

External cathodic protection of well casings

External cathodic protection of well casings

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

Käesolev Eesti standard EVS-EN 15112:2006 sisaldab Euroopa standardi EN 15112:2006 ingliskeelset teksti.	This Estonian standard EVS-EN 15112:2006 consists of the English text of the European standard EN 15112:2006.
Käesolev dokument on jõustatud 20.09.2006 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.	This document is endorsed on 20.09.2006 with the notification being published in the official publication of the Estonian national standardisation organisation.
Standard on kättesaadav Eesti standardiorganisatsioonist.	The standard is available from Estonian standardisation organisation.

Käsitlusala: This European Standard specifies methods used to evaluate the external corrosion hazards of well casings, as well as cathodic protection means and devices to be implemented in order to prevent corrosion of the external part of these wells in contact with the soil.	Scope: This European Standard specifies methods used to evaluate the external corrosion hazards of well casings, as well as cathodic protection means and devices to be implemented in order to prevent corrosion of the external part of these wells in contact with the soil.
---	---

ICS 23.040.99, 77.060

Võtmesõnad:

ICS 23.040.99; 77.060

English Version

External cathodic protection of well casings

Protection cathodique externe des cuvelages de puits

Äußerer kathodischer Korrosionsschutz von
Bohrlochverrohrungen

This European Standard was approved by CEN on 19 June 2006.

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.

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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, 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

Contents

Page

Foreword.....	3
Introduction	4
1 Scope	5
2 Normative references	5
3 Terms and definitions	5
4 Description and assessment of corrosion risks	9
4.1 General.....	9
4.2 Description of corrosion risks.....	9
4.3 Corrosion risk assessment.....	9
5 Prerequisites for application of cathodic protection	10
5.1 General.....	10
5.2 Electrical continuity.....	10
5.3 Electrical isolation	10
5.4 Cathodic protection equipment.....	11
5.5 Groundbed.....	11
5.6 Safety requirements	11
6 Design of the cathodic protection.....	12
6.1 General.....	12
6.2 Voltage drop profile method.....	12
6.3 Polarisation curve method.....	13
6.4 Mathematical approach based on a field test.....	13
6.5 Simulation of the cathodic protection for a well	13
7 Measurement of the well-casing-to-soil potential at the wellhead	14
7.1 General.....	14
7.2 Measuring points	14
7.3 Method used for potential measurement - Interpretation.....	15
8 Additional cathodic protection equipment	15
Annex A (normative) Voltage drop profile	16
Annex B (informative) Polarisation curve method applied to a well	23
Annex C (informative) Determination by calculation of the potential shift at the bottom of the well and the well to soil resistance.....	26
Bibliography	36

Foreword

This document (EN 15112:2006) 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 January 2007, and conflicting national standards shall be withdrawn at the latest by January 2007.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

Introduction

Gas, oil and water well casings are usually cemented for the purposes of anchoring the pipes in the borehole and isolating the various geological layers from each other. This is necessary to avoid liquid exchanges between these.

Steels in contact with the cement are in a passivation status and, thus, protected from any kind of external corrosion, except if the cement contains chloride ions. However, it is not always possible to obtain a continuous cementation on all the external steel surfaces. These bare residual surfaces may be in contact with more or less aggressive layers. Furthermore, these surfaces may constitute electrochemical cells with the cemented metallic parts. The anodic areas, which are the poor cemented parts, correspond to corrosion areas.

In general, external corrosion effects are rare, particularly on recent wells, since most of them are well cemented. However, borehole cementation programmes sometimes result in cementation failures, and studies have shown that, corrosion phenomena being progressive, the mean time for the appearance of leaks is dependent on different factors such as geological formation, thickness of the layers and of the steel casing.

Experience has also shown that the situation may be significantly improved by applying external cathodic protection to wells.

Environmental aspects with regard to gas, oil or water wells should be considered when deciding on whether or not to apply cathodic protection.

1 Scope

This European Standard specifies methods used to evaluate the external corrosion hazards of well casings, as well as cathodic protection means and devices to be implemented in order to prevent corrosion of the external part of these wells in contact with the soil.

This European Standard applies to any gas, oil or water well with metallic casing, whether cemented or not.

However, in special conditions (shallow casing: e.g. 50 m, and homogeneous soil), EN 12954 can be used to achieve the cathodic protection and assess its efficiency.

This European Standard also describes techniques allowing determination of the current required for protection and ensuring correct operation of the cathodic protection devices installed.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 12954:2001, *Cathodic protection of buried or immersed metallic structures — General principles and application for pipelines*

EN 60079-10, *Electrical apparatus for explosive gas atmospheres — Part 10: Classification of hazardous areas (IEC 60079-10:2002)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 12954 and the following apply (see also Figure 1).

3.1

casing (or well casing)

heavy steel pipe string used to line a borehole from the ground surface, and secured in the formations generally by cementing

NOTE Casing is generally externally cemented over its total depth or over a length sufficient to obtain anchoring and stability between the production or storage zone and the ground surface or other intermediate layers.

This pipe string allows:

- to prevent the ingress of fluid from upper strata;
- to keep the hole from collapsing due to the pressure of the geological layers crossed;
- to isolate the inside part of the well from the surrounding soil;
- to continue drilling to the production or storage zone;
- to drive down the tubing string from the surface to the production or storage zone.

There may be two or more strings of casing, one inside the other, in a single well: