

Moisture Measurement in Sand-Lime Brick Production

Sand-lime bricks are produced by adding lime and water to a mixture of sand. The resulting moist mixture of sand and calcium carbonate is shaped into bricks and pressed. Before the press, the mixture has a typical moisture of approx. 4 - 6 %. The required moisture for pressing is obtained by adding water directly before the press. Exact observation of the optimum pressing moisture is an essential criterion for the quality and, particularly, the solidity of sand-lime bricks.

Goal

The non-contacting on-line moisture measuring system MICRO-MOIST LB 456 is to be employed to measure the moisture of the lime-sand mixture directly before the stone press. As illustrated in the flow chart on the next page, water is to be added in the mixture before the press as a function of the moisture signal obtained. This alone guarantees a constant result of pressing, independent of the moisture of the materials being added. Too much moisture in the added materials would cause cracks in the lime-sand brick while hardening.

Measurement Conditions

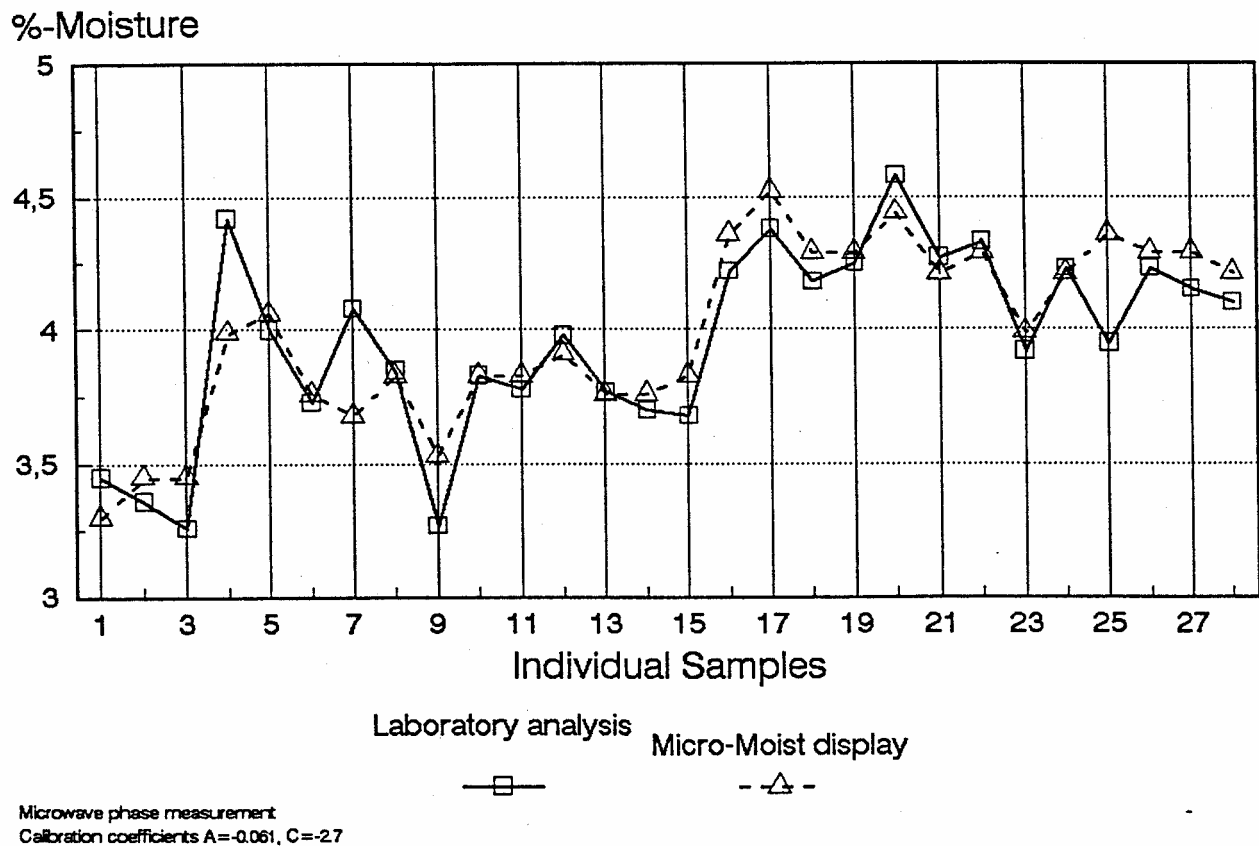
The processed lime-sand mixture is transported on a conveyer belt to the press. Due to the pressing cycle, the mixture is supplied discontinuously. A typical situation is a belt stop of about 8 - 12 seconds alternating with a 4 seconds transportation period. This stop-and-go operation can be controlled via the external Start/Stop contact of MICRO-MOIST which is served by the belt transport motor. Due to the different layer height and bulk density of the lime-sand mixture on the conveyer belt, the additional radiometric weight per area measurement is an absolute must. Since a rather short distance of the microwave antennae is advisable for this application, spiral antennae were used which are superior in the microwave near field.



Result of the Measurement

The moisture measurement is based on a pure phase measurement of the transmitted microwaves. To assess the accuracy of the measurement, comparative samples were used and their moisture content determined according to conventional laboratory methods.

The comparative laboratory values were plotted on a diagram versus the instrument reading; the linear curve was determined by means of a linear regression. Thus, the calibration coefficients obtained during the start-up procedure could be fine-tuned. The result is shown in the diagram below.



A simple standard deviation of about ± 0.2 % has been obtained.

A continuous measurement without the drawback of sampling is available for this type of application. Moisture variations are displayed and can be compensated for by adding the required amount of water in the mixer directly before the press to ensure a constant pressing result.

This measurement method is highly recommended for high-quality stones.