

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

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## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

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Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
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English Version

**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)

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COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

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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of an identical text or by endorsement, at the latest by August 2012, and conflicting national standards shall be withdrawn at the latest by August 2012.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.

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# Contents

Page

Foreword .....	v
Introduction .....	vi
1 Scope .....	1
2 Normative references .....	1
3 Terms and definitions .....	2
4 General .....	2
4.1 Quality management systems .....	2
4.2 Personnel .....	3
4.3 Design .....	3
5 Structure assessment and repair .....	3
5.1 General .....	3
5.2 Records .....	3
5.3 Visual inspection and delamination survey .....	4
5.4 Chloride analysis .....	4
5.5 Carbonation depth measurement .....	4
5.6 Concrete cover and reinforcement location .....	4
5.7 Reinforcement electrical continuity .....	4
5.8 Steel/concrete potential .....	5
5.9 Concrete electrical resistivity .....	5
5.10 Repair .....	5
5.11 Cementitious overlay .....	6
5.12 New structures .....	6
6 Cathodic protection system components .....	7
6.1 General .....	7
6.2 Anode systems .....	7
6.3 Monitoring sensors .....	12
6.4 Monitoring instrumentation .....	14
6.5 Data management system .....	15
6.6 D.C. cables .....	16
6.7 Junction boxes .....	17
6.8 Power supplies .....	17
6.9 Transformer-rectifiers .....	17
7 Installation procedures .....	19
7.1 Electrical continuity .....	19
7.2 Performance monitoring system .....	19
7.3 Connections to steel in concrete .....	20
7.4 Concrete repairs associated with the cathodic protection components .....	20
7.5 Surface preparation for anode installation .....	20
7.6 Anode installation .....	21
7.7 Connections to the anode system .....	21
7.8 Anode overlay, surface sealant or decorative coating application .....	21
7.9 Electrical installation .....	22
7.10 Testing during installation .....	22
8 Commissioning .....	23
8.1 Visual inspection .....	23
8.2 Pre-energizing measurements .....	23
8.3 Initial energizing of impressed current systems .....	23
8.4 Initial adjustment of impressed current systems .....	24
8.5 Initial performance assessment .....	24
8.6 Criteria of protection: Interpretation of performance assessment data .....	25
8.7 Adjustment of protection current for impressed current systems .....	26

<b>9</b>	<b>System records and documentation</b> .....	<b>26</b>
<b>9.1</b>	<b>Quality and test records</b> .....	<b>26</b>
<b>9.2</b>	<b>Installation and commissioning report</b> .....	<b>27</b>
<b>9.3</b>	<b>Operation and maintenance manual</b> .....	<b>27</b>
<b>10</b>	<b>Operation and maintenance</b> .....	<b>28</b>
<b>10.1</b>	<b>Intervals and procedures</b> .....	<b>28</b>
<b>10.2</b>	<b>System review</b> .....	<b>29</b>
<b>10.3</b>	<b>System review report</b> .....	<b>29</b>
<b>Annex A (informative)</b>	<b>Principles of cathodic protection and its application to steel in concrete</b> .....	<b>30</b>
<b>Annex B (informative)</b>	<b>Design process</b> .....	<b>36</b>
<b>Annex C (informative)</b>	<b>Notes on anode systems</b> .....	<b>39</b>
<b>Bibliography</b>	.....	<b>44</b>

## 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<sup>[7]</sup> and CEN/TS 14038-2:2011<sup>[27]</sup> 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.

# 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.

## 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.

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*



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

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”.

#### 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.