SLOVENSKI STANDARD
SIST EN ISO 22476-1:2023

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Nadomešča:
SIST EN ISO 22476-1:2013
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Geotehnično preiskovanje in preskušanje - Preskušanje na terenu - 1. del: Konusni penetracijski preizkus z ali brez merjenja pornih tlakov (ISO 22476-1:2022)

Geotechnical investigation and testing - Field testing - Part 1: Electrical cone and piezocone penetration test (ISO 22476-1:2022)

Geotechnische Erkundung und Untersuchung - Felduntersuchungen - Teil 1: Drucksondierungen mit elektrischen Messwertaufnehmern und Messeinrichtungen für den Porenwasserdruck (ISO 22476-1:2022)

Reconnaissance et essais géotechniques - Essais en place - Partie 1: Essais de pénétration au cône électrique et au piézocône (ISO 22476-1:2022)

Ta slovenski standard je istoveten z: **EN ISO 22476-1:2023**

ICS:

93.020	Zemeljska dela. Izkopavanja. Gradnja temeljev. Dela pod zemljo	Earthworks. Excavations. Foundation construction. Underground works

SIST EN ISO 22476-1:2023 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 22476-1

January 2023

ICS 93.020

Supersedes EN ISO 22476-1:2012, EN ISO 22476-1:2012/AC:2013

English Version

Geotechnical investigation and testing - Field testing - Part 1: Electrical cone and piezocone penetration test (ISO 22476-1:2022)

Reconnaissance et essais géotechniques - Essais en place - Partie 1: Essais de pénétration au cône électrique et au piézocône (ISO 22476-1:2022)

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This European Standard was approved by CEN on 30 September 2022.

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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 CEN-CENELEC Management Centre has the same status as the official versions.

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

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Ref. No. EN ISO 22476-1:2023 E

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European foreword

This document (EN ISO 22476-1:2023) has been prepared by Technical Committee ISO/TC 182 "Geotechnics" in collaboration with Technical Committee CEN/TC 341 “Geotechnical Investigation and Testing” 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 2023, and conflicting national standards shall be withdrawn at the latest by July 2023.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN ISO 22476-1:2012, EN ISO 22476-1:2012/AC:2013.

Any feedback and questions on this document should be directed to the users’ national standards body/national committee. A complete listing of these bodies can be found on the CEN website.

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

Endorsement notice

The text of ISO 22476-1:2022 has been approved by CEN as EN ISO 22476-1:2023 without any modification.

INTERNATIONAL STANDARD

ISO 22476-1

Second edition
2022-12

Geotechnical investigation and testing — Field testing —

Part 1: Electrical cone and piezocone penetration test

Reconnaissance et essais géotechniques — Essais en place —

Partie 1: Essais de pénétration au cône électrique et au piézocône

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 182, *Geotechnics*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 341, *Geotechnical Investigation and Testing*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 22476-1:2012), which has been technically revised. It also incorporates the Technical Corrigendum ISO 22476-1:2012/Cor 1:2013.

The main changes are as follows:

— dimensional tolerances of cone penetrometer have been updated;

— application class scheme has been replaced by cone penetrometer class and test category classification scheme;

— introduction of temperature influence on measurements monitoring and requirements of internal temperature sensor for cone penetrometer class 0;

— requirements for the calibration of cone penetrometers have been added;

— minor updates to figures and text have been made.

A list of all parts in the ISO 22476 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

This document establishes general principles equipment requirements, the execution of and reporting on cone and piezocone penetration tests.

The cone penetration test (CPT) consists of pushing a cone penetrometer using a series of pushrods into the soil at a constant rate of penetration. During penetration, measurements of cone resistance and sleeve friction are recorded. The piezocone penetration test (CPTU) also includes the measurement of pore pressures around the cone. Two International Standards define cone penetration tests: this document defines CPT and CPTU practice using electronic transducers; ISO 22476-12 defines CPT practice using mechanical measuring systems.

“Cone resistance” is the term used in practice and also in this document, although “cone penetration resistance” is a more correct description of the process.

The test results of this document are especially suited for the qualitative and/or quantitative determination of a soil profile together with other investigations (e.g. sampling according to ISO 22475-1 and identification ISO 14688-1) or as a relative comparison with in situ tests.

The results from a cone penetration test are typically used to evaluate:

— stratification;

— soil behaviour type;

— geotechnical parameters such as:

  — soil density;

  — shear strength parameters;

  — deformation and consolidation characteristics;

  — hydraulic conductivity and ground water pressure.

The results from a cone penetration test may also be used directly in geotechnical design calculations.

Geotechnical investigation and testing — Field testing —

Part 1:
Electrical cone and piezocone penetration test

1 Scope

This document establishes equipment, procedural and reporting requirements and recommendations on cone and piezocone penetration tests.

NOTE This document fulfils the requirements for cone and piezocone penetration tests as part of geotechnical investigation and testing according to the EN 1997 series.

This document specifies the following features:

a) type of cone penetration test;

b) cone penetrometer class according to Table 2;

c) test categories according to Table 3;

d) penetration length or penetration depth;

e) elevation of the ground surface or the underwater ground surface at the location of the cone penetration test with reference to a datum;

f) location of the cone penetration test relative to a reproducible fixed location reference point;

g) pore pressure dissipation tests.

This document covers onshore and nearshore cone penetration test (CPT). For requirements for offshore CPT, see ISO 19901-8.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories*

3 Terms, definitions and symbols

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1 Terms and definitions

3.1.1
average surface roughness
R_a
average deviation between the real surface of the *cone penetrometer* (3.1.6) and a medium reference plane placed along the surface of the cone penetrometer

3.1.2
base of the cone
cylindrical part of the *cone* (3.1.4) directly behind the conical part of the cone tip

3.1.3
calibration drift
difference between *reference reading* (3.1.34) before commencement of test and first *reference reading* (3.1.34) after calibration

3.1.4
cone
conical shaped bottom part of the *cone penetrometer* (3.1.6) and the cylindrical extension

Note 1 to entry: When pushing the penetrometer into the ground, the *cone resistance* (3.1.7) is transferred through the cone to the load sensor.

Note 2 to entry: This document assumes that the cone is rigid, so when loaded its deformation is very small relative to the deformation of other parts of the cone penetrometer.

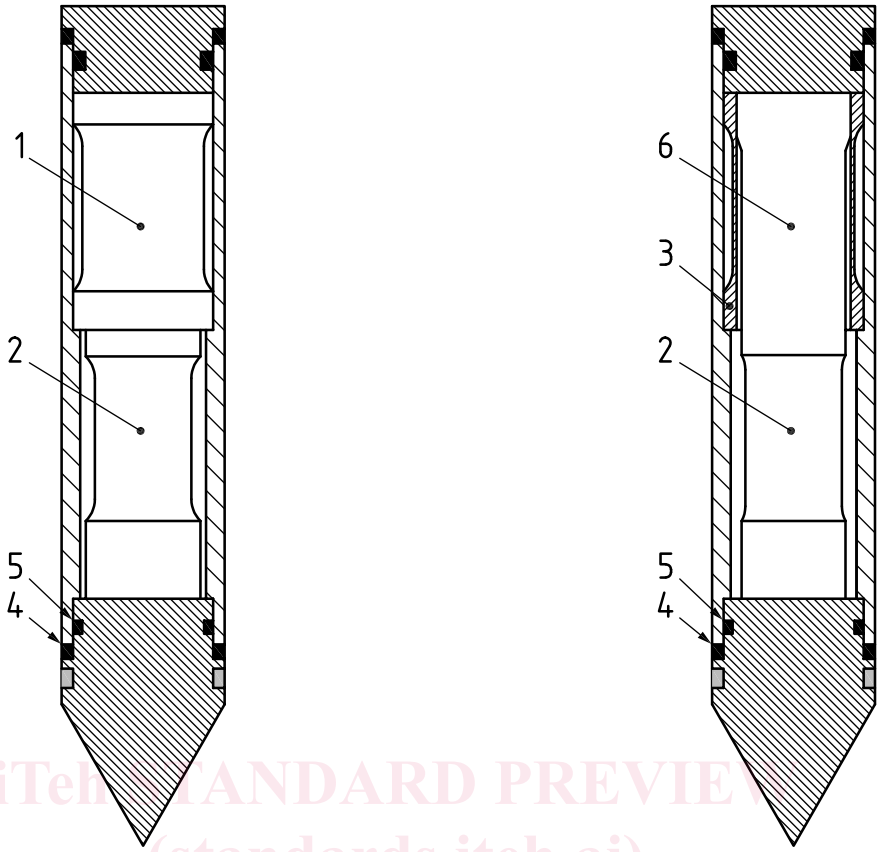
3.1.5
cone penetration test
CPT
test in which a *cone penetrometer* (3.1.6) at the end of a series of *pushrods* (3.1.33) is pushed into the ground at a constant rate of penetration and forces are measured electrically in the cone penetrometer

3.1.6
cone penetrometer
assembly containing the *cone* (3.1.4), *friction sleeve* (3.1.16), any other sensors and *measuring system* (3.1.23) as well as the connection to the *pushrods* (3.1.33)

Note 1 to entry: An example of a cone penetrometer is shown in Figure 1; for other filter locations, see Figure 2.

3.1.7
cone resistance
cone penetration resistance

3.1.8
corrected cone resistance
total cone resistance
q_t
measured cone resistance (3.1.20), q_c, corrected for pore pressure effects



a) Cone resistance and sleeve friction load cells in compression **b) Subtraction type cone penetrometer**

Key

1 sleeve load cell
2 cone load cell
3 thread
4 soil seal
5 water seal
6 load cell for combined axial forces acting on the cone and the friction sleeve

Figure 1 — Cross-sections of example cone penetrometers

3.1.9
corrected friction ratio
R_{ft}
ratio of the *measured sleeve friction* (3.1.22) or *corrected sleeve friction* (3.1.10) to the *corrected cone resistance* (3.1.8) measured at the same depth

Note 1 to entry: Usually, the measured sleeve friction is used; however, if available, the corrected sleeve friction is used.

3.1.10
corrected sleeve friction
f_t
measured sleeve friction (3.1.22), f_s, corrected for pore pressure effects