features, color and petrology. In roofing slates, color is defined by the proportion of secondary and accessory minerals. Since roofing slates are the result of metamorphism of pelitic rocks, their grain size and mineral composition are quite homogeneous, Main minerals are mica, quartz, chlorites and feldspar, while secondary minerals are typically iron sulphides/oxides and carbonates. Weatherable minerals are iron sulphides and carbonates, whose abundance is the main factor to determine the quality of roofing slates. Three families of color can be then recognized in roofing slates: black-grey (lithotype B), green (lithotype G) and red-purple (lithotype R). Lithotypes B and G are the result of reducing conditions, and usually contains iron sulphides. The dark color of lithotype B is due to minor amounts of organic matter, while in lithotype G the organic matter is virtually inexistent. On the other hand, the lithotype R has iron oxides instead of iron sulphides, since the slates were formed under oxidizing conditions. The other distinguishing feature, petrology, gives information about the grade of metamorphism and hence about the development of the cleavage planes. There are four main rocks used as roofing slates: low-grade slates, slates s.s., phyllites and schists. It is possible then to find a relationship between color and petrology with the technological properties of roofing slates. Generally speaking, color deals with the weathering potential, while petrology controls thickness, roughness and mechanical resistance.

The proposed classification is an attempt to establish an understandable and easy way to classify the different types of roofing slate used in the World. This classification gives general technical information, something that is not clear in the commercial terminology used nowadays. Every roofing slate in the World only matches in one category, and each category describes the aspect and technical properties of

a roofing slate on a general way. These new categorization can also be used to developed cheap and accurate customized test methods.