

DIN EN ISO 22476-1**DIN**

ICS 93.020

Supersedes
DIN EN ISO 22476-1:2013-01

**Geotechnical investigation and testing –
Field testing –
Part 1: Electrical cone and piezocone penetration test
(ISO 22476-1:2012 + Cor. 1:2013);
English version EN ISO 22476-1:2012 + AC:2013,
English translation of DIN EN ISO 22476-1:2013-10**

Geotechnische Erkundung und Untersuchung –
Felduntersuchungen –
Teil 1: Drucksondierungen mit elektrischen Messwertaufnehmern und Messeinrichtungen
für den Porenwasserdruck (ISO 22476-1:2012 + Cor. 1:2013);
Englische Fassung EN ISO 22476-1:2012 + AC:2013,
Englische Übersetzung von DIN EN ISO 22476-1:2013-10

Reconnaissance et essais géotechniques –
Essais en place –
Partie 1: Essais de pénétration au cône électrique et au piézocône (ISO 22476-1:2012 +
Cor. 1:2013);
Version anglaise EN ISO 22476-1:2012 + AC:2013,
Traduction anglaise de DIN EN ISO 22476-1:2013-10

Document comprises 43 pages

Translation by DIN-Sprachendienst.

In case of doubt, the German-language original shall be considered authoritative.

A comma is used as the decimal marker.

National foreword

This document (EN ISO 22476-1:2012 + AC:2013) has been prepared by Technical Committee ISO/TC 182 "Geotechnics" in collaboration with Technical Committee CEN/TC 341 "Geotechnical investigation and testing" (Secretariat: ELOT, Greece).

The responsible German body involved in its preparation was the *Normenausschuss Bauwesen* (Building and Civil Engineering Standards Committee), Working Committee NA 005-05-09 AA *Baugrund; Feldversuche* (*Sp CEN/TC 341/WG 2, WG 3, WG 5*).

The DIN Standards corresponding to the International Standards referred to in this document are as follows:

ISO 8503	DIN EN ISO 8503
ISO 10012	DIN EN ISO 10012
EN 1997-2	DIN EN 1997-2
EN ISO 14688-2	DIN EN 14688-2

Amendments

This standard differs from DIN 4094-1:2002-06 as follows:

- a) the cone penetration test including the measurement of pore pressures has been included;
- b) application classes have been specified.

Compared with DIN EN ISO 22476-1:2013-01 the following correction has been made:

- a) EN ISO 22476-1:2012/AC:2013 has been incorporated and thus Figure 4 has been replaced.

Previous editions

DIN 4094: 1960-12, 1990-12
DIN 4094-1: 1964-05, 1974-11, 2002-06
DIN EN ISO 22476-1: 2013-01

National Annex NA (informative)

Bibliography

DIN EN ISO 8503 (all parts), *Preparation of steel substrates before application of paints and related products — Surface roughness characteristics of blast-cleaned steel substrates*

DIN EN ISO 10012, *Measurement management systems — Requirements for measurement processes and measuring equipment*

DIN EN 1997-2, *Eurocode 7: Geotechnical design — Part 2: Ground investigation and testing*

DIN EN 14688-2, *Geotechnical investigation and testing — Identification and classification of soil — Part 2: Principles for a classification*

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN ISO 22476-1

September 2012

+ AC

January 2013

ICS 93.020

English Version

**Geotechnical investigation and testing - Field testing -
Part 1: Electrical cone and piezocone penetration test
(ISO 22476-1:2012 + Cor 1:2013)**

Reconnaissance et essais géotechniques - Essais en place - Partie 1: Essai de pénétration au cône électrique et au piézocône -
(ISO 22476-1:2012 + Cor 1:2013)

Geotechnische Erkundung und Untersuchung - Felduntersuchungen - Teil 1: Drucksondierungen mit elektrischen Messwertaufnehmern und Messeinrichtungen für den Porenwasserdruck
(ISO 22476-1:2012 + Cor 1:2013)

EN ISO 22476-1:2001 was approved by CEN on 2012-09-14 and Corrigendum AC:2013 on 2013-01-16.

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

CEN members are the national standards bodies of 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, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



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

Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents

	Page
Foreword to EN ISO 22476-1:2012	4
Foreword to EN ISO 22476-1:2012/AC:2013	4
Introduction	5
1 Scope	6
2 Normative references	7
3 Terms, definitions and symbols	7
3.1 Terms and definitions	7
3.2 Symbols	14
4 Equipment	15
4.1 Cone penetrometer	15
4.2 Tolerances	15
4.3 Surface roughness	16
4.4 Cone	16
4.5 Friction sleeve	17
4.6 Filter element	18
4.7 Gaps and soil seals	20
4.8 Push rods	20
4.9 Measuring system	20
4.10 Thrust machine	21
5 Test procedures	21
5.1 Selection of cone penetrometer	21
5.2 Selection of equipment and procedures	22
5.3 Position and level of thrust machine	24
5.4 Preparation of the test	24
5.5 Pushing of the cone penetrometer	24
5.6 Use of friction reducer	25
5.7 Frequency of logging parameters	25
5.8 Registration of penetration length	25
5.9 Dissipation test	26
5.10 Test completion	26
5.11 Equipment checks and calibrations	26
5.12 Safety requirements	27
6 Test results	27
6.1 Measured parameters	27
6.2 Correction of parameters	27
6.3 Calculated parameters	29
7 Reporting	29
7.1 General	29
7.2 Reporting of test results	29
7.3 Presentation of test results	31
7.4 Presentation of test results and calculated parameters	31
Annex A (normative) Maintenance, checks and calibration	33
Annex B (normative) Calculation of penetration depth	37
Annex C (informative) Correction of sleeve friction for water pressure	38
Annex D (informative) Preparation of the piezocone	39
Annex E (informative) Uncertainties in cone penetrometer testing	40

Bibliography	41
--------------------	----

Figures

Figure 1 — Cross section of an example of a cone penetrometer	8
Figure 2 — Locations of pore pressure filters.....	11
Figure 3 — Penetration length and penetration depth (schematic only)	12
Figure 4 — Tolerance requirements for use of 1000 mm ² cone penetrometer	17
Figure 5 — Geometry and tolerances of friction sleeve	18
Figure 6 — Correction of cone resistance and sleeve friction due to the unequal end area effect.....	28
Figure A.1 — Pressure chamber for determination of the net area ratio, a	35

Tables

Table 1 — Types of cone penetration test.....	22
Table 2 — Application classes.....	23
Table A.1 — Control scheme for maintenance routines.....	34