Correlating Qualitative Surface Profile Assessment Methods to Quantitative Methodology on Prepared Concrete Substrates

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Tables

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Foreword

Coating/lining manufacturers and/or facility owners frequently specify cleaning and roughening of the concrete surface prior to product installation. The specifications may reference qualitative methods including visual assessments using comparison coupons or quantitative methods including surface profile depth measurements. However, prior to this Technical Report, there was no known data to inform a conversion between qualitative and quantitative methods. The outcomes of this Technical Report enable coating manufacturers, engineers, specifiers, and contractors to convert well-established qualitative methods to quantitative values based on an interlaboratory experiment. While current quantitative methods can measure up to 6 mm (250 mils), extremely rough concrete surfaces (exceeding ~1.5 mm, or ~50 mils) were not included in the experiment due to the inability to stabilize the instrument probe and obtain accurate data.

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Scope

This Technical Report describes an experimental process that was used to create a “Lookup Table” for correlating qualitative descriptions of concrete roughness to quantitative values of surface profile.

Rationale

Proper bonding of coatings and linings to concrete surfaces requires proper cleaning of the concrete and also frequently requires the concrete surface to be roughened to increase its surface area. Abrasive blast cleaning, acid etching, or various impact/scarifying power tools can be used to augment the natural roughness of the concrete surface. The resulting surface profile depth can influence coating/lining adhesion and performance.

The surface profile (roughness) of prepared concrete can be assessed visually using Concrete Surface Profile (CSP) Chips such as those described in Guideline No. 310.2R produced by the International Concrete Repair Institute (ICRI), or by creating a replica of the prepared surface using an epoxy putty as described in ASTM D7682 and comparing it to the specified ICRI chip (Method A) or taking depth micrometer measurements from the replica (Method B). ASTM D8271 describes a procedure for acquiring measurements directly from the prepared concrete using an electronic depth micrometer. The Technical Applications for Concrete Materials (TACM)[1] group also produces concrete samples that are mechanically (or chemically) processed by the actual methods used to obtain the ICRI CSP® profiles. AMPP SP21513 addresses the frequency and acceptability of concrete surface profile measurements using any of these methods.

The CSP Chips produced by ICRI are arguably the most widely recognized and most frequently specified method to assess concrete roughness; however, this method (as well as the TACM concrete samples) is qualitative and requires some judgment. The procedures described in ASTM D7682 (Method B) and ASTM D8271 are quantitative but are not widely specified. There is value in correlating the qualitative and quantitative methods of assessing the surface profile of prepared concrete so that specifiers can specify either, without inadvertently invoking contradictory requirements.

[1] Technical Applications for Concrete Materials (TACM) is a privately held subsidiary of Artflor, Inc., www.technicalconcrete.com.

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