Moisture expansion of Ca-rich ceramic body

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The calcareous ceramic body is typical for historical pottery, e.g. maiolica, faience, as well as for contemporary production of ceramic tiles. The amount of the calcium component and the ratio of the other phases together with the firing temperature control the final properties of the ceramic body. The amount of the calcium component has a fundamental effect on relative expansion of the ceramic body after firing and also during long-term usage or eventually during storage. The expansion behaviour is mainly associated with the planarity of the final product which is required in the case of large-format tiles. Expansion of the ceramic body is also related to the long-term stability of historical ceramics especially glazed ceramic objects. In the case of low-fired porous ceramics the moisture expansion of the ceramic body occurs due to a humid environment. It is a process of rehydration/rehydroxylation of unstable non-crystalline residues which remains from clay minerals in the ceramic body after firing. Ceramic body expansion by the action of air or soil moisture is the main indication of the rehydration/rehydroxylation process which can lead to the deterioration of the ceramic body or the glazed surface. It is spontaneous irreversible process that begins immediately after firing and lasts for many years. Body expansion is mainly affected by the composition and porosity of the shard, as well as by the surrounding environment and the way the ceramic product is used. This process can be suppressed with a suitable mineralogical composition of calcareous ceramics. The main aim of this work is to study moisture expansion behaviour of calcareous ceramic bodies with a focus on both historical and contemporary ceramics.

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