



**SLOVENSKI STANDARD**  
**SIST EN 12501-1:2003**  
**01-december-2003**

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Protection of metallic materials against corrosion - Corrosion likelihood in soil - Part 1:  
General

Korrosionsschutz metallischer Werkstoffe - Korrosionswahrscheinlichkeit in Böden - Teil  
1: Allgemeines

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Protection des matériaux métalliques contre la corrosion - Risque de corrosion dans les  
sols - Partie 1 : Généralités

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**ICS:**

77.060

Korozija kovin

Corrosion of metals

**SIST EN 12501-1:2003**

**en**

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 12501-1**

April 2003

ICS 77.060

English version

## Protection of metallic materials against corrosion - Corrosion likelihood in soil - Part 1: General

Protection des matériaux métalliques contre la corrosion -  
Risque de corrosion dans les sols - Partie 1: Généralités

Korrosionsschutz metallischer Werkstoffe -  
Korrosionswahrscheinlichkeit in Böden - Teil 1:  
Allgemeines

This European Standard was approved by CEN on 21 February 2003.

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, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and United Kingdom.

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## Contents

	page
Foreword.....	3
Introduction .....	4
1 Scope .....	4
2 Normative references .....	4
3 Terms and definitions.....	4
4 General concepts.....	5
4.1 Principles.....	5
4.2 Assessment of the corrosion load in soil .....	5
4.3 Classification of the corrosion load in soil .....	5
4.4 Risk of appearance of corrosion damage in soil.....	6
5 Factors influencing the corrosion of buried structures .....	6
5.1 General.....	6
5.2 Soils and backfill materials.....	6
5.3 Structures and metals.....	7
5.4 Environment.....	7
Annex A (normative) Procedure for assessing the corrosion load in soil.....	8
A.1 Procedure .....	8
A.2 Preliminary inquiry.....	9
A.3 Site survey.....	9
A.4 Soil sampling.....	9
Annex B (informative) Examples of factors influencing the corrosion of buried structures .....	10
B.1 Soil and backfill material.....	10
B.2 Structure .....	10
B.3 Environment .....	10
Annex C (informative) Principal function of a buried structure and main type of corrosion to be considered.....	12
Bibliography .....	13

## Foreword

This document (EN 12501-1:2003) has been prepared by Technical Committee CEN/TC 262 "Metallic and other inorganic coatings", 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 October 2003, and conflicting national standards shall be withdrawn at the latest by October 2003.

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, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

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**EN 12501-1:2003 (E)****Introduction**

Corrosion analysis of a buried structure is complex due to the interactions of various factors of the corrosion system, such as soil, type of metallic material, characteristics of the structure and environment.

Consequently, identification and assessment of the factors pertaining to a given corrosion likelihood as defined in this European Standard are too complex for precise results to be expected solely from the use of this European Standard. Therefore this European Standard has to be supplemented by expertise and scientific training.

The European Standard comprises two parts:

Part 1: General

Part 2: Low alloyed and non alloyed ferrous materials.

**1 Scope**

This European Standard provides a basis for assessing the corrosion likelihood in soil of buried metallic structures such as pipelines, sheathed metallic cables, storage tanks, sheet piling, support anchors, culverts and earth reinforcement.

This part of this European Standard defines the general concepts for the assessment method and lists the main factors influencing the corrosion of buried structures.

**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 (including amendments).

EN 12501-2 Protection of metallic materials against corrosion — Corrosion likelihood in soil — Part 2: Low alloyed and non alloyed ferrous materials

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

**3 Terms and definitions**

For the purpose of this European Standard, the terms and definitions given in EN ISO 8044:1999 and the following apply.

**3.1****corrosion load**

sum of all the effects of a corrosive environment

### 3.2

#### foreign cathode

element of the environment in contact with the structure, with a more positive electrochemical potential than the structure, leading to the formation of a galvanic cell

## 4 General concepts

### 4.1 Principles

The assessment of the corrosion likelihood of buried metallic structures defined in Figure 1 takes into consideration:

- soil parameters;
- characteristics of the structure in the absence of protection;
- environmental factors.

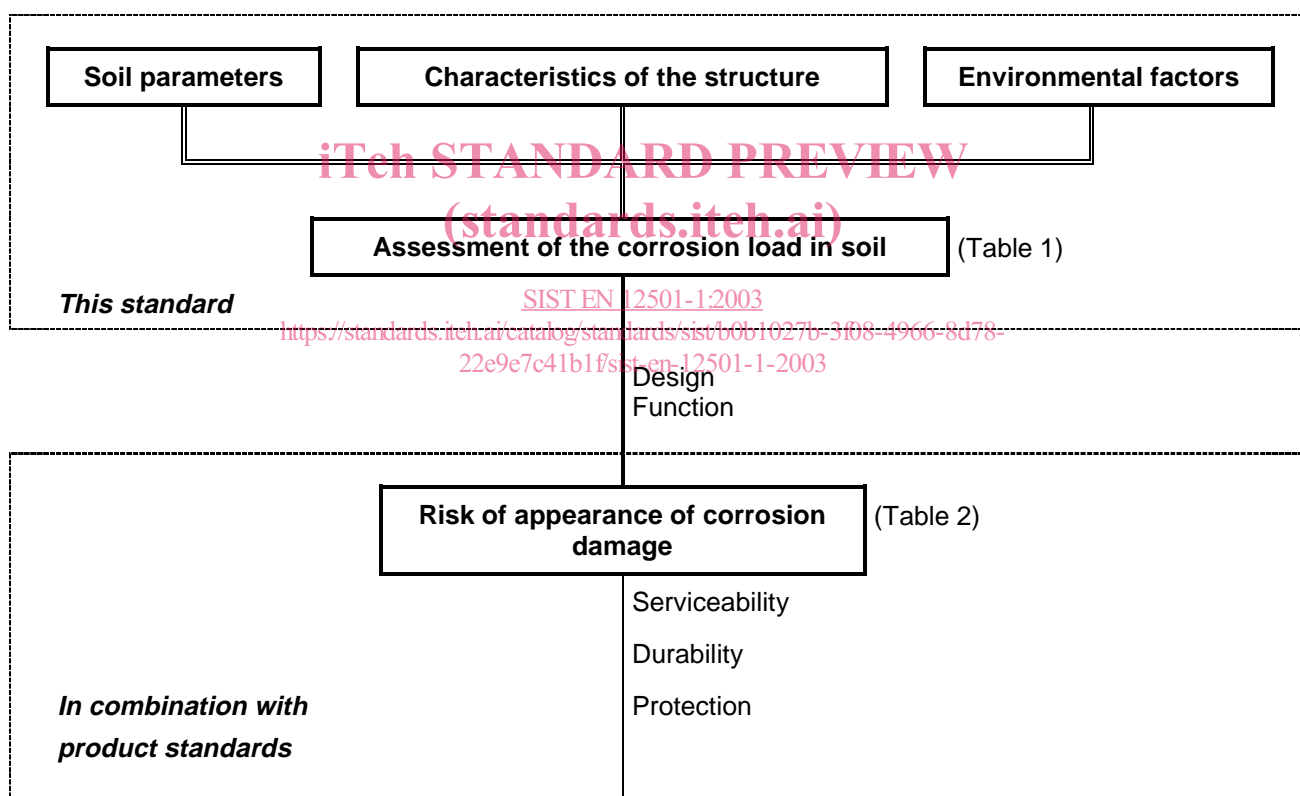


Figure 1 — Diagram for assessing the corrosion likelihood in soil

### 4.2 Assessment of the corrosion load in soil

A practical procedure for the assessment of the corrosion load in soil is given in annex A. It is a step by step method comprising three main steps: preliminary enquiry, site survey, soil sampling.

### 4.3 Classification of the corrosion load in soil

For a given metal, Table 1 defines three classes of corrosion load in soil.

## EN 12501-1:2003 (E)

Table 1 — Classes of corrosion load in soil

Classes of corrosion load	Classification in terms of probability
LOW	Low probability that the corrosion rate will be above a threshold value <b>or</b> that a specific corrosion effect will occur.
MEDIUM	High probability that the corrosion rate will be between the upper and lower threshold values.
HIGH	High probability that the corrosion rate will exceed a threshold value <b>or</b> that a specific corrosion effect will occur.

NOTE A specific corrosion effect relates to types of corrosion such as pitting, crevice corrosion, bimetallic corrosion, hydrogen embrittlement, corrosion fatigue or stress corrosion cracking. If such types are expected, the corrosion load should always be assumed as HIGH because quantitative assessment of such effects is not possible.

#### 4.4 Risk of appearance of corrosion damage in soil

The risk of appearance of corrosion damage can be estimated from the class of corrosion load in soil in combination with the requirements concerning the function of the structure, its design (material, thickness, ...), its serviceability and its durability.

The assessment of the risk of the appearance of corrosion damage is not detailed in this standard. Standards dealing with protective systems of specific buried metallic structures are to be used in combination with the corrosion load in soil. Some guidance is given in Table 2.

Table 2 — Risk of appearance of corrosion damage and service life requirements

Risk of appearance of corrosion damage	Service life requirements	Comments
LOW	Fulfilled	Corrosion resistance adequate. No additional corrosion protection measure required.
MODERATE	Not always ensured	Corrosion resistance not always adequate. Monitoring is recommended to assess risks of corrosion damage and to decide whether additional corrosion protection measures are necessary.
HIGH	Not fulfilled	Corrosion resistance inadequate. Additional corrosion protection measures required.

## 5 Factors influencing the corrosion of buried structures

### 5.1 General

Examples of factors to be considered are given in annex B.

### 5.2 Soils and backfill materials

This standard only applies to soils and backfill materials in direct contact with the structure. These materials can be divided into the following categories based on their origin:

- native soils, either disturbed or undisturbed;
- imported soils (backfill materials):
  - natural soils (sand, gravel, crushed limestone ...);



- artificial soils : by-products (granules, ...), industrial refuse (ashes, cinders, ...), etc ...

The main physical and chemical parameters of soils and backfill materials are considered in EN 12501-2.

### 5.3 Structures and metals

The corrosion of a structure in a given soil depends on numerous parameters specific to each structure, for example geometry, complexity and operational conditions. Moreover, for existing structures, corrosion products have to be considered as a part of the corrosion system.

When considering the corrosion of a buried structure, the impairment of its functions should be taken into account in relation to the expected type of corrosion. The main types of corrosion to be considered in relation to the principal function are given in annex C.

Metals and their alloys considered in this standard can either constitute the material used for the structure or the protective system for that structure.

### 5.4 Environment

Environmental factors are discussed in EN 12501-2 and include special factors such as electrical interference within the soil and foreign cathodes.

This standard does not consider in detail:

- cathodic protection measures (see EN 12954 and EN 13509);
- corrosion in soil due to stray currents from electrical direct current (DC) systems (see prEN 50162);
- corrosion in soil due to influences from electrical alternating current (AC) systems.

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Electrical direct current  
<https://standards.iteh.ai/catalog/standards/sist/b0b1027b-3f08-4966-8d78->  
Electrical alternating current