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Elektrokemisk realkalisering och kloridutdrivning för armerad betong –
Del 1: Realkalisering

Electrochemical realkalization and chloride extraction treatments for reinforced concrete –
Part 1: Realkalization

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TECHNICAL SPECIFICATION

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English version

Electrochemical realkalization and chloride extraction treatments for reinforced concrete - Part 1: Realkalization

Ré-alcalinisation électrochimique et traitements d'extraction des chlorures applicables au béton armé - Partie 1 : Ré-alcalinisation

Elektrochemische Realkalisierung und Chloridextraktionsbehandlungen für Stahlbeton - Teil 1: Realkalisierung

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Foreword

This document (CEN/TS 14038-1:2004) has been prepared by Technical Committee CEN/TC 219 “Cathodic protection”, the secretariat of which is held by BSI.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to announce this Technical Specification: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

Introduction

The purpose of realkalization is to provide long-term corrosion protection of steel reinforcement in concrete, which has become carbonated.

There are other electrochemical procedures, which can be used to provide corrosion protection of steel in concrete structures. These include cathodic protection and chloride extraction. There is a European Standard for cathodic protection of steel in concrete (EN 12696).

It is assumed in the drafting of this document that the execution of its provisions is entrusted to appropriately qualified and competent people, for whose use it has been prepared.

1 Scope

This document specifies a procedure for carrying out impressed current electrochemical realkalization of carbonated reinforced concrete in existing structures. It is applicable to atmospherically exposed parts of structures with ordinary reinforcement embedded in concrete.

This document does not apply to concrete containing prestressing steel which can suffer hydrogen embrittlement during realkalization, or to concrete containing epoxy-coated or galvanized reinforcement, or if chloride contamination is contributing to reinforcement corrosion.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

prEN 14629:2003, *Products and systems for the protection and repair of concrete structures — Test methods — Determination of chloride content in hardened concrete*

prEN 14630:2003, *Products and systems for the protection and repair of concrete structures - Test methods - Determination of carbonation depth in hardened concrete by the phenolphthalein method*

EN 12696:2000, *Cathodic protection of steel in concrete*

ENV 1504-9, *Products and systems for the protection and repair of concrete structures — Definitions, requirements, quality control and evaluation of conformity — Part 9: General principles for use of products and systems.*

EN ISO 8044:1999, *Corrosion of metals and alloys — Basic terms and definitions (ISO 8044:1999)*.

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 8044:1999 and the following apply.

3.1
realkalization
electrochemical treatment for restoring to concrete, which surrounds reinforcing bars, a high pH value corresponding to sound, non-carbonated concrete

4 Principle

Realkalization of reinforced concrete is performed by applying an electric field between the steel reinforcement embedded in the concrete and an anode surrounded by an alkaline electrolyte solution containing carbonate or hydroxyl ions temporarily placed on the concrete surface.

NOTE 1 The carbonated area treated by realkalization lies beneath the anode.

NOTE 2 Details of the principle underlying this process are given in the European Federation of Corrosion report [1].

NOTE 3 Electrolyte solutions of sodium, potassium and lithium may be used.

5 Assessment and repair of the structure

5.1 General

Prior to undertaking realkalization an assessment of the structure, including its physical condition, its structural integrity and the nature and extent of any repairs, which might be needed, shall be performed in accordance with ENV 1504-9.

The investigations specified in 5.2 to 5.8 shall be carried out in order to:

a) determine the suitability of the structure for realkalization;

b) provide information for design.

5.2 Review of records

All available drawings, specifications, records and notes shall be reviewed for information on the location, quantity, nature (e.g. mild or high strength steel, smooth or deformed bar, galvanized, epoxy-coated) and continuity of the reinforcement, as well as the constituents and quality of the concrete.

NOTE The possible sensitivity to reduction of bond strength should be evaluated in the case of smooth reinforcement.

5.3 Inspection

An inspection shall be carried out to ascertain the type, causes and extent of defects and any features of the structure or of its surrounding environment, which could influence the application and effectiveness of realkalization. All areas of the structure, which require realkalization, shall be checked for delamination of the concrete cover. Defects such as delaminations, cracks, honeycombing or poor construction joints which could permit significant water penetration, or prevent current flow and thereby impair the effectiveness of the realkalization treatment, shall be recorded.

NOTE 1 In areas, which have been previously repaired, the repair methods and materials used should be identified, as far as possible. If the concrete behind the repair is to be realkalized, the electrical resistivity and porosity of the repair media should be considered.

The cause of any deterioration, which is not attributable to corroding reinforcement, shall be determined.

NOTE 2 If any signs of structural distress are evident, an assessment of both the load-bearing capacity of the structure and the need for temporary or permanent strengthening or support should be made.

5.4 Carbonation depth measurement

Carbonation depth shall be measured according to prEN 14630 at several locations to ascertain its distribution.