

Technological Properties of Earthen Building Materials in Traditional Timber Frame Structures



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ABSTRACT

Earthen materials are commonly used in the 19th century timber frame dwellings of Anatolia as mud brick, mud infill, mud mortar and mud plaster. Some of these timber frame houses still keep their original architectural and technological features while most houses suffer from wrong repairs due to incompatible materials and inappropriate construction detailing. Wrong interventions introduce and/or accelerate many problems, such as dampness problems, salt damage. Comprehensive studies are, therefore, needed to improve the knowledge for the planning of proper repair and maintenance works and keeping them for long periods of time with their authentic features. In this study, the earthen materials were examined in terms of their raw material compositions and physical properties. For the laboratory analyses, the original mud brick, infill mortar and plaster samples were collected from some traditional timber frame houses in G d l and Beypazari districts of Ankara. The performance characteristics of those materials were examined in terms of: (i) physical properties, such as particle density, bulk density, porosity, water vapor permeability, (ii) raw materials characteristics, such as mineralogical composition of silt, clay and aggregates, binder-aggregate ratio, grain size distribution, fiber content. The results are expected to reveal some technological properties of the traditional earthen materials used in timber frame dwellings of G d l and Beypazari. The knowledge obtained will also be useful to define the specifications for the repair materials compatible with the original ones.

Keywords: Traditional earthen materials, raw materials characteristics, water vapor permeability, traditional timber framed structures