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TechNote

Surface Treatments in Parking Structures: Elastomeric Waterproofing Membranes—TechNote

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Introduction

Many parking structures, especially in northern climates or coastal areas where salt spray may occur, are subject to environments in which the concrete members are exposed to moisture, chlorides, and other deleterious materials. This can lead to corrosion of embedded reinforcement, concrete deterioration, and damage to the structure and contents within. Providing protective water-repellent and waterproofing systems is designed to stop the ingress of moisture, chlorides, and other deleterious materials; reduce the rate of corrosion-related deterioration; and extend the service life of the structure. There are several types of topically applied protective systems or materials that are commonly available, including coatings, protective treatments, and sealants.

Traffic-bearing waterproofing membrane systems (traffic coatings) are commonly used in parking structures to provide protection against intrusion of moisture, chlorides, and other deleterious materials. They are typically impermeable and elastomeric, allowing the coating to accommodate movement of the concrete element that has been coated. Less common coatings, not covered in this TechNote, include asphaltic overlay membrane systems and other membrane systems with noncomposite overlays. Although there are other waterproofing solutions, this TechNote will focus on the most commonly used traffic coatings, comprising of flexible polymer-based components. In addition to material selection considerations, surface preparation and quality assurance testing requirements should be specified based on structure and site considerations.

Question

What are the benefits, considerations, components, materials, testing, and procedures for the selection and installation of traffic-bearing waterproofing membrane systems for parking structures?

Answer

Traffic-bearing waterproofing membrane systems comprise several components or layers of elastomeric materials that protect the structure from the ingress of moisture, chlorides, and other deleterious materials, thereby reducing or preventing the corrosion-related deterioration of the structure. The materials commonly found in membrane systems include urethanes, epoxies, methacrylates, and sometimes epoxy/urethane hybrid materials. Appropriate surface preparation requirements, quality assurance testing, environmental exposure, and existing site conditions should be considered in the selection of the traffic coating system and included when specifying and performing the membrane installation. Although membranes have benefits, they add cost to the project and require periodic maintenance, including recoating or replacement.

Discussion

The primary purpose of traffic coatings in a parking structure is to prevent moisture, chlorides, and other deleterious materials from penetrating the various components of the parking structure. Membranes can also prevent water from entering occupied portions of a building or structure located below parking areas. If chlorides penetrate a concrete structure, and the concentration of the chloride ions reaches the corrosion threshold level at the steel reinforcement or other steel embedments, corrosion can initiate given the presence of moisture and oxygen. Over time, the corrosion can result in cracking delaminations, spalling, and section loss of the embedded steel reinforcement. If left unaddressed, these conditions can result in a reduction in the load-carrying capacity of the concrete structure and create hazardous conditions within the parking structure. When properly installed in new construction, a traffic coating will delay the onset of embedded steel corrosion, extend the life of the structure, and reduce costs associated with future structural repairs. When installed as part of a repair or maintenance program, a traffic coating will also extend the life of the repairs and reduce the corrosion rate of the existing reinforcement. It should be noted that membranes have a limited service life, and provisions for replacement and repair should be included in maintenance budgets.