

Structural elements of earth masonry: Physical and mechanical properties of earth bricks and mortars



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ABSTRACT

In the developing countries and in the modern construction field the use of earthen structures has dramatically declined. One of the main reasons was that these structures were empirical in nature and they have never been based on a scientific knowledge. However, in the last fifteen years many scientists began studying the behaviour of these structures. Nevertheless, there are still limited experimental data. The present work focuses on the study of the physical and mechanical properties of non stabilised compressed earth bricks and earth mortars.

For the experimental study, three types of bricks and six types of mortars were analysed in order to optimize their strength and their shrinkage. Samples of three different geometries of earth bricks were tested in compression during the time of maturing. Flexural and shrinkage tests were also performed. The same tests were made for earth mortar compositions.

In brief, the experimental results allowed us to characterise the mechanical and physical properties of typical (non stabilized) compressed earth bricks and mortars and understand the behaviour of the structural elements of earth masonry. Compressive strength value of earth brick compacted at 5 MPa, ranged from 3.0 to 3.5 MPa. Maximum deformations of these bricks were less than 3.5‰. Stress-strain curves of earth mortars have revealed their elastoplastic behavior. Compressive strength values were subjected to a statistical data processing which led to empirical equations in function of the soil content and the time of maturing of the sample.

Keywords: Earth bricks, earth mortars, mechanical characteristics