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Detection and Mitigation of Stray-Current Corrosion of Reinforced and Prestressed Concrete Structures

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ABSTRACT

This NACE International standard practice establishes the general principles to be adopted to minimize the effects of stray current corrosion caused by direct current (DC) and/or alternating current (AC) from external sources on steel reinforced concrete (RC) and prestressed concrete (PC) structures or structural elements. The standard practice offers guidance for the design of concrete structures that may be subject to stray-current corrosion; the detection of stray current interference; the selection of protection measures; and the selection of mitigation methods. The standard practice is intended for use by designers of RC and PC structures, professionals working with electrochemical techniques (e.g., cathodic protection [CP], realkalization, and electrochemical chloride extraction [ECE]); owners of structures with the risk of reinforcement corrosion caused by stray currents; owners of systems that could generate stray currents to concrete structures; engineers; and other interested parties.

KEYWORDS

alternating current (AC), cathodic protection (CP), concrete, corrosion, direct current (DC), electrochemical chloride extraction (ECE), electrochemical techniques, grounding, impressed current cathodic protection (ICCP), IR-free potential, NACE Publication 01110, NACE SP0177, NACE SP0290, prestressed concrete (PC), potential interference, rail transit, realkalization, reinforcement corrosion, sacrificial anodes, static stray currents, steel reinforced concrete (RC), STG 01, stray currents, Stray Current Corrosion, stray-current mitigation, telluric currents, TG 356.

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Foreword

This NACE International standard practice establishes the general principles to be adopted in order to minimize the effects of stray current corrosion caused by direct current (DC) and/or alternating current (AC) from external sources on steel reinforced concrete (RC) and prestressed concrete (PC) structures or structural elements. The standard practice is intended to offer guidance for: the design of concrete structures that may be subject to stray-current corrosion; the detection of stray current interference; the selection of appropriate protection measures; and the selection of appropriate mitigation methods.

The standard practice is intended for use by designers of RC and PC structures, professionals dealing with electrochemical techniques (e.g., cathodic protection [CP], realkalization, and electrochemical chloride extraction [ECE]), owners of structures with the risk of reinforcement corrosion caused by stray currents, owners of systems that could generate stray currents to concrete structures, engineers, and other interested parties.

The technical background for this standard is published as NACE Publication 01110, prepared by Task Group (TG) 356.[1]

This standard practice was prepared in 2019 by NACE TG 356, “Reinforced Concrete: Stray-Current-Induced Corrosion.” This TG is administered by Specific Technology Group (STG) 01, “Reinforced Concrete”; and is sponsored by STG 05, “Cathodic/Anodic Protection.” This standard practice is issued by NACE International under the auspices of STG 01.

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