NACE Publication 01104-2020
Item No. 24223
Approved: 3 Jan 2020

Electrochemical Realkalization of Steel-Reinforced Concrete—A State-of-the-Art Report

This NACE International technical committee report represents a consensus of those individual members who have reviewed this document, its scope, and provisions. Its acceptance does not in any respect preclude anyone from manufacturing, marketing, purchasing, or using products, processes, or procedures not included in this report. Nothing contained in this NACE report is to be construed as granting any right, by implication or otherwise, to manufacture, sell, or use in connection with any method, apparatus, or product covered by Letters Patent, or as indemnifying or protecting anyone against liability for infringement of Letters Patent. This report should in no way be interpreted as a restriction on the use of better procedures or materials not discussed herein. Neither is this report intended to apply in all cases relating to the subject. Unpredictable circumstances may negate the usefulness of this report in specific instances. NACE assumes no responsibility for the interpretation or use of this report by other parties.

Users of this NACE report are responsible for reviewing appropriate health, safety, environmental, and regulatory documents and for determining their applicability in relation to this report prior to its use. This NACE report may not necessarily address all potential health and safety problems or environmental hazards associated with the use of materials, equipment, and/or operations detailed or referred to within this report. Users of this NACE report are also responsible for establishing appropriate health, safety, and environmental protective practices, in consultation with appropriate regulatory authorities if necessary, to achieve compliance with any existing applicable regulatory requirements prior to the use of this report.

CAUTIONARY NOTICE: The user is cautioned to obtain the latest edition of this report. NACE reports are subject to periodic review, and may be revised or withdrawn at any time without prior notice. NACE reports are automatically withdrawn if more than 10 years old. Purchasers of NACE reports may receive current information on all NACE publications by contacting the NACE FirstService Department, 15835 Park Ten Place, Houston, TX 77084-5145 (tel: +1 281-228-6200, email: firstservice@nace.org)

ABSTRACT

Presents state-of-the-art information on electrochemical realkalization (ER) of conventionally reinforced concrete structures. Included are discussions of common industry practices used by design engineers to control corrosion of reinforcing steel in portland cement concrete structures through the application of ER. Intended for use by engineers attempting to protect corroding reinforced concrete structures by use of electrochemical treatment techniques. The information presented in this report is limited to ER for atmospherically exposed reinforced concrete and is not applicable to prestressed or post-tensioned elements or concrete containing epoxy-coated reinforcing steel, galvanized, or other coated or nonferrous reinforcement. Part II of a two-part series. Part I focuses on electrochemical chloride extraction of chloride-contaminated concrete.

KEYWORDS

Reinforced concrete, electrochemical realkalization, portland cement, carbonated concrete, TG 556

Foreword

The purpose of this technical committee report is to present state-of-the-art information on electrochemical realkalization (ER) for conventionally reinforced concrete structures. Included are discussions of common industry practices used by design engineers to control corrosion of reinforcing steel in portland cement concrete structures through the application of ER. This report is intended for use by engineers attempting to protect corroding reinforced concrete structures by use of electrochemical treatment techniques. The information presented in this report is limited to ER for atmospherically exposed reinforced concrete and is not applicable to prestressed or post-tensioned elements or concrete containing epoxy-coated reinforcing steel, galvanized, or other coated or nonferrous reinforcement.

This report, focusing on realkalization of carbonated concrete structures, is Part II of a two-part series. Part I focuses on electrochemical chloride extraction of chloride-contaminated concrete.[1] Research on rebar bond strength and other issues reviewed there may be relevant to ER treatment. The reader is therefore advised to review both documents.

This technical committee report was originally prepared in 2004 by Task Group (TG) 054 on Electrochemical Chloride Extraction and Realkalization of Reinforced Concrete in collaboration with the Corrosion Prevention Association.[(1)] It was revised in 2020 by TG 556,* "Electrochemical Realkalization of Steel-Reinforced Concrete—A State of the Art Report." Task Group 556 is administered by Specific Technology Group (STG) 01 on Reinforced Concrete. This report is issued by NACE International 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.

[(1)] Corrosion Prevention Association (CPA), Kingsley House, Ganders Business Park, Kingsley, Bordon, Hampshire, GU35 9LU, UK.

* Chairman David Whitmore, President, Vector Corrosion Technologies Ltd., Winnipeg, Canada.

Electrochemical Realkalization of Steel-Reinforced Concrete—A State-of-the-Art Report