Inspection Methods for Corrosion Evaluation of Conventionally Reinforced Concrete Structures

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ABSTRACT

This NACE International standard practice provides testing procedures and investigative techniques for the evaluation of conventionally reinforced concrete structures. The investigation and evaluation techniques described in this standard focus on degradation resulting from corrosion of the reinforcing steel. These techniques range from simple visual inspections that identify rust staining, cracks, and delamination to physical and chemical inspection methods, which use hammer rebound, ultrasonic testing, electrical resistance, chemical analyses, or electrochemical potential and corrosion rate measurements.

This standard is intended for use by corrosion specialists, civil engineers, and structural engineers involved with evaluating corrosion of reinforcing steel in concrete. It also may be useful to owners of reinforced concrete structures whose service life may be affected by reinforcing steel corrosion. It includes commentary for screening corrosion control methods that might be considered for restoration of the reinforced concrete structure being evaluated.

KEYWORDS

Reinforced concrete, reinforcing steel, concrete structure inspection, corrosion survey, delamination, cover thickness, corrosion potential, corrosion rate, carbonation depth, concrete resistivity, electrical continuity testing, chloride content measurement, chloride profile, TG 055.

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Foreword

This NACE International standard practice provides testing procedures and investigative techniques for the evaluation of conventionally reinforced concrete structures. This document does not include epoxy coated, galvanized, stainless, stainless cladded, or fiber reinforcing materials. Inspection methods discussed in this standard may not pertain to these other reinforcing materials. The investigation and evaluation techniques described in this standard focus on degradation resulting from corrosion of the reinforcing steel. When distress of a structure is evident, it is important to determine the nature of the degradation to select the best restoration strategy. Although this standard does not specifically address restoration options, additional information on repairs and corrosion mitigation techniques can be found in other NACE International standard practices, test methods, and state-of-the-art reports and publications from other organizations.[1-16]

This standard is intended for use by corrosion specialists, civil engineers, and structural engineers involved with evaluating corrosion of reinforcing steel in concrete. It also may be useful to owners of reinforced concrete structures whose service life may be affected by reinforcing steel corrosion.

NACE Task Group (TG) 055 prepared this standard. The TG is composed of manufacturers, users, consulting engineers, and other interested parties, and this standard represents a consensus of those members. This standard is not intended to be all encompassing. However, it provides information that allows the user to perform testing and evaluation of atmospherically exposed reinforced concrete structures. Note that the information gathered during this investigation may require subsequent investigation and evaluation by qualified structural engineering personnel, depending on the nature and extent of degradation.

This standard was prepared in 2008 and reaffirmed in 2018 by NACE TG 055, "Inspection Methods for Corrosion Evaluation of Conventionally Reinforced Concrete Structures," which is administered by Specific Technology Group (STG) 01, "Reinforced Concrete" and sponsored by STG 62, "Corrosion Monitoring and Measurement: Science and Engineering Applications." It is published under the auspices of STG 01.

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