SLOVENSKI STANDARD
SIST EN ISO 12696:2012

01-maj-2012

Nadomešča:
SIST EN 12696:2000

Katodna zaščita jekla v betonu (ISO 12696:2012)

Cathodic protection of steel in concrete (ISO 12696:2012)

Kathodischer Korrosionsschutz von Stahl in Beton (ISO 12696:2012)

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Protection cathodique de l'acier dans le béton (ISO 12696:2012)

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Ta slovenski standard je istoveten z: **EN ISO 12696:2012**

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ICS:

77.060	Korozija kovin	Corrosion of metals
91.080.40	Betonske konstrukcije	Concrete structures

SIST EN ISO 12696:2012 **en,fr,de**

2003-01.Slovenski inštitut za standardizacijo. Razmnoževanje celote ali delov tega standarda ni dovoljeno.

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EUROPEAN STANDARD

NORME EUROPÉENNE

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Cathodic protection of steel in concrete (ISO 12696:2012)

Protection cathodique de l'acier dans le béton (ISO 12696:2012)

Kathodischer Korrosionsschutz von Stahl in Beton (ISO 12696:2012)

This European Standard was approved by CEN on 31 January 2012.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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COMITÉ EUROPÉEN DE NORMALISATION
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Foreword

This document (EN ISO 12696:2012) has been prepared by Technical Committee CEN/TC 219 "Cathodic protection", the secretariat of which is held by BSI, in collaboration with Technical Committee ISO/TC 156 "Corrosion of metals and alloys".

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by August 2012, and conflicting national standards shall be withdrawn at the latest by August 2012.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 12696:2000.

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

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INTERNATIONAL STANDARD

ISO 12696

First edition
2012-02-01

Cathodic protection of steel in concrete

Protection cathodique de l'acier dans le béton

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 12696 was prepared by the European Committee for Standardization (CEN) Technical Committee CEN/TC 219, *Cathodic protection*, in collaboration with Technical Committee ISO/TC 156, *Corrosion of metals and alloys* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This first edition cancels and replaces EN 12696:2000, which has been technically revised.

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Introduction

This International Standard applies to cathodic protection of steel in concrete, with the concrete atmospherically exposed, buried or immersed.

Because the criteria of protection for steel in buried or immersed concrete are those applicable to cathodic protection of steel in atmospherically exposed concrete, this revision of EN 12696:2000 incorporates cathodic protection of steel in buried and immersed concrete. The provision of cathodic protection current can often be more economically provided to steel in buried and immersed concrete by using buried or immersed anode systems detailed in International Standards for buried and immersed steel structures, rather than the anode systems that are suitable for applications to steel in atmospherically exposed concrete. Therefore reference is made to other International Standards in this respect whilst the cathodic protection performance criteria for steel in concrete are defined in this International Standard for all exposures.

There are other electrochemical treatments intended to provide corrosion control for steel in concrete. These techniques include re-alkalisation and chloride extraction and are not incorporated into this International Standard. CEN/TS 14038-1:2004[7] and CEN/TS 14038-2:2011[27] have been published.

Cathodic protection of steel in concrete is a technique that has been demonstrated to be successful in appropriate applications in providing cost effective long-term corrosion control for steel in concrete. It is a technique that requires specific design calculations and definition of installation procedures in order to be successfully implemented. This International Standard does not represent a design code for cathodic protection of steel in concrete but represents a performance standard for which it is anticipated, in order to comply with this standard, a detailed design and specification for materials, installation, commissioning and operation will be prepared.

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Cathodic protection of steel in concrete

1 Scope

This International Standard specifies performance requirements for cathodic protection of steel in cement-based concrete, in both new and existing structures. It covers building and civil engineering structures, including normal reinforcement and prestressed reinforcement embedded in the concrete. It is applicable to uncoated steel reinforcement and to organic-coated steel reinforcement.

This International Standard applies to steel embedded in atmospherically exposed, buried, immersed and tidal elements of buildings or structures.

NOTE 1 Annex A gives guidance on the principles of cathodic protection and its application to steel in concrete.

NOTE 2 This International Standard, whilst not specifically intended to address cathodic protection of steel in any electrolyte except concrete, may be applied to cathodic protection of steel in other cementitious materials such as are found, for example, in early 20th century steel-framed masonry, brick and terracotta clad buildings. In such applications, additional considerations specific to these structures are required in respect of design, materials and installation of cathodic protection; however, the requirements of this International Standard may be applied to these systems.

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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.

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ISO 8044, *Corrosion of metals and alloys — Basic terms and definitions*

ISO 13174, *Cathodic protection for harbour installations*

EN 1504 (all parts), *Products and systems for the protection and repair of concrete structures — Definitions, requirements, quality control and evaluation of conformity*

EN 12954, *Cathodic protection of buried or immersed metallic structures — General principles and application for pipelines*

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

EN 14630, *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 15257, *Cathodic protection — Competence levels and certification of cathodic protection personnel*

IEC 60502-1, *Power cables with extruded insulation and their accessories for rated voltages from 1 kV (U_m = 1,2 kV) to 30 kV (U_m = 36 kV) — Part 1: Cables for rated voltages of 1 kV (U_m = 1,2 kV) and 3 kV (U_m = 3,6 kV)*

IEC 60529, *Degrees of protection provided by enclosures (IP Code)*

IEC 61140, *Protection against electric shock — Common aspects for installation and equipment*

IEC 61558-1, *Safety of power transformers, power supplies, reactors and similar products — Part 1: General requirements and tests*

IEC 61558-2-1, *Safety of power transformers, power supplies, reactors and similar products — Part 2-1: Particular requirements and tests for separating transformers and power supplies incorporating separating transformers for general applications*

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IEC 61558-2-2, *Safety of power transformers, power supplies, reactors and similar products — Part 2-2: Particular requirements and tests for control transformers and power supplies incorporating control transformers*

IEC 61558-2-4, *Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1 100 V — Part 2-4: Particular requirements and tests for isolating transformers and power supply units incorporating isolating transformers*

IEC 61558-2-13, *Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1 100 V — Part 2-13: Particular requirements and tests for auto transformers and power supply units incorporating auto transformers*

IEC 61558-2-16, *Safety of transformers, reactors, power supply units and similar products for voltages up to 1 100 V — Part 2-16: Particular requirements and tests for switch mode power supply units and transformers for switch mode power supply units*

IEC 62262, *Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 8044 and EN 1504 and the following apply.

3.1
zone
part of a cathodic protection system

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NOTE Anode systems may be divided into separate zones to supply current to a fully continuous reinforcement mesh. Alternatively, a single anode zone may supply current to separate, electrically isolated, zones within the reinforcement system. Zones may comprise an individual anode zone for each reinforcement zone or exposure condition. As the current provision to each of the zones in each of these alternatives can be separately measured, all of them are generically called “cathodic protection zones” and specifically “anode zones” or “cathode zones”.

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3.2
humectant
hygroscopic material, i.e. a substance that promotes the retention of moisture

NOTE It may be applied to the surface of a galvanic anode to keep the concrete-anode interface moist.

4 General

4.1 Quality management systems

The design, the installation, the energizing, the commissioning, and the long-term operation of all of the elements of cathodic protection systems for steel in concrete shall be fully documented.

NOTE ISO 9000 constitutes a suitable Quality Management Systems Standard which may be utilized.

Each element of the work shall be undertaken in accordance with a fully documented quality plan.

Each stage of the design shall be checked and the checking shall be documented.

Each stage of the installation, energizing, commissioning and operation shall be the subject of appropriate visual, mechanical and/or electrical testing, and all testing shall be documented.

All test instrumentation shall have valid calibration certificates traceable to national or European Standards concerning calibration.

The documentation shall constitute part of the permanent records for the works.

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4.2 Personnel

Each aspect of the cathodic protection system design, installation, testing of the installation, energizing, commissioning and long-term operational control shall be under the supervision of personnel with appropriate qualifications, training, expertise and experience in the particular element of the work for which they are responsible.

NOTE Cathodic protection of steel in concrete is a specialist multidiscipline activity. Expertise is required in the fields of electrochemistry, concrete technology, civil and/or structural engineering and cathodic protection engineering.

Personnel who undertake the design, supervision of installation, commissioning, supervision of operation, measurements, monitoring and supervision of maintenance of cathodic protection systems shall have the appropriate level of competence for the tasks undertaken. EN 15257 specifies a suitable method which may be utilized for assessing the competence of cathodic protection personnel.

The competence of cathodic protection personnel to the appropriate level for tasks undertaken should be demonstrated by certification in accordance with EN 15257 or by another equivalent prequalification procedure.

4.3 Design

This International Standard does not represent a design code but is a performance standard.

Cathodic protection systems for steel in concrete shall be the subject of detailed design.

The design shall, as a minimum, include the following:

a) detailed calculations;

b) detailed installation drawings;

c) detailed material and equipment specifications;

d) detailed method statements or specifications for installation, testing, energizing, commissioning and operation;

e) structures containing prestressing shall be assessed for their susceptibility to hydrogen embrittlement and for risk of stray currents.

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NOTE Annex B lists items that should be considered in the detailed design.

5 Structure assessment and repair

5.1 General

For cathodic protection (or cathodic prevention) of new structures, see 5.12.

The assessment of an existing structure, including its material condition, its structural integrity, and whether and how to repair it, shall be performed in accordance with EN 1504.

When cathodic protection is proposed as the repair/protection method, or part of it, for a structure, additional investigation shall be undertaken in order to

a) confirm the suitability of cathodic protection, and

b) provide system-design input information. See Annex B.

These investigations shall include, but shall not be limited to, those in 5.2 to 5.10.

5.2 Records

All available drawings, specifications, records and notes shall be reviewed to assess the location, quantity, nature (e.g. normal, galvanized, epoxy-coated, prestressed) and continuity of the reinforcement and any additional steel, the constituents and quality of the concrete.

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