

# Cathodic protection for steel offshore floating structures

The European Standard EN 13173:2001 has the status of a  
British Standard

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# National foreword

This British Standard is the official English language version of EN 13173:2001.

Reference should also be made to BS 7361, Code of practice for land and marine applications, which will eventually be withdrawn when all the CEN standards relating to cathodic protection currently being prepared, are published.

The UK participation in its preparation was entrusted to Technical Committee GEL/603, Cathodic protection, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this committee can be obtained on request to its secretary.

## Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the BSI Standards Catalogue under the section entitled “International Standards Correspondence Index”, or by using the “Find” facility of the BSI Standards Electronic Catalogue.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

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This British Standard, having been prepared under the direction of the Electrotechnical Sector Committee, was published under the authority of the Standards Committee and comes into effect on 15 June 2001

## Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 25 and a back cover.

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English version

## Cathodic protection for steel offshore floating structures

Protection cathodique des structures en acier flottant en  
mer

Kathodischer Korrosionsschutz für schwimmende Offshore-  
Anlagen aus Stahl

This European Standard was approved by CEN on 6 July 2000.

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 Management Centre or to any CEN member.

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 Management Centre has the same status as the official versions.

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



EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

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## 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 2001, and conflicting national standards shall be withdrawn at the latest by July 2001.

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.

## Introduction

Cathodic protection is usually applied, mostly as a complement to protective coating or paint, to protect the external surfaces of steel offshore floating structures and appurtenances from corrosion due to sea water or saline mud.

Cathodic protection works by supplying sufficient direct current to the immersed surface of the structure in order to change the steel to electrolyte potential to values where corrosion is insignificant.

The general principles of cathodic protection are detailed in EN 12473.

## 1 Scope

This European Standard defines the means to be used to cathodically protect the submerged metallic surfaces of steel offshore floating structures and appurtenances in sea water and saline mud.

### 1.1 Structures

This European Standard covers the cathodic protection of the external surface of offshore floating structures which are static during their usual operating conditions. This essentially includes: barges, jack-ups, semi-submersible platforms, storage tankers, buoys, etc.

It also covers the submerged areas of appurtenances, such as chains, attached to the structure, when these are not electrically isolated from the structure.

It does not cover the cathodic protection of ships, fixed offshore structures, elongated structures (pipelines, cables) or harbour installations, which are covered by other standards.

This European Standard concerns only the cathodic protection of external surfaces immersed in sea water, including sea chests and water intakes up to the first valve.

This European Standard does not include the internal protection of surfaces of any components such as ballast tanks and hull internals of floating structures.

### 1.2 Materials

This European Standard covers the cathodic protection of structures fabricated principally from bare or coated carbon manganese steels

As some parts of the structure may be made of metallic materials other than carbon manganese steels, the cathodic protection system should be designed to ensure that there is a complete control over any galvanic coupling and minimise risks due to hydrogen embrittlement or hydrogen induced cracking (see EN 12473).

This European Standard does not cover concrete structures.

### 1.3 Environment

This European Standard is applicable for the whole submerged zone in sea water, brackish waters, saline mud which can normally be found where the floating structure is anchored, moored or moving.

This European Standard is also applicable to appurtenances which may be in contact with muds (e.g. chains).

For surfaces which are alternately immersed and exposed to the atmosphere, the cathodic protection is only effective when the immersion time is sufficiently long for the steel to become polarised.

## 1.4 Safety and environment protection

This European Standard does not cover safety and environmental protection aspects associated with cathodic protection. The relevant national or international regulations shall apply.

## 2 Normative references

This European Standard incorporates, by dated or undated references, 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 (including amendments).

EN 12473, *General principles of cathodic protection in sea water*.

prEN 12496, *Galvanic anodes for cathodic protection in sea water*.

## 3 Terms and definitions

For the purposes of this European Standard the terms and definitions in EN 12473 and the following apply:

### 3.1 atmospheric zone

zone located above the wetted zone; that means above the level reached by the normal swell, whether the structure is moving or not

### 3.2 boot topping

section of the hull between light and fully loaded conditions, which may be intermittently immersed

### 3.3 Cathodic Protection zone

that part of the structure which can be considered independently with respect to cathodic protection design

### 3.4 immersed zone

zone located below the water line at draught corresponding to normal working conditions

### 3.5 submerged zone

zone including the immersed and the buried zones

### 3.6 underwater hull

part of the hull vital for its stability and buoyancy of a floating structure, i.e. below the light water line

## 4 Design basis

### 4.1 Objectives

The major objective of a cathodic protection system is to deliver sufficient current to protect each part of the structure and appurtenances and distribute this current so that the potential of each part of the structure is within the limits given by the protection criteria (see 4.2).

Potentials should be as uniform as possible over the whole structure. This objective may only be approached by an adequate distribution of the protective current over the structure during its normal service conditions. However, it may be difficult to achieve in some areas such as chains, water intakes, sea chests, when supplementary cathodic protection systems should be considered.

The cathodic protection system for a floating structure is generally combined with a coating system, even though some appurtenances, such as chains, may not benefit from a coating protection.

Dielectric shields may be used in conjunction with anodes to minimise the risk of local over-protection.

The cathodic protection system should be designed either for the life of the structure or for a period corresponding to the maintenance dry-docking interval.

The above objectives should be achieved by the design of a cathodic protection system using galvanic anodes or impressed current systems or a combination of both.

### 4.2 Cathodic protection criteria

The criteria for cathodic protection are detailed in EN 12473.

To achieve an adequate cathodic protection level, steel structures should have potentials as indicated hereafter.

The accepted criterion for protection of steel in aerated sea water is a potential more negative than  $-0,80$  V measured with respect to Ag/AgCl/sea water reference electrode.

A negative limit of  $-1,10$  V (Ag/AgCl/sea water reference electrode) is generally recommended.

Where there is a possibility of coating disbondment and corrosion fatigue, the negative limit should be more positive. This negative limit should be documented.

### 4.3 Design parameters

The design of a cathodic protection system should be made in accordance with the following parameters: structure subdivision, components description and service conditions.

#### 4.3.1 Structure subdivision

A floating structure can be divided into different Cathodic Protection zones, (CP zones), which are then considered independently with respect to cathodic protection design, although they may not necessarily be electrically isolated.

**EXAMPLE 1** For a storage tanker, some specific components may not be included in the underwater hull CP zone and therefore constitute a CP zone by themselves (e.g. : seachests).

**EXAMPLE 2** For buoys, a single zone is generally considered, including two components: the body of the buoy and the influenced part of the mooring chain(s).

#### 4.3.2 Description of CP zones

Each C.P. zone may consist of several components which should be fully described including material, surface area and coating characteristics (type, lifetime and coating breakdown factor).