Book of Abstracts

Escola de Engenharia da Universidade do Minho

VI International Materials Symposium

MATERIAIS 2011

XV Meeting of SPM – Sociedade Portuguesa de Materiais

18-20 Abril 2011

Guimarães, Portugal

PERFORMANCE ASSESSMENT OF WASTE FIBRE-REINFORCED MORTAR

C. Gonilho-Pereira[1], P. Faria[1], R. Fangueiro[2], P. Vinagre[1], S. Ratão[1], N. Pereira[1]

[1]*The Polytechnic Institute of Setubal, Portugal, cristiana.pereira@estbarreiro.ips.pt*
[2]*University of Minho, School of Engineering, Portugal*

The increase of extraction and processing of natural resources is accompanied by the formation of significant amount of waste materials - only 1/3 of extracted raw material is used to produce industrial output; the rest 2/3 turn into waste materials and by-products.

Comparative studies on recycling and waste management options reveal significant environmental advantages of recycling over landfilling and incineration. Therefore, the cost, quality and availability of raw materials became of paramount importance and a significant number of companies are currently developing secondary manufacturing processes for their waste materials and by-products.

Among the industries producing wasting materials, textile industry produces large amounts of waste which are used with success in second-line products. Although the usage of waste fibrous materials in the building construction industry is already a reality, namely in the production of thermal and acoustic insulation panels, their disposal in landfills is still a reality. Waste fibrous materials are accumulated at textile factories and the technical challenge is the search for new applications for waste products of fibrous materials.

An interesting application seems to be fiber-reinforced mortar mixtures for masonry applications, new or replacing existing mortars, which have not been extensively studied.

The selection of appropriate mortar mixtures is an important research problem once four main factors should be considered in their design - durability, flexural resistance, compatibility and, consequently, economy. The addition of reinforcing fibers reduces the size of cracks in cementitious materials, which also reduces the ingress of water, the primary factor in the deterioration which influence durability and compatibility with the support.

In this paper an experimental work is presented which main objective is the evaluation of the influence of the percentage of waste fibrous materials usage on the performance of fiber-reinforced mortars. Moreover, the influence of binder type is evaluated. Therefore mortars were produced with three different binders – cement, powder hydrated lime and powder hydrated lime with metakaolin.

Mortars performance evaluation was carried out through flow consistency, dynamic modulus of elasticity, flexural and compressive strength, freeze/thaw, open porosity, capillary absorption, drying and adherence tests.

Keywords: Waste fibrous material; Fibre-reinforced mortar; Durability; Recycling.