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Geotechnical investigation and testing — Field testing —

Part 10: Weight sounding test

Reconnaissance et essais géotechniques — Essais en place — Partie 10: Essai de sondage par poids

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Foreword

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ISO/TS 22476-10 was prepared by Technical Committee ISO/TC 182, *Geotechnics*, Subcommittee SC 1, *Geotechnical investigation and testing*.

ISO/TS 22476 consists of the following parts, under the general title *Geotechnical investigation and testing — Field testing*:

— *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*

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Foreword

This document CEN ISO/TS 22476-10:2004 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”.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to announce this Technical Specification: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

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 (TS)* [1)]
— *Part 7: Borehole jack test*
— *Part 8: Full displacement pressuremeter test (TS)* [1)]
— *Part 9: Field vane test*
— *Part 10: Weight sounding test (TS)* [1)]
— *Part 11: Flat dilatometer test (TS)* [1)]
— *Part 12: Mechanical cone penetration test*
— *Part 13: Plate loading test*

1) TS Technical Specification.

Introduction

The weight sounding penetrometer consists of a screw-shaped point, rods, weights or other loading system and a handle or a rotating device. The weight sounding test is made as a static sounding in soft soils when the penetration resistance is less than 1 kN. When the resistance exceeds 1 kN the penetrometer is rotated, manually or mechanically, and the number of half turns for a given depth of penetration is recorded.

The weight sounding test is primarily used to give a continuous soil profile and an indication of the layer sequence. The penetrability in even stiff clays and dense sands is good.

The weight sounding test is also used to estimate the density of cohesionless soils and to estimate the depth to very dense ground layers indicating the length of end-bearing piles.

1 Scope

This Technical Specification comprises requirements for ground investigations by means of the weight sounding test (WST) as part of the geotechnical investigations according to prEN 1997-1 and prEN 1997-2.

2 Normative references

Not applicable.

3 Terms and definitions

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

3.1
weight sounding resistance
either the smallest standard load for which the penetrometer sinks without rotation, or the number of half turns per 0,2 m of penetration when the penetrometer has its maximum load and is rotated

3.2
manual weight sounding test
test made by loading and rotating the penetrometer by hand using a handle

NOTE The penetrometer is loaded by weights.

3.3
mechanised weight sounding test
test in which loading and rotating of the penetrometer is made mechanically

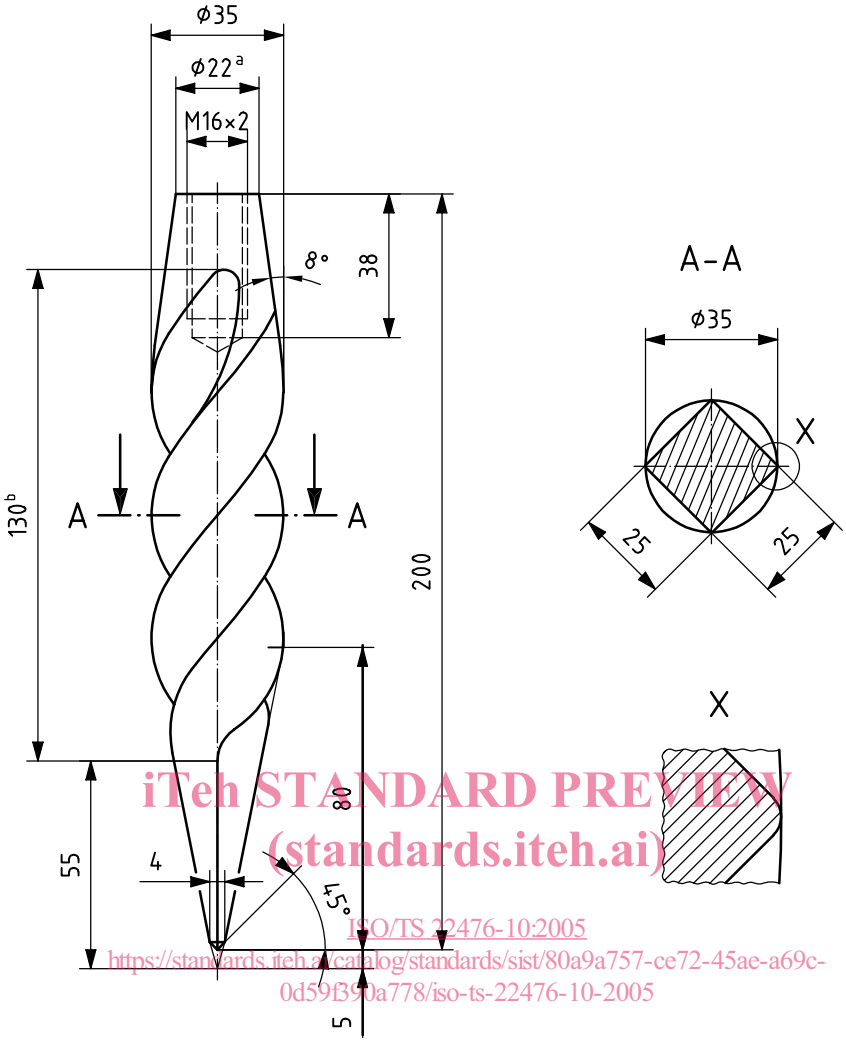
NOTE The penetrometer is loaded mechanically or by dynamometer or by weights.

4 Equipment

4.1 Penetrometer tip

The dimensions of the penetrometer point are shown in Figure 1. The diameter of the circumscribed circle of the screw-shaped point shall be 35 mm. The length of the point shall be 200 mm. The point, which has a pyramidical tip as shown in Figure 1, shall be twisted one turn to the left over a length of 130 mm.

The diameter of the circumscribed circle for the worn point shall not be less than 32 mm. The maximum allowable shortening of the point tip due to wear shall be 15 mm. The tip of the point shall not be bent or broken.



Key

a for 22 rods

b Twisted one turn to the left: 130 mm

Figure 1 — The point of the weight sounding penetrometer (dimensions in mm)

4.2 Weight loading system

The weights for the manual weight sounding test shall comprise of one 50 N clamp, two 100 N weights and three 250 N weights, total 1 000 N.

The weights for mechanised test may be replaced by a dynamometer with the measuring range from 0,05 kN up to 1,00 kN.

The maximum allowable deviation from the standard loads and the dynamometer scale shall be ± 5 % of the maximum load.

4.3 Rods

The diameter of the rods shall be 22 mm.

The length of the extension rod is usually 1 m. For pratical reason, the length of the first rod is usually 0,8 m. For the mechanised weight sounding test the length of the rod shall be 1,0 m to 2,0 m. The maximum allowable deviation from the total penetrated depth is 0,1 m.

The deviation from the straight axis shall not exceed 4 mm per m for the lowest 5 m of the rods and 4 mm per m for the remainder. The allowable eccentricity of the coupling shall not be more than 0,1 mm. The angular deviation for a joint between two straight rods shall not be more than 0,005 rad.

5 Test procedure

5.1 Calibration and checks

Prior to each test, a check of the proper condition of the equipment shall be made (wear of point, straightness of the rods etc.).

The precision of the measuring instruments – if applicable – shall be checked after any damage, overloading or repair but at least once every six months, unless the manufacturers specify shorter inspection intervals. Calibration records shall be kept together with the equipment.

5.2 Use of predrilling and casing

The possible need to predrill through the upper stiff or dense soil layers shall be estimated in each case.

NOTE Predrilling is often required through a dry crust or through a fill in order to minimise skin friction along the rods and increase the sensitivity of the penetrometer.

5.3 Manual weight sounding

When the penetrometer is used as a static penetrometer in soft soils, the rod shall be loaded in steps using the following standard loads: 0 kN, 0,05 kN, 0,15 kN, 0,25 kN, 0,50 kN, 0,75 kN, 1,0 kN. The maximum standard load is 1,0 kN.

The load shall be adjusted in the standard steps to give a rate of penetration of approximately 50 mm per second.

If the penetration resistance exceeds 1 kN or the penetration rate at 1 kN is less than 20 mm per second the rod shall be rotated. The load of 1 kN is maintained and the number of half turns required to give 200 mm of penetration shall be counted. During rotation if the point of the rod penetrates to the softer layer, it is necessary to evaluate whether should be halted.

The rod shall not be rotated when the penetration resistance is less than 1 kN.

The sounding shall be terminated by striking the rod with a hammer or by dropping some of the weights onto the clamp in order to check that the refusal is not temporary.

5.4 Mechanised weight sounding

The test shall be carried out in a similar manner as for the manual sounding. The rate of rotation shall not exceed 50 turns per minute.

The rate of rotation should be between 15 and 40 turns per minute. The recommended rate of rotation is 30 turns per minute.