

Nanofire: Fire behavior of conventional and innovative thermal mortars (CERIS seed project, 2021-2022)

Partners: CERIS/IST

CERIS Principal Investigator: I. Flores-Colen

CERIS research team members: J. P. Firmo, G. Borsoi, M. Arruda, A. Duarte, F. Ferreira

Funding: FCT

Total budget: 15.000€ CERIS: 15.000€

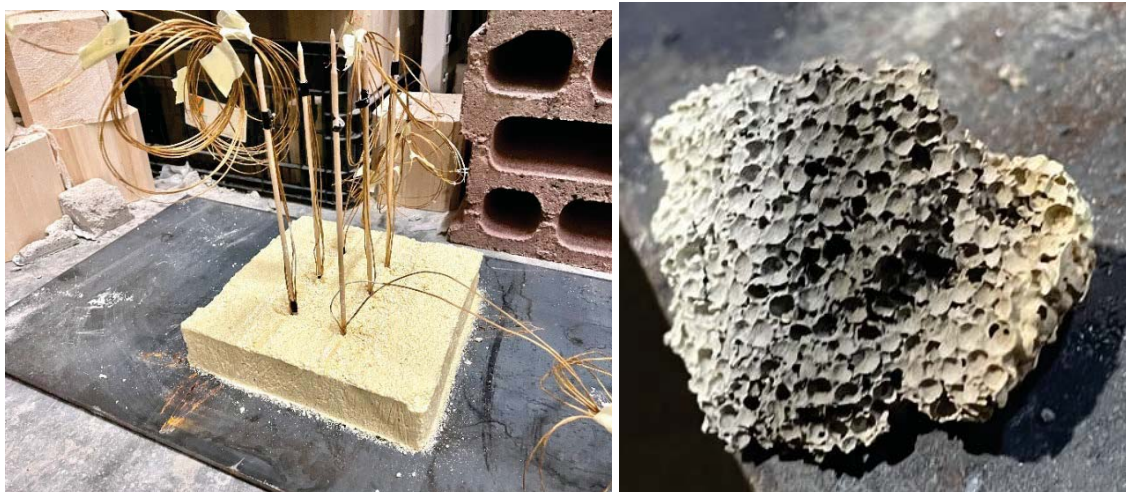
Period: 01/08/2021-31/01/2022

Summary description: The aim of this project is to study the fire behaviour of conventional EPS-based thermal mortars and innovative ones, integrating aerogel in their composition. The study consists in comparing the fire reaction properties, determining the thermophysical and thermodynamic properties and, based on these results, proposing a risk matrix. For this, the experimental campaign includes fire reaction tests to determine the heat of combustion and the ignitability of these products. Fire resistance tests, in which mortars will be subjected to a standard fire curve (ISO 834) and, based on the temperature distributions, their thermophysical properties at high temperatures will be determined/ calibrated. Residual properties characterization tests - mortars heated to high temperatures (e.g. 200, 300, 400°C) and, after cooling down to room temperature, the mechanical properties will be inferred through standard tests. The comparison is established not only between the different mortar compositions, but also between the degradation of their properties and components when heated, compared to the preliminary results obtained at room temperature. The lime mortar is used as a reference, being a mortar widely used in the market and whose behaviour to fire is the most favourable, class A1. The EPS mortar is representative of a common thermal mortar, whose properties are also known. The potential interest of the research is focused on the mortar containing a nanomaterial as aggregate, the aerogel.

CERIS participation: this study is framed within the thematic lines of CERIS related to Rehabilitation of the Natural Built Environment, Risk and Safety in the Built Environment and Response to Natural and Society changes. The 5 researchers involved are members of three research groups of CERIS: RG2 – Environment and Water Resources; RG5 – Studies in Construction and RG6 – Structures and Geotechnics

Output: the project intends to deliver: i) calibration of thermophysical properties of thermal mortars (EPS and Aerogel) as function of temperature; ii) evaluation of fire reaction properties of the studied mortars; iii) determination of residual mechanical properties of studied mortars post heated; iv) to propose a fire risk matrix of the studied materials based on the results obtained.

Illustrations:



EPS Mortar testing set-up (on the right) and detailed view post exposure to standard fire curve

Indicators: 2 papers in conferences and one international collaboration with Prof. F. Markert from DTU (Denmark)