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How to make loam bricks more stable

Andrea SCHICKER[1], Susanne GIER[1]

[1]*Department of Geodynamics and Sedimentology, University of Vienna, Althanstrasse 14, 1090 Vienna, Austria; anschic@hotmail.com*

Over the last few years ecologic building materials, such as loam bricks, became of greater economic importance. Studies of the mineralogy, granulometry, chemistry and cation exchange capacity of the raw materials are necessary for the optimisation of load capacity, robustness and the resistance of loam bricks against air humidity.

Four different types of loam provided by an Austrian brick company have been analysed: A1, A2, B and C. These four samples were analysed by means of X-ray powder diffraction to characterize their bulk mineralogical composition and clay mineralogy. The X-ray data show that samples A1 and A2 are similar in composition, containing quartz and feldspar; whereas samples B and C also contain calcite and dolomite.

Their clay mineral content ranges between 50 and 70%. Chlorite, vermiculite, illite and kaolinite constitute the clay fraction of samples A1 and A2. Smectite could only be found in samples B and C.

Samples A1 and A2 showed an ideal grain size distribution and an absence of expandable clay minerals, thus they were used for further studies of burst strength and bending tensile strength.

Different additives like finely ground trass, kieselgur, brick-dust, slagstar, Acronal S650, wood shavings and a clay mineral rich loam where added to the loam and homogenised.

Little loam bricks were prepared to quantify the burst strength and bending tensile strength. A brick series were coated with a hydrophobic impregnation fluid. The bricks were stored in boxes for 20 days with air humidities of 100% and 75%, respectively. After 1, 5 and 20 days the burst strength and bending tensile strength were measured to identify the humidity level which will be critical for brick's stability.

The initial strength of loam A1 with Acronal S650 is higher than that of the other types. However, it looses strength under the influence of high air humidity. Despite the comparatively small initial strength, loam A1 with slagstar shows the smallest losses after exposure to high air humidity.