

# Earthen domes in the Aleppo region (Syria): materials and building techniques

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**Abstract** The paper presents the results of a survey on the earthen domes in the villages of Aleppo's region (Syria). These buildings give rise to residential complexes characterized by high habitability, sustainability, and, last but not least, by an absolute value due to remarkable architectural and construction technology. The main element that identifies these buildings is the dome covering, pseudo cone shaped, made of earth bricks, arranged in slightly overhanging rows (growing in spiral), that rest on square cells. The building techniques, the geometry and structural solutions have been identified through a field survey and the subsequent creation of a scale model. Moreover the compositional and mechanical characterization of the building materials as been performed focused to understand the problems of durability and the structural behaviour of the masonries. The "false" dome buildings of the villages in the region of Aleppo, being made of earth bricks walled with an earth mortar, do not share the mechanical models commonly used for tholoi but require the formulation of models typical of the pseudo-monolithic constructions. The study allows us to affirm the complete reliability of these brickworks, assigning the responsibilities of the numerous observed failures to the crisis of support systems and to the loss of efficiency of the external protection (plaster coatings). These buildings represent a "poor" culture but nevertheless important for historical, anthropological and unique characters, representative of production processes which protection is of strategic interest as evidence of man's capacity to adapt and take advantage of local resources. In addition, the techniques used in vernacular architecture, are often the best solution in terms of economy, comfort and sustainability because they are the result of an adaptation that cannot afford wastes. It is clear that these three aspects are of considerable relevance and can provide useful suggestions in the new housing.

**Keyword** Syria, building systems, corbelled domes, mud bricks, earthen buildings