SLOVENSKI STANDARD
SIST EN 13174:2003

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Katodna zaščita za pristaniške napeljave

Cathodic protection for harbour installations

Kathodischer Korrosionsschutz für Hafenbauten

Protection cathodique des installations portuaires

Ta slovenski standard je istoveten z: **EN 13174:2001**

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EUROPEAN STANDARD
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English version

Cathodic protection for harbour installations

Protection cathodique des installations portuaires

Kathodischer Korrosionsschutz für Hafenbauten

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

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Contents

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of an identical text or by endorsement, at the latest by July 2001, and conflicting national standards shall be withdrawn at the latest by July 2001.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, together with protective coatings or paint to protect the external surfaces of steel harbour installations and appurtenances from corrosion due to sea water or saline mud.

Cathodic protection works by supplying sufficient direct current to the immersed external 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 immersed and buried metallic external surfaces of steel harbour installations and appurtenances in sea water and saline mud.

1.1 Structures

This European Standard covers the cathodic protection of fixed and floating structures. This essentially includes piers, jetties, dolphins (mooring and berthing), sheet or tubular piling, pontoons, buoys, floating docks, lock and sluice gates.

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 fixed or floating offshore structures, submarine pipelines or ships.

This European Standard does not include the internal protection of surfaces of any components such as ballast tanks and internals of floating structures or the internals or back faces of sheet steel piling which is in contact with backfill.

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 to the whole submerged zone in sea water, brackish waters and saline mud which can normally be found in harbour installations wherever these structures are fixed or floating.

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 splash zone, ie. above the level reached by the normal swell, whether the structure is moving or not

3.2
buried zone
zone located under the mud line

3.3
Cathodic Protection zone
that part of the structure which can be considered independently with respect to cathodic protection design

3.4
extended tidal zone
zone including the tidal zone, the splash zone and the transition zone

3.5
H.A.T.
level of highest astronomical tide

3.6
immersed zone
zone located above the mud line and below the extended tidal zone or the water line at a draught corresponding to the normal working conditions

3.7
L.A.T.
level of lowest astronomical tide

3.8
M.T.L.
mean tide level (also known as M.S.L. or M.W.L.)

3.9
R.O.V.
remotely operated vehicle

3.10
piling
deep foundation tubular or sheet steel element forming part or whole harbour structure

3.11
splash zone
the height of the structure which is intermittently wet and dry due to the wave action just above the H.A.T

3.12
submerged zone
zone including the buried zone, the immersed zone and the transition zone

3.13
transition zone
zone located below L.A.T. and including the possible level inaccuracy of the structure installation which is affected by a higher oxygen content due to normal swell or tidal movement

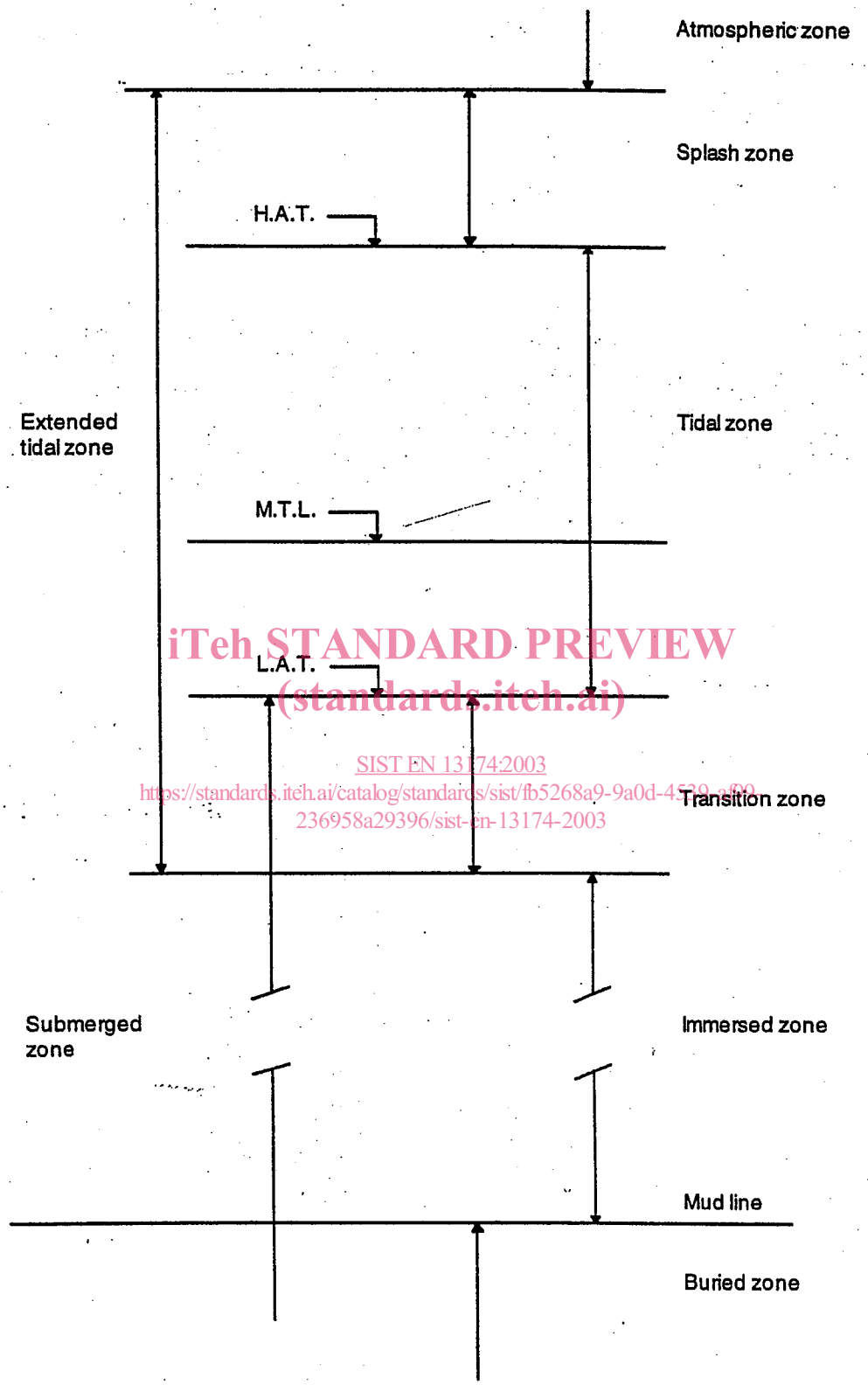

Figure 1 – Schematic representation of levels and zones in sea water environment

4 Design basis

4.1 Objectives

The major objective of a cathodic protection system is to deliver sufficient current to 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 may be approached only by an adequate distribution of the protective current over the structure during normal service conditions, however it may be difficult to achieve in some areas such as chains, when a supplementary cathodic protection system should be considered.

The cathodic protection system for a fixed and floating structure is generally combined with a coating system, even though some appurtenances such as chains, may not benefit from the use of coatings. Extensive coating damage may also occur to buried areas of piling which is driven into position during installation.

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 time of the structure or for a period corresponding to maintenance or dry-docking interval. Alternatively when it is not feasible to design the cathodic protection system for the life of the structure or dry-docking is not possible, the system should be designed for easy replacement, typically using divers or R.O.V.

The above objectives should be achieved by the design of a cathodic protection system using impressed current or galvanic anode 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 polarised potential more negative than -0,80 V measured with respect to silver/silver chloride/sea water reference electrode (Ag/AgCl/sea water reference electrode).

However, steel immersed in solutions which contain active sulphate reducing bacteria (anaerobic conditions), because of the possibility of microbiologically induced corrosion, a potential more negative than -0,90 V (Ag/AgCl/sea water reference electrode) is generally recommended.

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

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