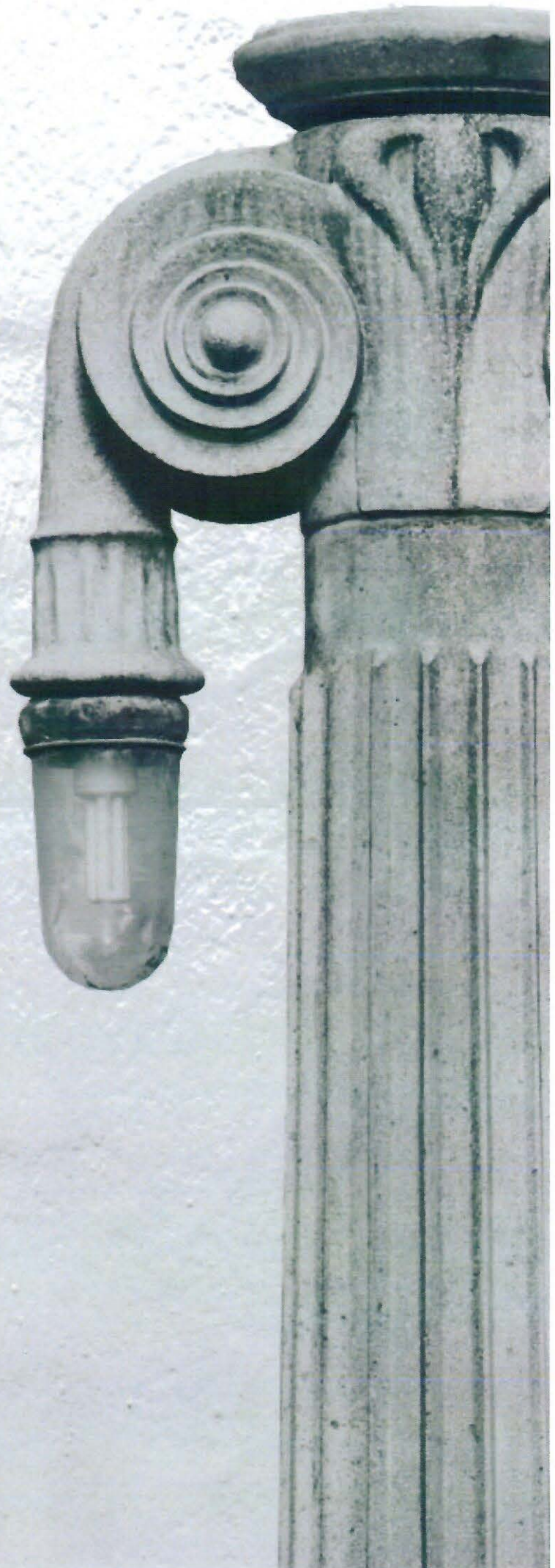


# 6th Historic Mortars Conference

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## ENHANCEMENT OF LATENT HEAT STORAGE CAPACITY OF LIME RENDERING MORTARS

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**Keywords:** Air lime mortars; Phase Change Materials (PCM); Thermal energy storage materials; thermal efficiency, renders

**Abstract:** Microencapsulated Phase Change Materials (PCMs) were introduced in air lime rendering mortars in order to improve the thermal comfort of the inhabitants and the energy efficiency of buildings of the Architectural Heritage under the premises of minimum intervention and maximum compatibility. PCMs were directly added during the mixing process to fresh air lime mortars in three different percentages: 5, 10 and 20 wt. %. Some chemical additives were also incorporated to improve the final performance of the renders: a starch derivative as an adhesion booster, metakaolin as pozzolanic addition to shorten the setting time and to increase the final strength; and a polycarboxylate ether as a superplasticizer to adjust the fluidity of the fresh renders avoiding an excess of mixing water. The specific heat  $C_p$ , the enthalpy  $\Delta H$  ascribed to the phase change and the melting temperature of the PCMs were determined by Differential Scanning Calorimetry (DSC). The capacity of the renders to store/release heat was demonstrated at a laboratory scale, proving by thermal conductivity measurements the effectiveness of PCMs for the reduction of gaps between peak and off-peak thermal loads as well as for the delay in the appearance of the peaks. The favourable results proved the effect of these PCMs with respect to the thermal performance of these rendering mortars, offering a promising way of enhancement of the thermal efficiency of building materials of the Cultural Heritage.