



## **Evaluating the utility of surface hardness data for characterising building sandstones**

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Quantitative information about surface hardness of porous building materials, including sandstone, can be obtained quickly and easily using field-portable devices such as the Equotip hardness tester. Such information may be of great use in comparing the weathering status of different stones, and also for examining the effects of conservation treatments such as consolidants. However, to make best use of surface hardness data two remaining areas of uncertainty need tackling. First, more information is needed about how factors such as sample thickness, porosity and surface roughness affect surface hardness data on a range of stone types. Second, more exploration needs to be undertaken on what types of information can be extracted from surface hardness data and how it compares to other measures of material properties such as compressive strength. In this paper we address these issues through a study of four sandstone types (Stanton Moor Sandstone, UK; Prague Sandstone, Czech Republic; Ohio Sandstone, USA; Locharbriggs Sandstone, UK). Using the Equotip with both higher and lower impact energy probes (D type = 11 Nmm, C type = 3 Nmm) single impact and repeat impact data have been collected from blocks cut from all four sandstones of different thicknesses, and with different degrees of experimentally created surface roughness. Data on porosity and compressive strength have also been collected. Our analyses illustrate that surface hardness data can contribute usefully to investigations of the performance of building sandstones, especially when used in conjunction with other techniques.