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Maintenance and Rehabilitation Considerations for Corrosion Control of Atmospherically Exposed Existing Steel-Reinforced Concrete Structures

ABSTRACT

Presents corrosion control guidelines that are applicable to existing atmospherically exposed structures made of concrete conventionally reinforced with carbon steel. These guidelines should be used primarily when repair or rehabilitation is being implemented because of deterioration resulting from the corrosion of steel reinforcement. Includes sections on Periodic Inspection and Routine Maintenance of reinforced-concrete structures (site survey, structural survey, repair options), Assessment of Reinforced Concrete Structures, and Corrosion Control Techniques and Repair Strategy. Corrosion control techniques that are described include surface treatments, removal of concrete, and electrochemical treatments, including ECE, ER, and cathodic protection.

KEYWORDS

Reinforced concrete, reinforcing steel, electrochemical chloride extraction, ECE, electrochemical realkalization, ER, cathodic protection, ICCP, GACP, TG 324.

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Foreword

Corrosion of reinforcing steel in concrete is a serious problem in certain environments throughout the world. This corrosion is directly attributable to the presence of significant amounts of chloride or other aggressive substances at the steel surface. Parking structures, bridges and roadways, buildings, sanitary and water facilities, marine structures, concrete pipe, storage facilities, and other reinforced concrete structures are being damaged by corrosion.

Corrosion of the reinforcing steel can weaken or destroy a structure. Corrosion of the reinforcing steel in concrete and the resulting cracking and spalling of concrete cost billions of dollars each year. These losses can be reduced if proper corrosion control factors are considered during rehabilitation and maintenance repair of reinforced concrete structures.

The purpose of this standard is to give maintenance personnel, engineers, and facility owners the necessary considerations for corrosion control of existing atmospherically exposed steel-reinforced concrete structures. These considerations include guidelines to control corrosion of reinforcing steel in portland cement concrete structures.

The provisions of this standard should be applied under the direction of a registered professional engineer or a person certified by NACE as a Corrosion Specialist or Cathodic Protection (CP) Specialist. His or her professional experience should include suitable experience in corrosion control of reinforced concrete structures.

This NACE standard was originally prepared in 1990 by NACE Task Group (TG) T-3K-5, a component of Unit Committee T-3K, "Corrosion and Other Deterioration Phenomena Associated with Concrete." To provide the necessary expertise on all aspects of the subject and to gain input from all interested parties, TG T-3K-5 was composed of corrosion consultants, consulting engineers, architect-engineers, CP engineers, researchers, structure owners, and representatives from industry and government. Unit Committee T-3K became Group Committee T-11, "Corrosion and Deterioration of the Infrastructure," and later Specific Technology Group (STG) 01, "Reinforced Concrete." This standard was revised by TG T-11-4a in 1998 and reaffirmed by STG 01 in 2006. It was revised in 2009 and reaffirmed with editorial changes in 2019 by TG 324, "Reinforced Concrete: Maintenance and Rehabilitation Considerations for Existing Structures." It is published by NACE under the auspices of STG 01.

In NACE standards, the terms ***shall, must, should,*** and ***may*** are used in accordance with the definitions of these terms in the NACE Publications Style Manual. The terms ***shall*** and ***must*** are used to state a requirement, and are considered mandatory. The term ***should*** is used to state something good and is recommended, but is not considered mandatory. The term ***may*** is used to state something considered optional.

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