ILNAS

Institut luxembourgeois de la normalisation
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des produits et services

ILNAS-EN ISO 22476-2:2005

Geotechnical investigation and testing - Field testing - Part 2: Dynamic probing (ISO 22476-2:2005)

Reconnaissance et essais géotechniques - Essais en place - Partie 2: Essai de pénétration dynamique (ISO 22476-2:2005)

Geotechnische Erkundung und Untersuchung - Felduntersuchungen - Teil 2: Rammsondierungen (ISO 22476-2:2005)

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National Foreword

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EUROPEAN STANDARD

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This European Standard was approved by CEN on 4 November 2004.

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CEN members are the national standards bodies of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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Contents

Foreword

This document (EN ISO 22476-2:2005) has been prepared by Technical Committee CEN/TC 341 “Geotechnical investigation and testing”, the secretariat of which is held by DIN, 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of an identical text or by endorsement, at the latest by July 2005, and conflicting national standards shall be withdrawn at the latest by July 2005.

EN ISO 22476 *Geotechnical investigation and testing - Field testing* has the following parts:

— *Part 1: Electrical cone and piezocone penetration tests*

— *Part 2: Dynamic probing*

— *Part 3: Standard penetration test*

— *Part 4: Ménard pressuremeter test*

— *Part 5: Flexible dilatometer test*

— *Part 6: Self-boring pressuremeter test*

— *Part 7: Borehole jack test*

— *Part 8: Full displacement pressuremeter test*

— *Part 9: Field vane test*

— *Part 10: Weight sounding test*

— *Part 11: Flat dilatometer test*

— *Part 12: Mechanical cone penetration test*

— *Part 13: Plate loading test*

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard : Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

1 Scope

This document specifies requirements for indirect investigations of soil by dynamic probing as part of geotechnical investigation and testing according to EN 1997-1 and EN 1997-2.

This document covers the determination of the resistance of soils and soft rocks in situ to the dynamic penetration of a cone. A hammer of a given mass and given height of fall is used to drive the cone. The penetration resistance is defined as the number of blows required to drive the cone over a defined distance. A continuous record is provided with respect to depth but no samples are recovered.

Four procedures are included, covering a wide range of specific work per blow:

— dynamic probing light (DPL): test representing the lower end of the mass range of dynamic equipment;

— dynamic probing medium (DPM): test representing the medium mass range of dynamic equipment;

— dynamic probing heavy (DPH): test representing the medium to very heavy mass range of dynamic equipment;

— dynamic probing super heavy (DPSH): test representing the upper end of the mass range of dynamic equipment.

The test results of this document are specially suited for the qualitative determination of a soil profile together with direct investigations (e.g. sampling according to prEN ISO 22475-1) or as a relative comparison of other in situ tests. They may also be used for the determination of the strength and deformation properties of soils, generally of the cohesionless type but also possibly in fine-grained soils, through appropriate correlations. The results can also be used to determine the depth to very dense ground layers e.g. to determine the length of end bearing piles, and to detect very loose, voided, back-filled or infilled ground.

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.

EN 10204, *Metallic products — Types of inspection documents*

prEN ISO 22475-1, *Geotechnical investigation and testing — Sampling by drilling and excavation methods and groundwater measurements — Part 1: Technical principles for execution (ISO/DIS 22475-1:2004)*

3 Terms and definitions

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

3.1
dynamic penetrometer
cone and drive rods

3.2
dynamic probing equipment
penetrometer and all equipment necessary to drive the penetrometer

3.3
anvil or drive head
portion of the drive-weight assembly that the hammer strikes and through which the hammer energy passes into the drive rods

3.4
cushion; damper
placed upon the anvil to minimise damage to the equipment

3.5
hammer
portion of the drive-weight assembly which is successively lifted and dropped to provide the energy that accomplishes the penetration of the cone

3.6
height of fall
free fall of the hammer after being released

3.7
drive-weight assembly
device consisting of the hammer, the hammer fall guide, the anvil and the drop system

3.8
drive rods
rods that connect the drive-weight assembly to the cone

3.9
cone
pointed probe of standard dimensions used to measure the resistance to penetration (see Figure 1)

3.10
actual energy; driving energy
E_{meas}
energy delivered by the drive-weight assembly into the drive rod immediately below the anvil, as measured

3.11
theoretical energy
E_{theor}
energy as calculated for the drive weight assembly,

$$E_{\text{theor}} = m \times g \times h$$

where

m is the mass of the hammer;

g is the acceleration due to gravity;

h is the falling height of the hammer.

3.12
energy ratio
E_r
ratio of the actual energy E_{meas} and the theoretical energy E_{theor} of the hammer expressed in percentage

3.13
N_{xy}-value
number of blows required to drive the penetrometer over a defined distance x (expressed in centimetres) by the penetrometer y

3.14
specific work per blow
E_n
value calculated by

$$E_n = m \times g \times h/A = E_{theor}/A$$

where

m is the mass of the hammer;

g is the acceleration due to gravity;

h is the falling height of the hammer;

A is the nominal base area (calculated using the base diameter D);

E_{theor} is the theoretical energy.

4 Equipment

4.1 Driving device

Dimensions and masses of the components of the driving device are given in Table 1. The following requirements shall be fulfilled:

a) hammer shall be conveniently guided to ensure minimal resistance during the fall;

b) automatic release mechanism shall ensure a constant free fall, with a negligible speed of the hammer when released and no induced parasitic movements in the drive rods;

c) steel drive head or anvil should be rigidly connected to the top of the drive rods. A loose connection can be chosen;

d) guide to provide verticality and lateral support for that part of the string of rods protruding above the ground should be part of the driving device.

If a pneumatic system for lifting a hammer is used, it shall be supplied with inspection documents as stipulated by EN 10204 because the driving energy is not always ensured.

4.2 Anvil

The anvil shall be made of high strength steel. A damper or cushion may be fitted between the hammer and anvil.

4.3 Cone

The cone of steel shall have an apex angle of 90° and an upper cylindrical extension mantle and transition to the extension rods as shown in Figure 1 and with the dimensions and tolerances given in Table 1. The cone may be either retained (fixed) for recovery or disposable (lost). When using a disposable cone the end of the drive rod shall fit tightly into the cone. Alternative specifications for the cones are given in Figure 1.