# INTERNATIONAL STANDARD

ISO 22476-1

First edition 2012-09-15

# 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



ISO 22476-1:2012(E)



#### **COPYRIGHT PROTECTED DOCUMENT**

#### © ISO 2012

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

## **Contents**

Page

Forewo	ord	<b>v</b>
Introdu	ıction	. vi
1	Scope	1
2	Normative references	2
3	Terms, definitions and symbols	2
3.1	Terms and definitions	2
3.2	Symbols	9
4	Equipment	
4 4.1	Cone penetrometer	
4.1 4.2	Tolerances	
4.2 4.3	Surface roughness	
4.3 4.4		
4.4 4.5	ConeFriction sleeve	
4.5 4.6		
4.6 4.7	Filter element	
4. <i>7</i> 4.8	Gaps and soil seals	
_	Push rods	
4.9 4.10	Measuring system	
4.10	Thrust machine	. 16
5	Test procedures	16
5.1	Selection of cone penetrometer	.16
5.2	Selection of equipment and procedures	17
5.3	Position and level of thrust machine	.19
5.4	Preparation of the test	.19
5.5	Pushing of the cone penetrometer	.19
5.6	Use of friction reducer	.20
5.7	Frequency of logging parameters	20
5.8	Registration of penetration length	
5.9	Dissipation test	21
5.10	Test completion	21
5.11	Equipment checks and calibrations	21
5.12	Safety requirements	
•		
6	Test results	
6.1	Measured parameters	
6.2	Correction of parameters	
6.3	Calculated parameters	. 24
7	Reporting	.24
7.1	General	.24
7.2	Reporting of test results	24
7.3	Presentation of test results	26
7.4	Presentation of test results and calculated parameters	.26
Annex	A (normative) Maintenance, checks and calibration	
	B (normative) Calculation of penetration depth	
	C (informative) Correction of sleeve friction for water pressure	
	D (informative) Preparation of the piezocone	
	E (informative) Uncertainties in cone penetrometer testing	
·	= \viiististististististististististististis	

### ISO 22476-1:2012(E)

Bibliography	
Figures	
Figure 1 — Cross section of an example of a cone penetrometer	3
Figure 2 — Locations of pore pressure filters	6
Figure 3 — Penetration length and penetration depth (schematic only)	8
Figure 4 — Tolerance requirements for use of 1000 mm <sup>2</sup> cone penetrometer	12
Figure 5 — Geometry and tolerances of friction sleeve	13
Figure 6 — Correction of cone resistance and sleeve friction due to the unequal end area effect	23
Figure A.1 — Pressure chamber for determination of the net area ratio, a	30
Tables	
Table 1 — Types of cone penetration test	17
Table 2 — Application classes	18
Table A.1 — Control scheme for maintenance routines	29

#### **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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 22476-1 was prepared by the European Committee for Standardization (CEN) Technical Committee CEN/TC 341, *Geotechnical investigation and testing*, in collaboration with Technical Committee ISO/TC 182, *Geotechnics*, Subcommittee SC 1, *Geotechnical investigation and testing*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

ISO 22476 consists of the following parts, under the general title *Geotechnical investigation and testing*— *Field testing*:

- Part 1: Electrical cone and piezocone penetration test
- Part 2: Dynamic probing
- Part 3: Standard penetration test
- Part 4: Ménard pressuremeter test
- Part 5: Flexible dilatometer test
- Part 7: Borehole jack test
- Part 9: Field vane test
- Part 10: Weight sounding test [Technical Specification]
- Part 11: Flat dilatometer test [Technical Specification]
- Part 12: Mechanical cone penetration test (CPTM)