Lead-Glazed Architectural Terra Cotta: A Comparative Study of Consolidants

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Most published studies regarding consolidation of ceramics focus on polychromy, engobes, and archaeological artefacts rather than glazes. The conservation of an architectural terra cotta enabled a new study on glaze consolidation. The challenge was to find a consolidant fluid enough to penetrate between the glaze and body without penetrating the substrate. This consolidant should also provide adequate adhesion and not impact the object's original brightness and colour. As complete reversibility of consolidation is difficult to achieve, it should also have good ageing properties.

Seven consolidants were selected to test under similar conditions, and pretests determined the best solvent and concentration (w/w) to use: 25% ACRIL 33 in water; 10% Aquazol 500 in acetone; 15% PARALOID B-72 in acetone; 15% mixture of 1:1 Aquazol 500 and PARALOID B-72 in acetone; 5% Mowital B 60 HH in acetone; 25% PRIMAL E-330S (CM330) in water; and 50% PRIMAL WS-24 in water.

A comparative study of these seven consolidants was conducted using three tests. The samples used were made by infiltrating the chosen polymer between a glass slide, which imitated the glaze layer, and a piece of terra cotta. The first test compared colorimetry before and after application, using a spectrophotometer. The glass slide was applied leaving an overhang on the terra cotta substrate, which facilitated the second test to evaluate bond strength: with the terra cotta fixed on the table, weights (2.2 g each) were incrementally added on the glass overhang every five seconds until the bond broke. The last test measured visible penetration into the terra cotta: the samples were cut in half and the distance travelled by the consolidant was measured at two fixed points, which were averaged to approximate overall depth of penetration. The protocol showed that PARALOID B-72 was the most suitable consolidant for the 'glazed' terra cotta tested. Aquazol 500 and the Aquazol 500/PARALOID B-72 mix were also satisfactory.

A lower concentration of PRIMAL E-330S could result in a weaker bond and reduce colour change. Conversely, a higher concentration of PRIMAL WS-24 could improve adhesion and lower penetration. Mowital B 60 HH could also show better results with a higher concentration, but the solution was already viscous at 5 percent (w/w) in acetone. This consolidant could be more effective on ceramics with a lower degree of porosity, thereby decreasing penetration and increasing bond strength. A higher concentration of ACRIL 33 could increase the already high colorimetry change and is not a good choice for terra cotta.