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Value of experimentally derived rock mechanical and rock physical data for indirect assessment of natural stone durability

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Durability, which is not a fundamental property, cannot be measured in the laboratory by using any single test method. Conventional testing of durability on natural stone relies on accelerated testing or on the environmental chamber tests which results are evaluated from changes of selected physical properties (mostly weight change, porosity increase, less commonly dynamic elastic properties) with pass/fail decision making. The behaviour of natural stone in real environment is, however, seriously oversimplified from these tests.
Due to the difficulty in proposing realistic conditions for an accelerated durability test, the durability is sometimes extrapolated from some common physical properties (porosity, pore volume, pore size distribution; the capacity of natural stone to absorb, to uptake, and/or to retain water under different physical conditions; reduction of strength due to the presence of water). In the recent study, we focus on possible extrapolation of rock mechanical properties (namely stress- strain behaviour) on durability of porous natural stones. Based on our experimental data, the most promising indicator seems to be crack damage threshold which is, in contrast to ultimate strength, independent from manufacturing and other effects of specimens.