

General principles of cathodic protection in sea water

General principles of cathodic protection in sea water

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN 12473:2000 sisaldab Euroopa standardi EN 12473:2000 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 17.07.2000 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p>	<p>This Estonian standard EVS-EN 12473:2000 consists of the English text of the European standard EN 12473:2000.</p> <p>This document is endorsed on 17.07.2000 with the notification being published in the official publication of the Estonian national standardisation organisation.</p> <p>The standard is available from Estonian standardisation organisation.</p>
--	---

<p>Käsitlusala:</p> <p>This European standard covers the general principles of cathodic protection including the criteria for protection, environmental and design considerations and secondary effects of cathodic protection and is intended as an introduction to other European standards in the general series "Cathodic protection of steel structures in sea water".</p>	<p>Scope:</p> <p>This European standard covers the general principles of cathodic protection including the criteria for protection, environmental and design considerations and secondary effects of cathodic protection and is intended as an introduction to other European standards in the general series "Cathodic protection of steel structures in sea water".</p>
--	--

ICS 23.040.99, 77.060

Võtmesõnad:

English version

General principles of cathodic protection in sea water

Principes généraux de la protection
cathodique en eau de mer

Allgemeine Grundsätze des
kathodischen Korrosionsschutzes in
Meerwasser

This European Standard was approved by CEN on 1999-12-03.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

The European Standards exist 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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, the Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom.

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

Contents

Page

Foreword	4
1 Scope	5
2 Normative references	5
3 Terms and definitions	5
4 Corrosion principles of buried or immersed metals	9
4.1 The nature of metallic corrosion	9
4.2 Polarisation	10
5 Principles of cathodic protection	12
6 The application of cathodic protection	14
6.1 Sacrificial anode method	14
6.2 Impressed current method	14
6.3 Hybrid systems	14
7 Determination of level of cathodic protection	17
7.1 Measurement of protection level	17
7.2 Reference electrodes	17
7.3 Potentials of reference electrodes	17
7.4 Potential measurement	18
8 Guidance for protection	18
8.1 General	18
8.2 Steel	18
8.3 Other metallic materials	19
9 Design considerations	22
9.1 Introduction	22
9.2 Technical and operating data	23
9.3 Surfaces to be protected	23
9.4 Protective coatings	23
9.5 Availability of electrical power	23
9.6 Weight limitations	23
9.7 Adjacent structures	23

9.8	Installation considerations.....	24
9.9	Current demand	24
10	Effect of environmental factors on current demand	24
10.1	Introduction	24
10.2	Dissolved oxygen.....	24
10.3	Sea currents.....	24
10.4	Calcareous deposits	25
10.5	Temperature.....	25
10.6	Salinity.....	26
10.7	pH.....	26
10.8	Marine fouling.....	26
10.9	Effect of depth	26
10.10	Seasonal variations and storms	26
11	Secondary effects of cathodic protection	26
11.1	Alkalinity	27
11.2	Environmentally-assisted cracking.....	27
11.3	Chlorine.....	28
11.4	Stray currents and Interference effects	28
12	The use of cathodic protection in association with surface coatings.....	28
12.1	Introduction	28
12.2	Coating selection	29
12.3	Coating breakdown	29
	Annex A (normative) Reference electrodes.....	30
	Bibliography	32

Foreword

This European Standard has been prepared by Technical Committee CEN/TC 219 "Cathodic protection", the secretariat of which is held by BSI.

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 July 2000, and conflicting national standards shall be withdrawn at the latest by July 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, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Annex A of this European standard is normative.

1 Scope

This European Standard covers the general principles of cathodic protection including the criteria for protection, environmental and design considerations and secondary effects of cathodic protection and is intended as an introduction to other European Standards in the general series "Cathodic Protection of Steel Structures in Sea Water".

This European Standard provides a link between the theoretical aspects and the practical applications of cathodic protection as contained in the European Standards:

prEN 12474:1997, *Cathodic protection for submarine pipelines.*

EN 12495:2000, *Cathodic protection for fixed steel offshore structures.*

prEN 12496:1997, *Galvanic anodes for cathodic protection in sea water and saline mud.*

prEN 13173:1998, *Cathodic protection for steel offshore floating structures.*

This group of European Standards does not cover cathodic protection of steel in concrete whether immersed or atmospherically exposed. These aspects are covered by prEN 12696-1:1997 and prEN 12696-2.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

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

3 Terms and definitions

For the purposes of this European Standard the terms and definitions in EN ISO 8044 and the following apply:

3.1

acidity

presence of an excess of hydrogen ions over hydroxyl ions ($\text{pH} < 7$)

3.2

alkalinity

presence of an excess of hydroxyl ions over hydrogen ions ($\text{pH} > 7$)

3.3

anaerobic condition

absence of free oxygen in the electrolyte

3.4

anodic area

that part of a metal surface which acts as an anode

3.5

bond

metal conductor, usually of copper, connecting two points with the intention of making the points equipotential

3.6

calcareous deposits

minerals precipitated on the steel cathode because of the increased alkalinity caused by cathodic protection