SLOVENSKI STANDARD
SIST-TS CEN ISO/TS 17892-8:2004

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Geotehniļ no preiskovanje in preskuġanje ï Laboratorijsko preskuġanje zemljin ï 8. del: Nekonsolidirani nedrenirani triosni preskus (ISO/TS 17892-8:2004)

Geotechnical investigation and testing - Laboratory testing of soil - Part 8: Unconsolidated undrained triaxial test (ISO/TS 17892-8:2004)

Geotechnische Erkundung und Untersuchung - Laborversuche an Bodenproben - Teil 8: Unkonsolidierter undränierter Triaxialversuch (ISO/TS 17892-8:2004)

Reconnaissance et essais géotechniques - Essais de laboratoire sur les sols - Partie 8: Essai triaxial non consolidé non drainé (ISO/TS 17892-8:2004)

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Geotechnical investigation and testing - Laboratory testing of soil - Part 8: Unconsolidated undrained triaxial test (ISO/TS 17892-8:2004)

Reconnaissance et essais géotechniques - Essais de sol au laboratoire - Partie 8 : Essai triaxial non consolidé non drainé (ISO/TS 17892-8:2004)

Geotechnische Erkundung und Untersuchung - Laborversuche an Bodenproben - Teil 8: Unkonsolidierter undränierter Triaxialversuch (ISO/TS 17892-8:2004)

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Contents

page

Foreword 3
1 Scope 5
2 Normative references 5
3 Terms and definitions 5
4 Symbols 5
5 Equipment 6
6 Test procedure 8
7 Test results 10
8 Test report 11
Bibliography 13

Figures

Figure 1 — Example of a triaxial test unit 6

Foreword

This document (CEN ISO/TS 17892-8:2004) 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, 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 on fine-grained soils.

— 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 test method for the determination of the compressive strength of a cylindrical, water-saturated specimen of undisturbed or remoulded cohesive soil when first subjected to an isotropic stress without allowing any drainage from the specimen, and thereafter sheared under undrained conditions within the scope of the geotechnical investigations according to prEN 1997-1 and -2.

NOTE "Water-saturated" refers to the in-situ condition. The material tested need not necessarily be saturated at all stages during the laboratory testing.

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.*

CEN ISO/TS 17892-1, *Geotechnical investigation and testing — Laboratory testing of soil — Part 1: Determination of water content (ISO/TS 17892-1:2004)* .

CEN ISO/TS 17892-2, *Geotechnical investigation and testing — Laboratory testing of soil — Part 2: Determination of density of fine grained soil (ISO/TS 17892-2:2004)*.

CEN ISO/TS 17892-3, *Geotechnical investigation and testing — Laboratory testing of soils — Part 3: Determination of density of soild particles — Pycnometer method (ISO/TS 17892-3:2004)*.

3 Terms and definitions

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

3.1
failure
stress of strain condition at which failure takes place

3.2
cohesive soils
soils that behave as if they were actually cohesive, e.g. clay and clayey soils

NOTE Most soils in this group behave cohesively due to negative pore pressure and friction, and not due to cohesion.

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

NOTE If no specification for the failure state is given, failure may be considered to occur at the peak deviator stress.

4 Symbols

ε_1 vertical strain during shearing.

σ_3 minor principal stress or cell pressure.

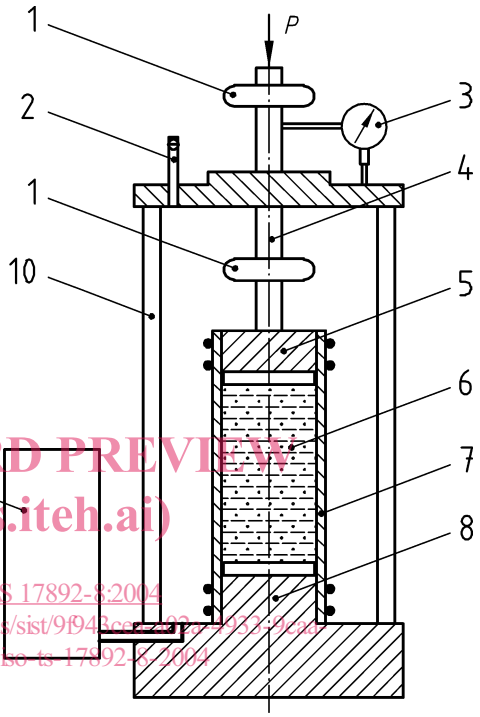
σ_1 major principal stress or vertical stress.

$\sigma_1 - \sigma_3$ deviator stress.

5 Equipment

5.1 General

A schematic diagram of an apparatus for triaxial testing is shown in Figure 1. The requirements for an apparatus are given in the following sections.



Key

1 alternative positions for load measuring device
2 air bleed
3 vertical compression measuring device
4 piston
5 top cap
6 soil specimen
7 rubber membrane
8 pedestal
9 device for measurement and control of cell pressure
10 triaxial cell
P vertical load

Figure 1 — Example of a triaxial test unit

5.2 Triaxial cell

5.2.1 The triaxial cell shall be able to withstand the cell pressure without significant leakage of cell fluid out of the cell.

NOTE A cell with a maximum cell pressure of 1500 kPa will be sufficient for nearly all cases. Transparent cells are recommended.

5.2.2 The sealing bushing and piston guide shall be designed such that the piston runs smoothly and maintains alignment.

5.2.3 The testing procedure, the accuracy of the load measuring device, the design of the piston, its sealing and guide and the design of the connection between the piston and the top cap shall be such that the load at failure is known within ± 3 % or within ± 1 N, whichever is the greater (see NOTE).

The laboratory shall ensure that this accuracy can be achieved with the worst possible combination of vertical and horizontal force and bending moment acting at that end of the piston that sticks into the triaxial cell. If the load measuring device is situated outside the triaxial cell (see Figure 1), it shall be ensured that the friction between the piston and it's sealing bushing is low enough or repeatable enough to permit the failure load to be determined with the required accuracy.

NOTE Smooth running of the piston when subjected to no horizontal load and no cell pressure is no guarantee that this is the case.

If the load measuring device is situated inside the triaxial cell, it shall be ensured that the device is sufficiently insensitive to horizontal forces and/or bending moments to achieve the required accuracy. The influence of the cell pressure on the load cell, if any, shall be sufficiently repeatable to be corrected for.

5.2.4 The top cap and the pedestal and the connection between the top cap and the piston shall be designed such that their deformations are negligible compared to the deformations of the soil specimen.

5.2.5 The diameter of the top cap and of the pedestal should normally be equal to the diameter of the specimen. Specimens with diameters smaller than the diameter of the end caps may be tested provided cavities under the membrane at the ends of the specimen can be avoided.

5.2.6 The vertical stress applied on the specimen due to the weight of the top cap may not exceed 3 % of the unconfined compressive strength (compressive strength is equal to two times the shear strength) of the specimen or 1 kPa whichever is the greater.

5.3 Confining membrane

5.3.1 The soil specimen shall be confined by an elastic membrane which effectively prevents the cell fluid from penetrating into the specimen. If rubber membranes are used, membranes with following properties should be used:

— Unstretched diameter between 95 % and 100 % of specimen diameter (after being stored in water);

— thickness not exceeding about 1 % of the specimen diameter;

— elastic modulus (measured in tension) not exceeding 1600 kPA.

5.3.2 Confining membranes that give a correction on the deviator stress (σ_1 - σ_3) of more than 10 % at failure should not be used.

5.3.3 If O-rings are used to seal the confining membrane to the top cap and to the pedestal, their dimensions and elastic properties shall be such that the confining membrane is firmly sealed to the top cap and to the pedestal.

5.4 Cell pressure device

5.4.1 The device for maintaining the cell pressure constant shall be accurate enough to keep the required cell pressure constant within ± 2 % or ± 1,0 kPa, whichever is greater.

5.4.2 The tubings between the triaxial cell and the cell pressure sensor shall be wide enough to ensure negligible pressure difference between these two components.

5.5 Loading press

5.5.1 The loading press shall be able to provide the rates of vertical strain according to 6.5. The actual rate may not deviate more than ± 10 % from the required value. The movement of the press shall be smooth without fluctuations or vibrations.

NOTE A loading press with a maximum load capacity of 10 kN and which is able to advance the piston with rates varying from about 0,5 mm to about 3 mm per minute with a minimum of four different advance rates is considered to be sufficient for most testing.

5.5.2 The stroke of the loading press shall be at least 30 % of the specimen height.

5.6 Measuring devices

5.6.1 Vertical load

The accuracy of the vertical load sensor shall be compatible with the accuracy by which it is required that the failure load shall be known (see 5.2.3).