ILNAS

Institut luxembourgeois de la normalisation
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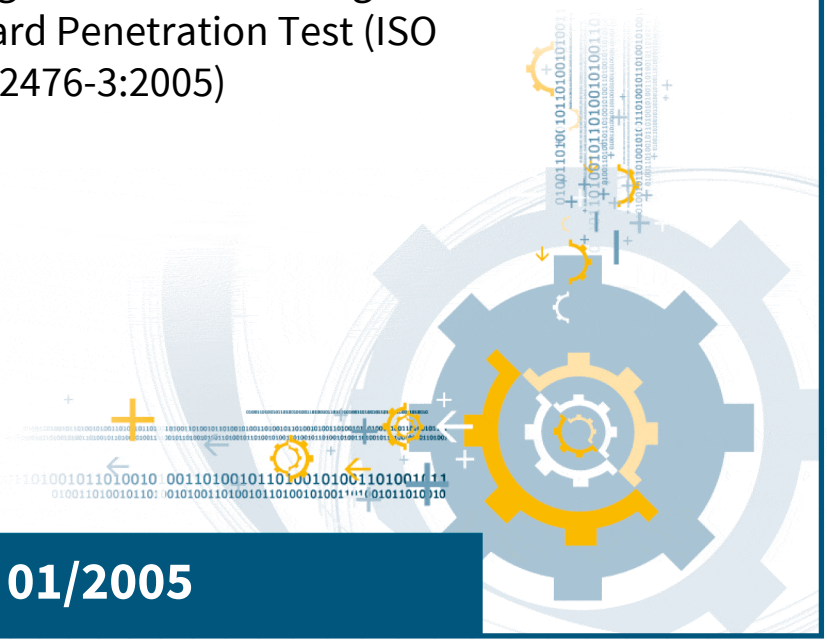
ILNAS-EN ISO 22476-3:2005

Geotechnical investigation and testing - Field testing - Part 3: Standard penetration test (ISO 22476-3:2005)

Reconnaissance et essais géotechniques - Essais en place - Partie 3 : Essais de pénétration au carottier (ISO 22476-3:2005)

Geotechnische Erkundung und Untersuchung - Felduntersuchungen - Teil 3: Standard Penetration Test (ISO 22476-3:2005)



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National Foreword

This European Standard EN ISO 22476-3:2005 was adopted as Luxembourgish Standard ILNAS-EN ISO 22476-3:2005.

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- Participate in the design of standards
- Foresee future developments
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EUROPEAN STANDARD
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EN ISO 22476-3

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

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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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Foreword

This document (EN ISO 22476-3:2005) 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: Menard 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: Lefranc permeability test*

— *Part 13: Water pressure tests in rock*

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 standard penetration test as part of geotechnical investigation and testing according to EN 1997-1 and EN 1997-2 to compliment direct investigations (e.g. sampling according to prEN ISO 22475-1).

The standard penetration test aims to determine the resistance of soils at the base of a borehole to the dynamic penetration of a split barrel sampler and the recovering of disturbed samples for identification purposes (SPT). In gravelly soils and in soft rocks a solid cone is also be used (SPT(C)).

The standard penetration test is used mainly to assess the strength and deformation parameters of cohesionless soils, but some valuable data may also be obtained in other soil types.

The basis of the test consists in driving a sampler by dropping a hammer of 63,5 kg mass on to an anvil or drive head from a height of 760 mm. The number of blows (N) necessary to achieve a penetration of the sampler of 300 mm (after its penetration under gravity and below a seating drive) is the penetration resistance.

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.

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

3.1
anvil or drive head
that portion of the drive-weight assembly that the hammer strikes and through which the hammer energy passes into the drive rods

3.2
hammer
portion of the drive-weight assembly consisting of the 63,5 kg impact weight which is successively lifted and dropped to provide the energy that accomplishes the penetration and sampling

3.3
height of fall
free fall of the hammer after being released

3.4
drive-weight assembly
device consisting of the hammer, the hammer fall guide, the anvil and the drop system

3.5
drive rods
rods that connect the drive-weight assembly to the sampler

3.6
actual energy
E_{meas}
energy delivered by the drive-weight assembly into the drive rod, immediately below the anvil, as measured

3.7
theoretical energy
E_{theor}
energy as calculated for the drive weight assembly:

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

where

m is the mass of the hammer;

g is the acceleration due to gravity;

h is the falling height of the hammer.

3.8
energy ratio
E_r
ratio of the actual energy E_{meas} and the theoretical energy E_{theor} of the hammer expressed in percentage

3.9
***N*-value**
number of blows required to drive the sampler for a test drive of 300 mm following the seating drive

4 Equipment

4.1 Drilling equipment

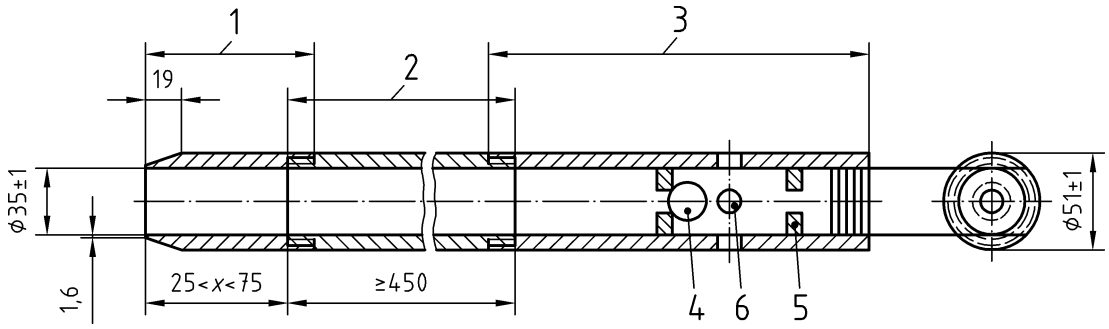
The drilling equipment shall be capable of providing a clean hole to ensure that the penetration test is performed on essentially undisturbed soil.

The area that is exposed in the base of the borehole prior to testing can influence the results and consequently the borehole diameter shall always be reported. A significant effect on the result can begin to occur when the diameter is 150 mm or more.

4.2 Sampler

The steel split barrel sampler shall have the dimensions indicated in Figure 1 and shall be provided with a non-return valve with sufficient clearance to permit the free flow of water or mud during driving.

The inner diameter of the sampler can be up to 3 mm larger than that of the shoe to allow for a liner. In gravelly sand, a solid 60° cone instead of the standard shoe can be used. In this case the test shall be noted as SPT(C).



Key

1 Drive shoe
2 Split barrel
3 Coupling
4 Non return valve (ball diameter: recommended 25 mm; ball seating: recommended 22 mm)
5 Ball retaining pins
6 Four vent holes (min diameter 12 mm)
x Length of the drive shoe

Figure 1 — Longitudinal cross section of an SPT sampler without a provision for a liner (dimensions in mm)

4.3 Drive rods

The drive rods shall have a stiffness that prevents buckling during driving. Rods with a mass of more than 10,0 kg/m shall not be used. Only straight rods shall be used and periodic checks shall be made on site, including connections between consecutive rods. When measured over the whole length of each rod the relative deflection shall not be greater than 1 in 1 200.

4.4 Drive weight assembly

The drive weight assembly, of an overall mass not exceeding 115 kg, shall comprise:

— a steel hammer of 63,5 kg ± 0,5 kg conveniently guided to ensure minimal resistance during the drop;

— an automatic release mechanism which will ensure a constant free fall of (760 ± 10) mm, a negligible speed of the hammer when released, and no induced parasitic movements in the drive rods;

— a steel drive head or anvil rigidly connected to the top of the drive rods. It may be an internal part of the assembly, as with safety hammers.

4.5 Optional equipment

4.5.1 Blow counter

A device to measure mechanical or electric impulses can be placed on the system in order to count the number of the blows of hammer.

4.5.2 Penetration length measuring device

The penetration length is measured either by counting on a scale on the rods or by recording sensors. In this latter case, resolution shall be less than 1/100 of the measured length.