DRAFT INTERNATIONAL STANDARD ISO/DIS 13174

Attributed to ISO/TC **156** by the Central Secretariat (see page iii)

Voting begins on
2005-04-05

Voting terminates on
2005-09-05

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

FAST-TRACK PROCEDURE

Cathodic protection for harbour installations

Protection cathodique des installations portuaires

ICS 47.020.99; 77.060

NOTE FROM THE ISO CENTRAL SECRETARIAT

This draft International Standard is submitted for voting to ISO member bodies under the fast-track procedure.

Technical Committee ISO/TC 156, *Corrosion of metals and alloys*, at its meeting held in May 2004, decided to approve the submission of the standard EN 13174:2001, *Cathodic protection for harbour installations*, for processing under the "Fast-track procedure", in accordance with the provisions of Clause F.2, Annex F, of the ISO/IEC Directives, Part 1 (fourth edition, 2001).

F.2 "Fast-track procedure"

F.2.1 Proposals to apply the fast-track procedure may be made as follows.

F.2.1.1 Any P-member or category A liaison organization of a concerned technical committee may propose that an **existing standard from any source** be submitted for vote as an enquiry draft. The proposer shall obtain the agreement of the originating organization before making a proposal. The criteria for proposing an existing standard for the fast-track procedure are a matter for each proposer to decide.

F.2.1.2 An international standardizing body recognized by the ISO or IEC council board may propose that a **standard developed by that body** be submitted for vote as a final draft International Standard.

F.2.1.3 An organization having entered into a formal technical agreement with ISO or IEC may propose, in agreement with the appropriate technical committee or subcommittee, that a **draft standard developed by that organization** be submitted for vote as an enquiry draft within that technical committee or subcommittee.

F.2.2 The proposal shall be received by the Chief Executive Officer, who shall take the following actions:

a) settle the copyright and/or trademark situation with the organization having originated the proposed document, so that it can be freely copied and distributed to national bodies without restriction;

b) for cases F.2.1.1 and F.2.1.3, assess in consultation with the relevant secretariats which technical committee/subcommittee is competent for the subject covered by the proposed document; where no technical committee exists competent to deal with the subject of the document in question, the Chief Executive Officer shall refer the proposal to the technical management board, which may request the Chief Executive Officer to submit the document to the enquiry stage and to establish an ad hoc group to deal with matters subsequently arising;

c) ascertain that there is no evident contradiction with other International Standards;

d) distribute the proposed document as an enquiry draft (F.2.1.1 and F.2.1.3) in accordance with 2.6.1, or as a final draft International Standard (case F.2.1.2) in accordance with 2.7.1, indicating (in cases F.2.1.1 and F.2.1.3) the technical committee/subcommittee to the domain of which the proposed document belongs.

F.2.3 The period for voting and the conditions for approval shall be as specified in 2.6 for an enquiry draft and 2.7 for a final draft International Standard. In the case where no technical committee is involved, the condition for approval of a final draft International Standard is that not more than one-quarter of the total number of votes cast are negative.

F.2.4 If, for an enquiry draft, the conditions of approval are met, the draft standard shall progress to the approval stage (2.7). If not, the proposal has failed and any further action shall be decided upon by the technical committee/subcommittee to which the document was attributed in accordance with F.2.2 b).

If, for a final draft International Standard, the conditions of approval are met, the document shall progress to the publication stage (2.8). If not, the proposal has failed and any further action shall be decided upon by the technical committee/subcommittee to which the FDIS was attributed in accordance with F.2.2 b), or by discussion between the originating organization and the office of the CEO if no technical committee was involved.

If the standard is published, its maintenance shall be handled by the technical committee/subcommittee to which the document was attributed in accordance with F.2.2 b), or, if no technical committee was involved, the approval procedure set out above shall be repeated if the originating organization decides that changes to the standard are required.

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

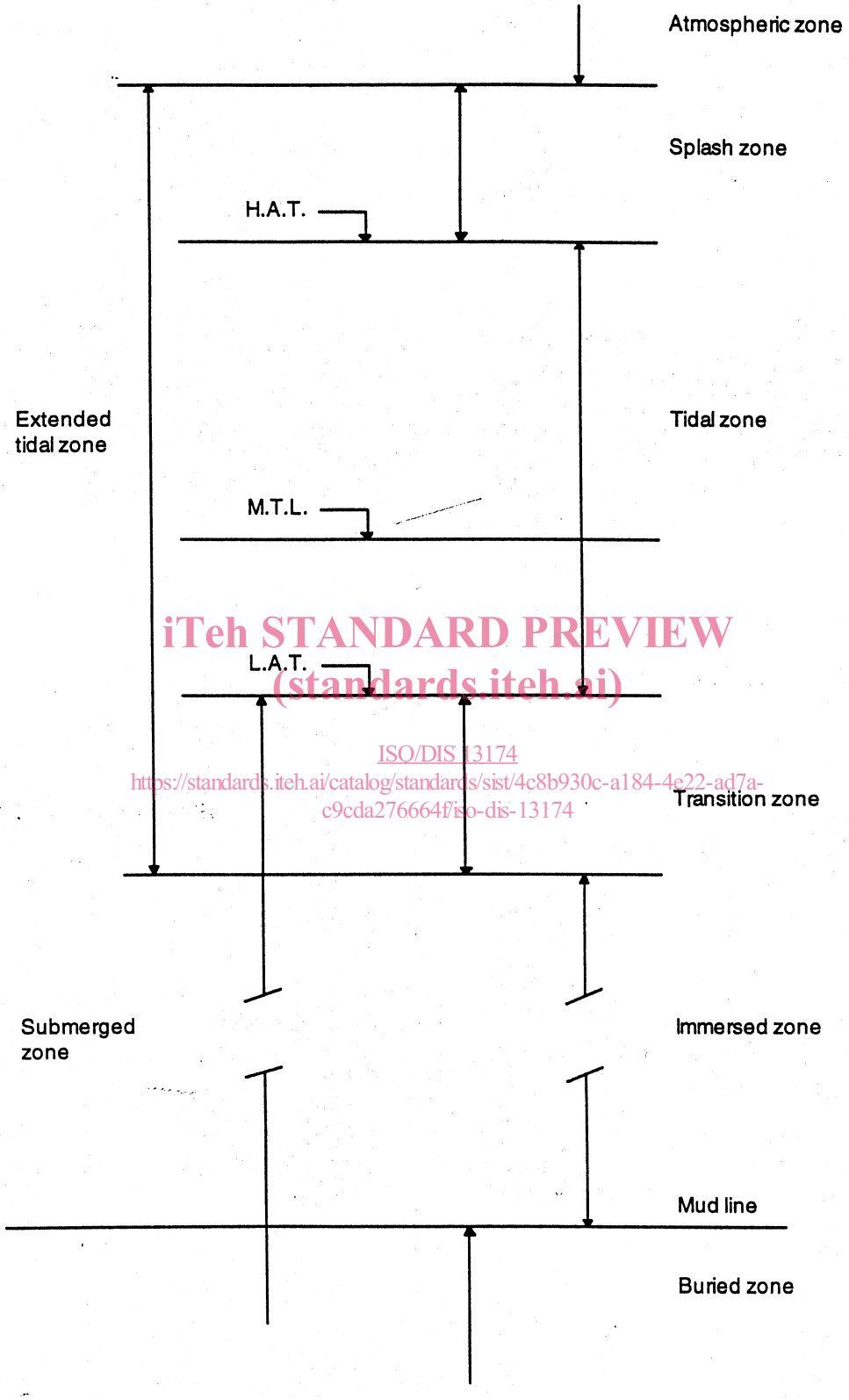

Figure 1 – Schematic representation of levels and zones in sea water environment

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.