Deterioration of Masonry Surfaces and of Surface Treatments: Experimental Results on Full-Scale Models

Luigia Binda[1], Paolo Rocca[2], and Thea Squarcina[3]

Abstract:

Salt crystallization and frost-defrost action are among the most frequent causes of masonry decay. Surface treatments using advanced materials, like organic and inorganic resins, are being applied to existing and new masonry to provide protection and improve serviceability when aggressive agents are present in the environment. A systematic approach to the study of durability of surface treatments has been conducted by the authors for several years. The study, previously based on accelerated aging tests and subsequently on the measurement of surface deterioration of treated and untreated specimens, has now been extended to full-scale facades. Small structures designed by the authors with modular masonry facades have been built in an open field. Some of the facades have been treated with waterproofing and consolidant materials, others will be treated after being badly damaged by sulfate attack. Data on the thermohygrometric conditions of the environment, collected over four years, and the moisture and salt movements in the walls, are presented. Discussion is provided on the increasing deterioration of the treated and untreated masonry surfaces, the influence of mortar joints, the position and exposure of the walls, the movement of moisture, and the damage diffusion. Comparison between the in-situ and laboratory results were conducted to adjust the aging tests to the natural environment.

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[1] Professor, Department of Structural Engineering, Milan Polytechnic, Italy
[2] Researcher, ICITE-CNR, S. Giuliano Milanese, Italy
[3] Ph.D., Department of Structural Engineering, Milan Polytechnic, Italy