

Stone roofing in Aosta Valley: technical properties and durability of traditional litotypes

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The choice of a stone as a covering and roofing material is due primarily to its durability. In fact, it can last for centuries, be re-used several times and is loaded with a greater resistance to the load or snow. In addition, if the slate stone come from the neighbours, its supply is characterized by a lower cost (both from an economic and from an environmental point of view), giving employ to local companies and people.

The roof, made with stone slate, is one of the specific characteristics of the Aosta Valley architecture. In particular in this Region, the slates for roofing have irregular shape, big dimension and thickness major than the other kind of roofing techniques. It is a technique used for very strength roofing, traditionally used in the alpine architecture. The roofing slates, originally coming from local quarries of schistose rocks , in recent years come even from other countries.

Nowadays, in order to keep the tradition alive and preserve the specific characteristics of the rural landscape, the Valle d'Aosta Autonomous Region provides subsidies for using stone slates (locally named "losa") in roofing. For this goal, the local law actually foresees the following technical properties to declare: water absorption; flexural strength, freeze-thaw resistance , pyrite content, carbonate content. In addition also the slate uniformity should be verified and declared.

For this research, traditional stone have been analysed comparing their properties with those of not local stone. Moreover roofs were observed in situ in order to evaluate the behaviour of stone , analysing the presence of discoloration, cracking and breaking and rust.

All the local stone tested show excellent technical features, also in comparison with the law requirements. Porphyritic rocks are characterized by the best physical and mechanical properties than the other kind of traditional stone (highest values of flexural strength and less of water absorption), even if the value obtained after the freeze and thaw cycles are characterized by high value of standard deviation.

The analysis of the conservation state of roofing installed since 40 years ago, shows that, despite the best technical features, the porphyritic stones don't show the better state of conservation in the roofing slate, both concerning the stone ruptures and the variation in colour. Otherwise stones with lower value of flexural strength and higher of water absorption, instead, show a good behaviour in the roofing in situ, also in term of colour changing.

Therefore, from the analysed data and the roofing conservation assessment, the uniformity of stone slates sample is an important factor to evaluate together with physical and mechanical characteristics. The discrepancy between the technical performance and the behaviour in situ can be related to the high variability of some rocks when supplied in high quantity. The samples sent to laboratory for technical characterization does not reflect this variability ; even better, specimens could be chosen among the first class choice, while , for big supplying all the produced slabs have to be used.