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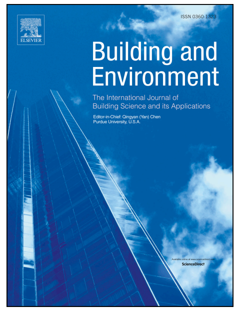

Characterization and thermal performance evaluation of infrared reflective coatings compatible with historic buildings

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TITLE

CHARACTERIZATION AND THERMAL PERFORMANCE EVALUATION OF INFRARED REFLECTIVE COATINGS COMPATIBLE WITH HISTORIC BUILDINGS

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ABSTRACT
Two infrared reflective coatings recently developed as part of the EFFESUS European research project are characterized and evaluated in this paper. Thermal performance, durability, compatibility with historic fabric, and reversibility are all analysed. The results of extensive research that include laboratory analysis of selected substrates, measurements on a large-scale traditional masonry mock-up, thermodynamic simulations, and finally application in to a real historic building in Istanbul, all support the potential of the new coatings to improve the thermal performance of historic buildings, in keeping with their visual integrity and cultural value. Besides their reflective properties, proven by the thermal stress reductions on the treated surfaces, the new coatings are characterized by low visual impact, easy application, material compatibility, and reversibility after application, as well as durability over time.

1. INTRODUCTION

Reflective coatings are passive solutions that reflect a proportion of incidental infrared (IR) surface radiation. They contribute to mitigation of the effects of the heat island phenomenon at an urban level, while decreasing the cooling demand in summer and improving indoor thermal comfort within the building. The literature contains immense scientific effort to design geo-engineering solutions for the effective mitigation of climate change and the consequent heat island effect, using high albedo materials for “cool roofs”, urban paving and building envelopes [1]. The development and the environmental and energetic performance of cool coatings technologies are widely discussed in two review articles [2; 1]. The first generation of cool coatings consisted of natural materials (generally, natural stone aggregates) with a high albedo (higher than 0.8), light colours and walkable surfaces for application principally on roofs and pavements [1; 3; 4]. Then, a second generation of non-white materials with an albedo higher than the first generation of coatings was also recently