







Review


Fired clay bricks manufactured by adding wastes as sustainable construction material – A review

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<https://doi.org/10.1016/j.conbuildmat.2014.03.045> 

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Abstract

This paper provides a review of research concerning the recycling of different types of wastes into **eco-friendly fired clay bricks (FCB's)**. Materials and methods of researches are discussed. Several properties of bricks, made by incorporating additives are reviewed as well as procedures in accordance with international standards are highlighted. **Most common results, grouped by type of additive, are shown and discussed.** In conclusion, the reuse of waste in brick production might be **an environmental friendly way to manage them.** In some cases it even implies an enhancement of the bricks properties as well as an advantage for brick producers.

Introduction

Manufacturing activities produce different amounts of substances which are not wanted for the main purpose of such process. Industry, agriculture and also cities where we live,

produce large amounts of these substances. The target for engineers must be developing new ways to recover waste into new products by the so called 3R system, reuse, reduce and recycling [1].

Large mass flow and high temperatures are required in order to be viable for this type of waste management. Therefore, the research has been focused on the ceramic sector. This sector meets both needs. Therefore this paper is only focused on fired clay bricks and does not pay attention to others types of waste bricks such as concrete or unfired blocks.

Reducing waste is not the only reason to investigate the addition of certain residues into a clay matrix, although traditionally it has been the main purpose of research on this topic. Other reasons may be considered. Wastes may save energy in the manufacturing process by increasing local temperature, in some stages of the firing process in a tunnel kiln. Their higher heating values (HHV) are added by self-combustion within the clay matrix so less energy is needed to fire the bricks. Their addition may also reduce water requirements by improving the plasticity of the blend and depending on the waste nature, some properties of FCB's may be improved.

Therefore there are more reasons for using additives in the ceramic sector than just recycling. Various researches have been conducted focusing on the enhancement of FCB's. Some authors studied the effects on manufacturing processes and in other cases research just took into account how much waste was possible to add while remaining within minimum standard requirements.