Geotechnical investigation and testing - Field testing - Part 4: Ménard pressuremeter test (ISO 22476-4:2012)

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NATIONAL FOREWORD

See Eesti standard EVS-EN ISO 22476-4:2012 sisaldab Euroopa standardi EN ISO 22476-4:2012 ingliskeelset teksti.	This Estonian standard EVS-EN ISO 22476-4:2012 consists of the English text of the European standard EN ISO 22476-4:2012.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 01.12.2012.	Date of Availability of the European standard is 01.12.2012.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

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Geotechnische Erkundung und Untersuchung - Felduntersuchungen - Teil 4: Pressiometerversuch nach Ménard (ISO 22476-4:2012)

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Foreword

This document (EN ISO 22476-4:2012) has been prepared by Technical Committee CEN/TC 341 “Geotechnical Investigation and Testing”, the secretariat of which is held by ELOT, in collaboration with Technical Committee ISO/TC 182 "Geotechnics".

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of an identical text or by endorsement, at the latest by June 2013, and conflicting national standards shall be withdrawn at the latest by June 2013.

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

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Part 4: Ménard pressuremeter test

1 Scope

This part of ISO 22476 specifies the equipment requirements, execution of and reporting on the Ménard pressuremeter test.

NOTE 1 This part of ISO 22476 fulfils the requirements for the Ménard pressurermeter test, as part of the geotechnical investigation and testing according to EN 1997-1 and EN 1997-2.

This part of ISO 22476 describes the procedure for conducting a Ménard pressuremeter test in natural soils, treated or untreated fills and in weak rocks, either on land or off-shore.

The pressuremeter test results of this part of ISO 22476 are suited to a quantitative determination of ground strength and deformation parameters. They may yield lithological information. They can also be combined with direct investigation (e.g. sampling according to ISO 22475-1) or compared with other *in situ* tests (see EN 1997-2:2007, 2.4.1.4(2) P, 4.1 (1) P and 4.2.3(2) P).

The Ménard pressuremeter test is performed by the radial expansion of a tricell probe placed in the ground (see Figure 1). During the injection of the liquid volume in the probe, the inflation of the three cells first brings the outer cover of the probe into contact with the pocket wall and then presses on them resulting in a soil displacement. Pressure applied to and the associated volume expansion of the probe are measured and recorded so as to obtain the stress-strain relationship of the soil as tested.

Together with results of investigations with ISO 22475-1 being available, or at least with identification and description of the ground according to ISO 14688-1 and ISO 14689-1 obtained during the pressuremeter test operations, the test results of this part of ISO 22476 are suited to the quantitative determination of a ground profile, including

— the Ménard E_M modulus,

— the Ménard limit pressure p_{LM} and

— the Ménard creep pressure p_{fM}.

This part of ISO 22476 refers to a probe historically described as the 60 mm G type probe. This part of ISO 22476 applies to test depths limited to 50 m and test pressure limited to 5 MPa.

NOTE 2 Ménard pressuremeter tests are carried out with other probe diameters and pocket dimensions such as shown below.

Probe		**Drilling diameter** (mm)	
Designation	**Diameter** (mm)	**min**	**max**
AX	44	46	52
BX	58	60	66
NX	70/74	74	80

Two alternative methods of measurement are provided as follows.

— Procedure A: data are recorded manually.

— Procedure B: data are recorded automatically.

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.

ISO 14688-1, *Geotechnical investigation and testing — Identification and classification of soil — Part 1: Identification and description*

ISO 14689-1, *Geotechnical investigation and testing — Identification and classification of rock — Part 1: Identification and description*

ISO 22475-1, *Geotechnical investigation and testing — Sampling methods and groundwater measurements — Part 1: Technical principles for execution*

ENV 13005:1999, *Guide to the expression of uncertainty in measurement*

3 Terms, definitions and symbols

3.1 Terms and definitions

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

3.1.1
pressuremeter
whole equipment which is used to carry out a Ménard pressuremeter test, excluding the means necessary to place the pressuremeter probe into the ground

NOTE 1 A pressuremeter includes a pressuremeter probe, a pressure and volume control unit, called CU, lines to connect the probe to the CU and, in the case of procedure B, a data logger which is either built into the CU or linked to it.

NOTE 2 See Figure 2.

3.1.2
pressuremeter test pocket
circular cylindrical cavity formed in the ground to receive a pressuremeter probe

3.1.3
pressuremeter borehole
borehole in which pressuremeter pockets with circular cross sections are made in the ground, and into which the pressuremeter probe is to be placed

3.1.4
pressuremeter test
process during which a pressuremeter probe is inflated in the ground and the resulting pocket expansion is measured by volume as a function of time and pressure increments according to a defined programme

NOTE See Figure 4 and F.1.

3.1.5
pressuremeter sounding
whole series of sequential operations necessary to perform Ménard pressuremeter testing at a given location, i.e. forming pressuremeter test pockets and performing pressuremeter tests in them

NOTE See F.2.

3.1.6
pressuremeter pressure reading, p_r
pressure p_r as read at the CU elevation in the liquid circuit supplying the central measuring cell