SLOVENSKI STANDARD
SIST-TS CEN ISO/TS 17892-6:2004

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Geotehniļ no preiskovanje in preskuģanje ï Laboratorijsko preskuģanje zemljin ï 6. del: Preskus s konusom (ISO/TS 17892-6:2004)

Geotechnical investigation and testing - Laboratory testing of soil - Part 6: Fall cone test (ISO/TS 17892-6:2004)

Goetechnische Erkundung und Untersuchung - Laborversuche an Bodenproben - Teil 6: Fallkegelversuch (ISO/TS 17892-6:2004)

Reconnaissance et essais géotechniques - Essais de laboratoire sur les sols - Partie 6: Essai de pénétration de cône (ISO/TS 17892-6:2004)

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TECHNICAL SPECIFICATION

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Geotechnical investigation and testing - Laboratory testing of soil - Part 6: Fall cone test (ISO/TS 17892-6:2004)

Reconnaissance et essais géotechniques - Essais de sol au laboratoire - Partie 6: Essai au cône (ISO/TS 17892-6:2004)

Goetechnische Erkundung und Untersuchung - Laborversuche an Bodenproben - Teil 6: Fallkegelversuch (ISO/TS 17892-6:2004)

This Technical Specification (CEN/TS) was approved by CEN on 20 October 2003 for provisional application.

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Foreword

This document (CEN ISO/TS 17892-6:2004) 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 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.

CEN ISO/TS 17892 consists of the following parts, under the general title “*Geotechnical investigation and testing — Laboratory testing of soil*”:

— Part 1: Determination of water content.

— Part 2: Determination of density of fine grained soil.

— Part 3: Determination of particle density - Pycnometer method.

— Part 4: Determination of particle size distribution.

— Part 5: Incremental loading oedometer test.

— Part 6: Fall cone test.

— Part 7: Unconfined compression test.

— Part 8: Unconsolidated undrained triaxial test.

— Part 9: Consolidated triaxial compression tests.

— Part 10: Direct shear tests.

— Part 11: Permeability tests.

— Part 12: Determination of Atterberg limits.

Introduction

This document covers areas in the international field of geotechnical engineering never previously standardised. It is intended that this document presents broad good practice throughout the world and significant differences with national documents is not anticipated. It is based on international practice (see [1]).

1 Scope

This document specifies the laboratory determination of undrained shear strength of both undisturbed and remoulded specimen of saturated fine grained cohesive soils by use of a fall-cone.

This document specifies the fall-cone test, in which a cone is allowed to fall with its tip towards a soil specimen, whereupon the penetration of the cone into the soil is measured. Tests performed according to this test yield penetration values which can be used to estimate the undrained shear strength.

The test is applicable to both undisturbed and remoulded soil test specimen.

For undisturbed soil test specimen, the results of the test are dependent on the quality of the specimen. Because of possible effects of anisotropy, it can also differ depending on what undrained shear strength the relation refers to.

The evaluated value of the undrained shear strength of the 'undisturbed' soil refers to its state during the test in the laboratory. This value is not necessarily indicative of the undrained shear strength of the soil in its natural state in the field. Therefore, the test should be regarded as an index test.

NOTE 1 For non-homogeneous soil samples, this method yields values of the undrained shear strength which are less representative for the bulk shear strength of the sample than other tests involving a larger volume of soil.

NOTE 2 For disturbed soil samples and fissured soil samples this method normally yields higher strength values than tests involving a larger volume of soil.

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 1997-1, *Eurocode 7 - Geotechnical design — Part 1: General rules.*

prEN 1997-2, *Eurocode 7 - Geotechnical design - Part 2: Ground investigation and testing*

3 Terms and definitions

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

3.1
undrained shear strength
c_u
the shear strength of a saturated fine grained soil determined in such a way that the soil remains undrained during the shearing process

3.2
fall-cone undrained shear strength
c_{ufc}
the undrained shear strength determined using a fall-cone apparatus

3.3
undisturbed sample
normally a sample of quality class 1 according to prEN 1997-2

4 Equipment

4.1 Cone apparatus

4.1.1 The apparatus shall permit the cone to be held firmly initially and to be released instantaneously to fall freely in the vertical direction into the soil specimen.

4.1.2 The apparatus shall have a mechanism which allows the cone to be raised or lowered and adjusted in such way that the tip of the cone just touches the surface of the specimen before the cone is released.

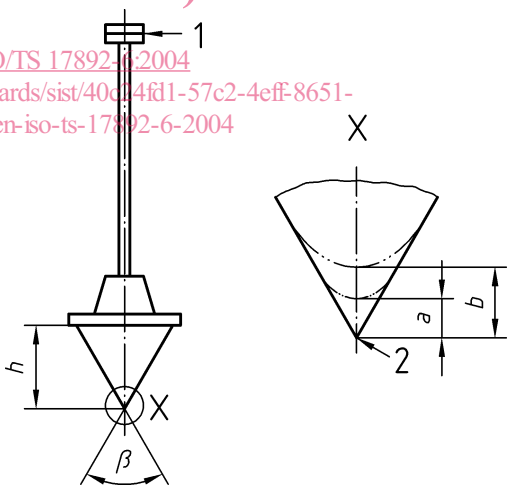
4.1.3 The cone apparatus shall be equipped with a scale or other read off unit with such grading and resolution that the depth of the cone penetration, which shall be within 5 mm to 20 mm, can be read off to a resolution of ± 0,1 mm after the release of the cone.

4.2 Fall-cones

4.2.1 A set of cones with cone angles of 30° or 60° and masses covering the whole range of possible shear strengths shall be used. A typical set of four fall cones is given on Table 1. The 60 g/60° cone is shown in Figure 1 as a typical example of such a cone.

Table 1 — Set of fall-cones - typical masses and dimensions

Mass	g	10	60	80	100	400
Tip angle β	°	60	60	30	30	30



Key

1 index line
2 cone tip
a is the deviation from the geometrical tip at manufacturing
b is the maximum wear
h is the height of the conical tip
β is the tip angle

Figure 1 — Example of a fall-cone

4.2.2 When readings are taken manually, there shall be a distinct index line at the top of each shaft which shall be clearly visible in the reading scale.

4.2.3 The cones shall be made of stainless material and have smooth polished surfaces with an average roughness R_a of less than 0,8 µm. Cones with obvious wear or scratches shall be replaced.

4.2.4 The masses of the cones, together with their shafts, shall be within 1 % of the nominal mass and the tip angles shall be within 0,2° of the nominal angles.

4.2.5 The deviation from the geometrical tip at manufacturing a shall be less than 0,1 mm. The maximum wear b shall be less than 0,3 mm.

4.2.6 The height of the conical tip h shall be greater than 20 mm. To ensure that the point remains sufficiently sharp for the purposes of the test, the cone should be replaced if the point can no longer be felt when brushed

lightly with the tip of the finger when the tip is pushed through a hole (1,50 ± 0,02) mm in diameter, drilled through a metal plate (1,75 ± 0,1) mm thick for a 30° cone or a (1,0 ± 0,1) mm thick metal plate for a 60° cone.

4.3 Ancillary apparatus

The ancillary apparatus consists of the following:

a) Sample tube for undisturbed soil specimen or plane for extruded and/or trimmed test specimen;

b) mixing cup; for remoulded specimen, a mixing cup shall be used with the rim parallel to the base. The cup shall be made of steel, porcelain or plastic, of cylindrical or semi-spherical shape, with a diameter greater than of 55 mm and depth of at least 30 mm;

c) spatula;

d) sample extruder;

e) wire cutter.

5 Test procedure

5.1 Test specimen preparation

5.1.1 General

5.1.1.1 For determination of undrained shear strength of undisturbed soil, the samples shall be taken with a sampling method yielding undisturbed samples.

5.1.1.2 When the soil contains shells, coarser particles, fissures, channels etc. fall-cone tests may yield erroneous results.

5.1.1.3 The time for storage of the soil samples and their handling can affect the test result.

5.1.2 Undisturbed specimen in sample tube

5.1.2.1 The test shall be performed on soil material which is representative of the sampling level and from that part of the sample, which according to experience of the particular sampling method is least disturbed.

5.1.2.2 Disturbed materials shall be extruded at the top of the sample form the tube by use of the sample extruder. The protruding part shall be cut off with the wire cutter in such a way that the soil surface is as even as possible.

NOTE The required amount of sample to be cut off mainly depends on the used type of sampler.