
**Geotechnical investigation and
testing — Field testing —**

**Part 11:
Flat dilatometer test**

*Reconnaissance et essais géotechniques — Essais en place —
Partie 11: Essai au dilatomètre plat*

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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).

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For an explanation on 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 the following URL: www.iso.org/iso/foreword.html.

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This first edition of ISO 22476-11 cancels and replaces ISO/TS 22476-11:2005, which has been technically revised.

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

Geotechnical investigation and testing — Field testing —

Part 11: Flat dilatometer test

1 Scope

This document establishes guidelines for the equipment requirements, execution of and reporting on flat dilatometer tests.

NOTE This document fulfils the requirements for flat dilatometer tests as part of the geotechnical investigation and testing according to EN 1997-1 and EN 1997-2.

The basic flat dilatometer test consists of inserting vertically into the soil a blade-shaped steel probe with a thin expandable circular steel membrane mounted flush on one face and determining two pressures at selected depth intervals: the contact pressure exerted by the soil against the membrane when the membrane is flush with the blade and, subsequently, the pressure exerted when the central displacement of the membrane reaches 1,10 mm.

Results of flat dilatometer tests are used mostly to obtain information on soil stratigraphy, *in situ* state of stress, deformation properties and shear strength. It is also used to detect slip surfaces in clays. The flat dilatometer test is most applicable to clays, silts and sands, where particles are small compared to the size of the membrane.

2 Normative references

There are no normative references in this document.

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:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1.1

dilatometer blade

dilatometer probe

blade-shaped steel probe that is inserted into the soil to perform a flat dilatometer test

3.1.2

membrane

thin circular steel diaphragm that is mounted flush on one face of the blade and is expanded by applying a gas pressure at its back

3.1.3

switch mechanism

apparatus housed inside the blade, behind the membrane, capable of switching on and off an electric contact when the membrane expands and reaches two preset deflections equal, respectively, to 0,05 mm (*A-pressure* (3.1.10) reading) and 1,10 mm (*B-pressure* (3.1.11) reading)

3.1.4

signal

activation (signal on) or disconnection (signal off) by the switch mechanism between the blade and the membrane to detect two preset positions of the membrane equal to 0,05 mm and 1,10 mm

3.1.5

pneumatic-electric cable

cable that connects the control unit to the blade, delivers gas pressure at the back of the membrane and provides electric continuity between the control unit and the switch mechanism

3.1.6

control and calibration unit

set of suitable devices capable of supplying gas pressure to the back of the membrane and measuring the pressure when the switch mechanism activates and disconnects the electric contact behind the membrane

3.1.7

earth wire

wire connecting the control unit to the earth

3.1.8

pressure source

pressurized gas tank filled with any dry non-flammable and non-corrosive gas incorporating a pressure regulator

3.1.9

dilatometer sounding

sequence of dilatometer tests executed from the same station at ground level in a vertical direction at closely spaced intervals with depth increments ranging from 100 mm to 300 mm

3.1.10

A-pressure

A

pressure that is applied to the back of the membrane to expand its centre 0,05 mm against the soil

3.1.11

B-pressure

B

pressure that is applied to the back of the membrane to expand its centre 1,10 mm against the soil

3.1.12

C-pressure

C

pressure that is applied to the back of the membrane when the centre of the membrane returns to the *A-pressure* position during a controlled, gradual deflection following the *B-pressure*

3.1.13

A-membrane-calibration-pressure

ΔA

suction recorded as a positive value that is applied to the back of the membrane to retract its centre to the 0,05 mm deflection in air

3.1.14**B-membrane-calibration-pressure** ΔB

pressure that is applied to the back of the membrane to expand its centre to the 1,10 mm deflection in air

3.1.15**zero gauge value** Z_M

pressure gauge deviation from zero when venting the blade to atmospheric pressure

3.1.16**<A> soil pressure** p_0

corrected *A*-pressure (3.1.10)

Note 1 to entry: The term “contact pressure” is also used.

3.1.17** soil pressure** p_1

corrected *B*-pressure (3.1.11)

3.1.18**<C> soil pressure** p_2

corrected *C*-pressure (3.1.12)

3.1.19***in situ* pore water pressure** u_0

water pressure prior to blade insertion at the depth of the centre of the membrane

3.1.20***in situ* effective vertical stress** σ'_{v0}

vertical stress prior to blade insertion at the depth of the centre of the membrane

3.1.21**dilatometer material index** I_D

index used to classify soils according to their response to the test

3.1.22**dilatometer
horizontal stress
index** K_D

index related to the *in situ* horizontal stress

3.1.23**dilatometer modulus** E_D

parameter related to the stiffness of the soil

3.1.24**pore pressure index** U_D

index related to the permeability of the soil