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Contact sponge water absorption test implemented for in situ measures

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The contact sponge method is a non-destructive in-situ methodology used to estimate a water uptake coefficient. The procedure, unlike other in-situ measurement was proven to be directly comparable to the water uptake laboratory measurements, and was registered as UNI 11432:2011.
The UNI Normal procedure requires to use a sponge with known density, soaked in water, weighed, placed on the material for 1 minute (UNI 11432, 2011; Pardini & Tiano, 2004), then weighed again. Difficulties arise in operating on test samples or on materials with porosity varied for decay.
While carrying on the test, fluctuations in the bearing of the environmental parameters were negligible, but not the pressure applied to the surface, that induced the release of different water amounts towards the material.
For this reason we designed a metal piece of the same diameter of the plate carrying the sponge, to be screwed at the tip of a pocket penetrometer. With this instrument the sponge was kept in contact with the surface for 1 minute applying two different loads, at first pushed with 0.3 kg/cm2 in order to press the sponge, but not its holder, against the surface. Then, a load of 1.1 kg/ cm2 was applied, still avoiding deviating the load to the sponge holder.
We applied both the current and our implemented method to determine the water absorption by contact sponge on 5 fresh rock types (4 limestones: Fine - and Coarse grained Pietra di Vicenza, Rosso Verona, Breccia Aurora, and the silicoclastic Macigno sandstone).
The results show that 1) the current methodology imply manual skill and experience to produce a coherent set of data; the variable involved are in fact not only the imposed pressure but also the compression mechanics. 2) The control on the applied pressure allowed reproducible measurements. Moreover, 3) the use of a thicker sponge enabled to apply the method even on rougher surfaces, as the device holding the sponge is not in contact with the tested object.
Finally, 4) the implemented measurements gave the possibility of a direct comparison with the capillary water absorption method.

Pardini C. & Tiano P. 2004. Valutazione in situ dei trattamenti protettivi per il materiale lapideo, proposta di una nuova semplice metodologia. ARKOS, 5, 30-36.

UNI 11432. 2011. Beni culturali Materiali lapidei naturali ed artificiali - Misura della capacita di assorbimento di acqua mediante spugna di contatto. P. 6.