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Geotechnical investigation and testing — Field testing —

Part 4: Prebored pressuremeter test by Ménard procedure

Reconnaissance et essais géotechniques — Essais en place —

Partie 4: Essai pressiomètrique dans un forage préalable selon la procédure Ménard

Reference number
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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).

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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 22476-4:2012), which has been technically revised.

The main changes compared to the previous edition are as follows:

— types of probes;

— correction procedures;

— probe placing techniques in Annex C;

— clarification of D;

— harmonization of terms and symbols.

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

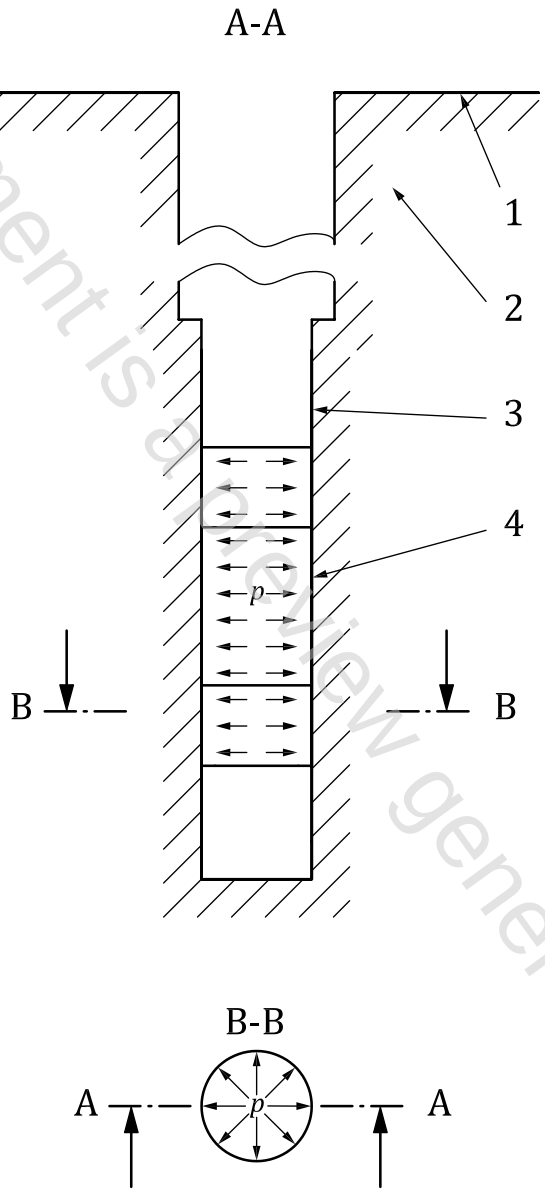
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Introduction

The Ménard pressuremeter test is performed by the radial expansion of a cylindrical probe of a minimum slenderness of 6, placed in the ground (see Figure 1). During the injection of the fluid volume in the probe, the inflation of the measuring cell first brings the outer cover of the probe into contact with the pocket wall and then producing ground displacement. Pressure applied to and the associated radial expansion of the probe are measured either by volume or radial transducers and recorded so as to obtain the stress-strain relationship of ground as tested.



Key

1	ground surface	*p*	applied pressure
2	ground	A-A	axial section
3	pressuremeter test pocket	B-B	cross section
4	expanding pressuremeter probe		

Figure 1 — Principle of a Ménard pressuremeter test

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 obtained during the pressuremeter

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test operations, the tests are performed in order to obtain the quantitative determination of a ground profile, including

— the Ménard pressuremeter modulus E_M,

— the Ménard pressuremeter limit pressure p_{lM}, and

— the Ménard creep pressure p_f.

NOTE 1 This document fulfils the requirement for the Ménard pressuremeter test, as part of geotechnical investigation and testing according to EN 1997-1 and EN 1997-2.

NOTE 2 This document refers to a probe historically described as the "60 mm (also called BX) G type probe", that corresponds to a 58 mm diameter probe with a drilling diameter between 60 mm and 66 mm with a pressure limitation of 5 MPa. If specified by the relevant authority or agreed for a specific project by the relevant parties, a different pressure, not higher than 8 MPa, can be set.

NOTE 3 G type probe refers to probes with an external cover creating guard cells (see 4.2).

NOTE 4 Ménard pressuremeter tests can be carried out with other diameter probes such as 32 mm, 44 mm and 76 mm probes.

NOTE 5 Examples of other probe and pocket drilling dimensions are indicated in Table 1.

Table 1 — Probe and pocket drilling dimensions

Probe Designation	Probe Diameter mm	Drilling diameter (mm)	
		Min	Max
AX	44	46	52
NX	70/74	74	80

NOTE 6 Tests with maximum pressures higher than 8 MPa are dealt by ISO 22476-5.

NOTE 7 For the scope of this document (and the associated measuring device and maximum uncertainties given in Table E.1), E_M values up to 500 MPa (that can be determined by calculation) can be commonly obtained. Enhancement of equipment to reduce uncertainties can be implemented to increase the range of measurements. For example, use of GA type equipment and of a shunt for volume measurement can allow measuring E_M values up to 10 000 MPa. Uncertainty calculation can be used to confirm the relevance of these pressuremeter moduli.

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Geotechnical investigation and testing — Field testing —

Part 4:
Prebored pressuremeter test by Ménard procedure

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1 Scope

This document specifies equipment requirements, the execution of and reporting on the Ménard pressuremeter test.

This document describes the procedure for conducting a Ménard pressuremeter test in natural grounds, treated or untreated fills, either on land or off-shore.

The pressuremeter tests results of this document are suited to a quantitative determination of ground strength and deformation parameters. They can yield lithological information in conjunction with measuring while drilling performed when creating the borehole (according to ISO 22476-15). 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).

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

ISO 14689, *Geotechnical investigation and testing — Identification, description and classification of rock*

ISO 22475-1, *Geotechnical investigation and testing – Sampling by drilling and excavation and ground water measurements – Part 1: Technical principles for execution*

ISO 22476-15, *Geotechnical investigation and testing — Field testing — Part 15: Measuring while drilling*

3 Terms, definitions and symbols

3.1 Terms and definitions

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

ISO and IEC maintain terminological 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/

3.1.1
pressuremeter probe
cylindrical flexible probe which can be expanded by the application of hydraulic pressure and/or pressurised gas

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