IN-LB	Inch-Pound Units
SI	International System of Units

Guide for Assessment and Surface Preparation for Application of Protection Systems for Concrete

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This document provides general guidance for determining appropriate acceptance criteria for a prepared surface to receive a protection system. There are many techniques for preparation of a surface prior to installation of a protection system, and no single method is ideal for all situations. This guide discusses various preparation methods that can be used to achieve the intended surface condition.

Keywords: coatings; membranes; protection systems; surface preparation.

CONTENTS

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CHAPTER 1—INTRODUCTION AND SCOPE

1.1—Introduction

Proper surface preparation is critical to the short- and long-term performance of protection systems applied to concrete. Inadequate surface preparation is one of the most common causes of concrete protection system failures. This guide provides information and recommendations for the evaluation and preparation of concrete surfaces that are to receive a protective system. Various protection systems and their descriptions are provided in ACI 515.2R.

It is important to note that surface preparation requirements may vary with the protection system selected. The protection system manufacturer will typically have specific requirements for prepared surface conditions for their materials, including the surface profile, moisture level, acceptability of cracks, and surface pH. The manufacturer may also provide recommended remediation techniques for addressing surface contamination, surface and substrate moisture, moisture migration, surface profile, cracks, or other qualities of the final prepared surface. Failure to meet the manufacturer's surface preparation requirements may not only impact the protection system's performance but also the manufacturer's warranty, the owner's acceptance, the installer's liability, or any combination thereof.

1.2—Scope

This guide is not intended to and does not supersede the requirements specified or identified by the protection system manufacturer or as required by applicable ordinances or regulations. However, in situations where the best practices identified in this guide differ from the requirements of the protection system manufacturer, the specifier or installer should consider discussing these differences with the owner, the protection system manufacturer, or both, before the system is installed.

This guide is intended for bonded or penetrating surface-applied concrete protection systems, such as coatings, linings, and sealers. While information contained herein may be applicable to other concrete protection systems, it is not specifically intended for other concrete protections systems, such as cathodic protection systems, concrete overlays, or integral admixtures. In addition, some sections of this guide may not be applicable to concrete protective systems applied in extreme environments, such as in submerged conditions or at extreme temperatures.

CHAPTER 2—DEFINITIONS

2.1—Definitions

Please refer to the latest version of ACI Concrete Terminology for a comprehensive list of definitions. Definitions provided herein complement that resource.

defect—surface condition that may or may not require repair prior to application of a protection system, depending on the protection system specified and manufacturer's requirements.

protection systems—bonded or penetrating surface-applied concrete protection systems, such as coatings, linings, and sealers.

CHAPTER 3—PROJECT EVALUATION

Surface preparation of concrete is required prior to the application of protection systems when used for either repair/rehabilitation or new construction projects. Whether freshly placed or existing, the concrete being considered for the application of a protection system should be inspected and its condition evaluated in conjunction with the selection of a protection system. This understanding of the subject concrete condition (along with the project constraints and desired protection system performance) will impact both the types and methods of surface preparation used as well as the selection of the protection system itself.

3.1—Condition assessment of concrete

Before selection or application of a protection system, it is prudent to assess the condition of the concrete to which the protection system will be applied. During this assessment, it is important to identify the general concrete characteristics that influence selection and application of a protection system, including pH, moisture content, or surface voids such as honeycombing and bugholes. The condition assessment may include tasks such as the evaluation of the subject concrete element's structural integrity, material properties, presence of moisture or water, presence of contaminants, environmental conditions (including temperature range, weather, chemical exposure, and traffic), and other items that may affect the performance of a protection system and the ability to satisfactorily install the system. ACI 364.1R provides information related to assessment of a concrete structure.

The findings of this condition assessment will determine the appropriate method or combination of methods to be used for providing the surface preparation necessary to meet the requirements of the protection system to be applied. Consider variations in the surface conditions observed in vertical or overhead areas versus those in horizontal areas when choosing surface preparation methods and techniques.

3.1.1 *Visual inspections*—Begin every condition assessment with a visual inspection of the concrete surface. ACI 201.1R provides information related to visual inspections of concrete.

Fig. 3.1.1a—Spalled concrete that will likely need to be addressed prior to installation of a protection system.

Fig. 3.1.1b—Spalled concrete that will likely need to be addressed prior to installation of a protection system.

Typically, when the concrete is in good condition and the environmental conditions, material properties, and history of the subject concrete are well understood, a visual assessment may be sufficient to provide the necessary understanding to determine the appropriate surface preparation, method(s), and technique(s). However, in many situations, the visual assessment will identify conditions that may require additional evaluation, such as spalled concrete or surface cracking (Fig. 3.1.1a, 3.1.1b, and 3.1.1c), which are discussed in the following subsections.

3.1.2 *Visible concrete defects*—During a visual assessment, defects on the concrete substrate may exist that could affect the performance of the selected protection system. Based on the specific protection system selected, a manufacturer may require that a surface defect be repaired prior to application. Depending on the defect(s) and the protection system being used, mitigation of the defect(s) may be required. These defects may include conditions such as spalls, cracks, surface voids such as honeycombing or bugholes, excess concrete paste, and sand streaks. Depending on the cause,

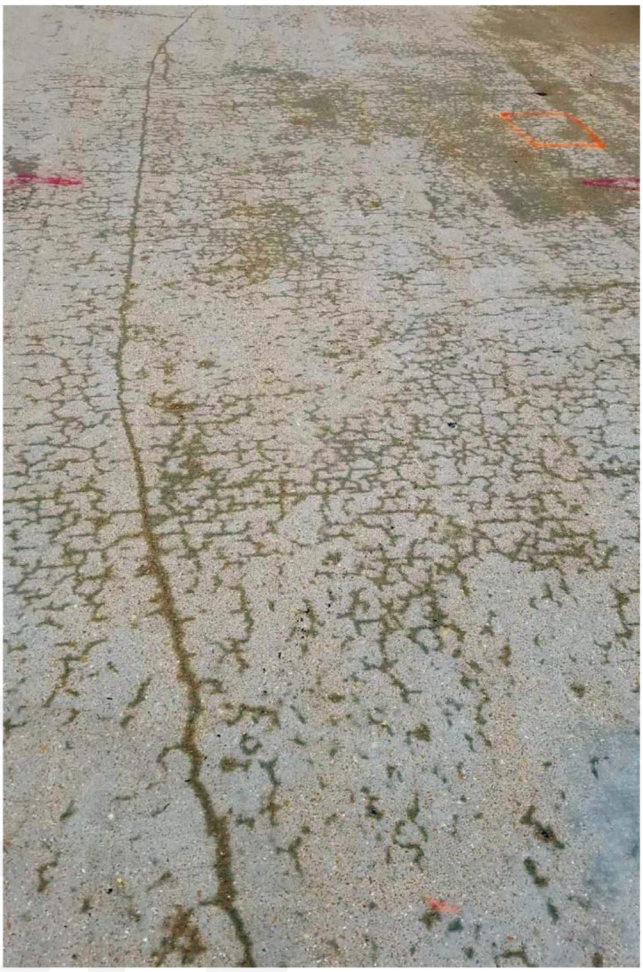

Fig. 3.1.1c—Surface craze cracking may not need to be repaired prior to installation of a protection system.

nature, and extent, the observed defects may: a) represent structural integrity issues; b) affect protection system performance; or c) be benign. Evaluation by qualified professionals, including the protective systems technical services representative, a licensed design professional, or both, may be required to access the cause, severity, and impact of the noted defects on the selected system.

3.1.2.1 *Structural concrete defects*—A structural concrete defect is a condition where the load-carrying capacity or integrity of an element is reduced. A qualified licensed design professional should determine if a structural defect exists, requires repair, or both. Structural repair procedures are beyond the scope of this guide. Refer to ACI 364.1R and ACI 349.3R for guidance on the evaluation of concrete structures before rehabilitation. Refer to ACI 546R, ACI 546.2R, ACI 546.3R, ACI 562, ACI 563, ACI Repair Application Procedures (RAP) documents (RAP-1 through RAP-14), and International Concrete Repair Institute (ICRI) 320.1R for guidance on concrete repair procedures.

3.1.2.2 *Nonstructural concrete defects*—A nonstructural concrete defect may include surface cracks, surface distress, and textural features as described in ACI 201.1R. Determining if a nonstructural defect requires removal or repair depends on the nature and extent of the defect(s), and