



**5º CONGRESSO IBERO-LATINO-AMERICANO
EM SEGURANÇA CONTRA INCÊNDIOS**

***5th IBERIAN-LATIN-AMERICAN CONGRESS
ON FIRE SAFETY***

15-17 /07/ 2019 - Porto, Portugal

**Atas dos Resumos
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FIRE BEHAVIOUR OF ECOLOGICAL SOIL-CEMENT BLOCKS WITH WASTE INCORPORATION – EXPERIMENTAL AND NUMERICAL ANALYSIS

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1. INTRODUCTION

The increasing interest on earth construction as a sustainable building solution led to the development of modern earth construction techniques, in particular of masonry made of compressed earth blocks (CEBs). Soil is an abundant raw material, recyclable and reusable, non-combustible, non-toxic, with significant thermal behaviour and without too expensive transformation processes, which allows selecting this material as a major possibility for sustainable construction. The main goal of the present study is to assess the behaviour of soil-cement blocks with incorporation of organic wastes. The problem of waste accumulation exists worldwide and has become a concern for today's society, leading to enormous environmental damage. One of the possibilities for reducing their environmental impact is the reuse of these wastes in new materials. However, incorporating wastes changes mechanical, physical and thermal properties of the new material. In order to evaluate the potential use of the wastes in blocks composition, laboratory tests were conducted and results were analysed [1]. This paper presents the fire behaviour of ecological soil-cement blocks with waste incorporation. At high temperatures, physical and mechanical changes were evaluated in the tested elements. Therefore, an experimental program was performed using samples of wall panel with soil-cement blocks. Previously, thermomechanical behaviour on cylindrical samples at different temperature

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ranges have been studied, [2]. The highest temperature tested was 600°C. The wall specimens under fire conditions were also analysed by a non-linear transient finite element numerical model, in time and temperature domains, and the numerical and experimental temperature fields compared.

2. EXPERIMENTAL PROGRAM

The wall panel had 1 m², tested in a fire resistance furnace according to EN 1364-1 [3] applied for non-loadbearing elements, Figure 1. Fire resistance is a measure of the ability of a building element to resist a fire, usually the time for which the element can meet appropriate criteria during exposure to a standard fire resistance test. Two performance criteria were verified which are the integrity and the insulation. The geometry of the blocks that form the wall consists in a hollow block with dimensions 210 × 110 × 80 mm³ (width × thickness × height), Figure 2.

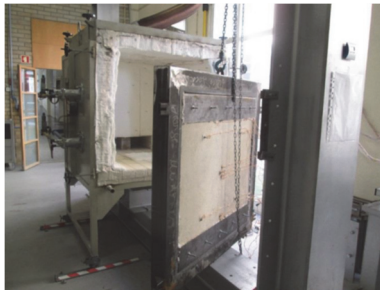


Figure 1: Fire-resistance furnace



Figure 2: Soil-cement blocks with wastes

3. CONCLUSIONS

The incorporation of wastes into the soil-cement mixtures allows another use for the compound, while saving on the amount of soil to be used. In this work, the fire behaviour of wall elements in soil-cement blocks with the incorporation of wastes are evaluated. Suitability is related to the material's ability to remain intact for a given period of time and under adverse temperature conditions, thus ensuring insulation integrity conditions.

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