

Investigation of the Use of Unburnt Clay Bricks in Load Bearing Structures

Johannes Reeh Scheibelein

DTU Department of Civil Engineering, Technical University of Denmark

INSTRUCTION AND BACKGROUND

The project aims to investigate the use of unfired clay bricks in supporting structures. The unfired clay bricks are sensitive to moisture. In light of this, this study will aim to evaluate the moisture dependent strength-properties of the unfired clay bricks. The study will also contain concrete proposals on how the building envelope can be built with unfired clay bricks. The study will give several suggestions on how the unfired clay bricks, should be handled as a building material. This includes how the structure is protected from the weather in the construction phase.

MANUFACTURING AND ENERGY CONSUMPTION

The manufacturing of concrete and fired bricks is bound by heavy energy consumption. We need to find new building-materials, which do not demand a lot of energy to manufacture. According to [1] the energy consumption in the manufacturing and construction of a 140 m² house is 98% less for unfired clay bricks than a house build of concrete and fired bricks. This of course has huge implications of carbon-foot-print of such a structure.

INDOOR CLIMATE AND LEVELS OF RELATIVE HUMIDITY

Buildings today are more closed with respect to moisture-transport, than buildings historically have been. This is mainly because of the height demands on insulation-properties. However, this can lead to moisture-related problems, such as bad indoor climate, or even desiccation of the structure itself. The unfired clay brick very good moisture-transport properties and is totally breathable. This means that moisture trapped in the construction can be transported to the free air. The indoor climate is never too humid or too dry. This of course has positive implications on the energy needed for ventilation-installations, which then becomes more or less obsolete. In the end we have saved energy in the manufacturing of the materials for housing, and we have saved energy in running the building, when taken into use. We use 40% off all consumed energy on buildings, so there is a lot to save.

UNFIRED CLAY BRICKS IN LOAD BEARING STRUCTURES

The study shows, that unfired clay bricks are more than capable of taking the loads subjected to it, when building normal living size houses, villas, etc. This gives good confirmation of what was already known based on practical experience. The code of conduct for designing masonry structures is Eurocode 6, which the unfired clay brick has been fitted into. This gives a tool for architects and engineers to design new and modify existing structures in accordance with the design code.

REFERENCES

[1]: Gregersen, T., & Kristiansen, E. Ubrændt lerjords byggetekniske egenskaber., DTU BYG 2010