



The use and limitations of Schmidt hammer and Duroscope tests in assessing surface properties of weathered limestone and travertine

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Schmidt hammer and Duroscope are two non-destructive tests that had been firstly used in testing construction materials, especially concrete than it was later applied on stone surfaces. The paper describes various types of Schmidt hammers (Digi Schmidt, L-type, N-type, PT-type) and the Duroscope providing comparative test results of stone surfaces. Porous limestones, compact limestones and travertines were tested. The fabric properties of limestones and travertines were recorded first and similar lithologies were tested in various environments and conditions. For comparison weathered ashlar of buildings and freshly quarried stone blocks were analyzed to detect changes in rebound values of weathered and non-altered surfaces under natural and urban environments in Hungary. Selected outcrops exposing the same lithotypes were also measured by using Schmidt-hammer.

The test results show that there are significant differences in rebound values of the same surface when different Schmidt hammer types are used. The number of the measurements also influences the reliability of test results together with the surface roughness. The grade of weathering can be best assessed by using the proper type of Schmidt-hammer. It is also important to have comparative values of unaltered stone surfaces and surfaces that display various weathering features.

The application of Schmidt hammer in assessing grade of weathering is a useful tool, but it is necessary to understand the limitations of the method. One of the key open

questions is that it is very difficult to convert rebound values to strength values, and such formulas which are available for concrete needs to be elaborated for stones. These measurements also point out the detectable differences in rates of weathering in polluted urban environment and in rural areas.