

NANOFIRE - Fire behaviour of conventional and innovative thermal mortars

Summary

This project aimed to study the fire behaviour of the degradation of their properties and conventional EPS-based thermal mortars and components when heated. The lime mortar was innovative ones, integrating aerogel into their used as a reference, being widely used in the composition. The study compared the fire market and whose behaviour to fire is the most reaction properties, determining thermophysical and thermodynamic properties representative of a standard thermal mortar, and proposing a risk matrix based on these results. whose properties are also known. The potential For this, the experimental campaign included fire interest of the research was focused on the reaction tests to determine the heat of mortar combustion and the ignitability of these products. aggregate, the aerogel.

Fire resistance tests, in which mortars were subjected to a standard fire curve (ISO 834) and their thermophysical properties at elevated temperatures were determined/ calibrated based on the temperature distributions. 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 were inferred through standard tests. Compared to the preliminary results obtained at room temperature, The comparison is established between the different mortar compositions and

the favourable, class A1. The EPS mortar was containina a nanomaterial as

The project output was: i) calibration of thermophysical properties of thermal mortars (EPS and Aerogel) as a function of temperature; ii) evaluation of fire reaction properties of the studied mortars; iii) determination of residual mechanical properties of studied mortars postheated; iv) proposal of a fire risk matrix of the studied materials based on the results.

Two conference papers, one Master's dissertation, and one international collaboration with Prof. F. Markert from DTU (Denmark) were carried out. Two articles in journals are in preparation.

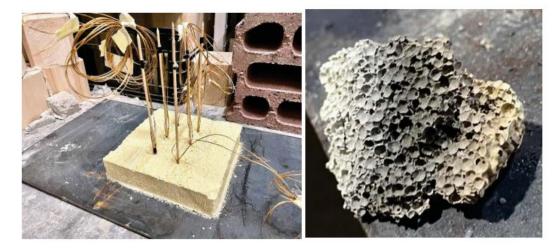


Figure 1. EPS Mortar testing set-up (on the left) and detailed view post-exposure to standard fire curve (on the right).

Project Reference

Leading Institution

CERIS – Civil Engineering Research and Innovation for Sustainability (Portugal)

Partners

DTU (Denmark) – internship

CERIS Principal Investigator

Inês Flores-Colen (ines.flores.colen@tecnico.ulisboa.pt)

CERIS Research Team

João Firmo, Giovanni Borsoi, Mário Arruda, António Duarte, Filipa Ferreira

Funding

CERIS – Civil Engineering Research and Innovation for Sustainability

Period

2021

Total 15 000.00€

CERIS

Project Website

percoat.tecnico.ulisboa.pt/Docs/ nanofire.pdf