

ICS 13.080.20; 93.020

English version

**Geotechnical investigation and testing - Laboratory testing of
soil - Part 4: Determination of particle size distribution (ISO/TS
17892-4:2004)**

Reconnaissance et essais géotechniques - Essais de sol
au laboratoire - Partie 4: Détermination de la granulométrie
(ISO/TS 17892-4:2004)

Geotechnische Erkundung und Untersuchung -
Laborversuche an Bodenproben - Teil 4: Bestimmung der
Korngrößenverteilung (ISO/TS 17892-4:2004)

This Technical Specification (CEN/TS) was approved by CEN on 2 December 2003 for provisional application.

The period of validity of this CEN/TS is limited initially to three years. After two years the members of CEN will be requested to submit their comments, particularly on the question whether the CEN/TS can be converted into a European Standard.

CEN members are required to announce the existence of this CEN/TS in the same way as for an EN and to make the CEN/TS available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force (in parallel to the CEN/TS) until the final decision about the possible conversion of the CEN/TS into an EN is reached.

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.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

Contents

Foreword.....	3
1 Scope	5
2 Normative references	5
3 Terms and definitions	6
4 Equipment	6
4.1 General.....	6
4.2 Sieving	7
4.3 Hydrometer method.....	7
5 Test procedure	10
5.1 Selection of test method	10
5.2 Sieving	10
5.3 Hydrometer analysis	15
6 Test results	21
6.1 Sieving	21
6.2 Hydrometer.....	21
6.3 Pipette method	23
7 Test report	24
Annex A (informative) Calibration of hydrometer	26
A.1 Volume calibration.....	26
A.2 Scale calibration	26
A.3 Meniscus correction.....	27
Annex B (informative) Calibration of hydrometer	29
B.1 Pretreatment for organic material	29
B.2 Pretreatment for carbonate material.....	29
B.3 Final pretreatment stage	29
Bibliography	30

Tables

Table 1 — Minimum mass required for sieving as a function of particle diameter D_{90}	12
Table 2 — Maximum mass of soil retained on each sieve.....	14
Table 3 — Dry mass of soil specimen for sedimentation test.....	17
Table 4 — Insertion depth of pipette.....	20
Table 5 — Dynamic viscosity of water.....	23
Table A.1 — Temperature correction.....	28

Figures

Figure 1 — Example of pipette configuration	9
Figure 2 — Sieving procedure	11
Figure 3 — General procedure for sedimentation	16
Figure 4 — Example of a particle size distribution result.....	25
Figure A.1 — Example of calibration of hydrometer scale	27

Foreword

This document (CEN ISO/TS 17892-4:2004) 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 grain soils
- Part 8: Unconsolidated undrained triaxial test
- Part 9: Consolidated triaxial compression tests on water saturated soils
- Part 10: Direct shear tests
- Part 11: Determination of permeability by constant and falling head
- Part 12: Determination of the 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 describes methods for the determination of the particle size distribution of soil samples.

The particle size distribution is one of the most important physical characteristics of soil. Classification of soils is mainly based on the particle size distribution. Many geotechnical and geohydrological properties of soil are related to the particle size distribution.

The particle size distribution provides a description of soil, based on a subdivision in discrete classes of particle sizes. The size of each class can be determined by sieving and/or sedimentation. For soils with less than 10 % fines, the sieving method is applicable. Soils with more than 10 % fines can be analysed by a combination of sieving and sedimentation.

Sieving is the process whereby the soil is separated in particle size classes by the use of test sieves. Sedimentation is the process of the setting of soil particles in a liquid. The difference in settling rate enables the particle size classes to be separated. Two sedimentation methods are described; the hydrometer method and the pipette method.

The methods described are applicable to all non-cemented soils with particle sizes less than 125 mm.

Depending on the purpose for the determination of the particle size distribution, pretreatment or correction for calcium carbonate, dissolved salts and/or organic matter can be required. The use of these methods should be stated in the laboratory report.

Modern methods that incorporate detection systems using x-rays, laser beams, density measurements and particle counters are not covered by this document.

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.

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

ISO 565, *Test sieves - Metal wire cloth, perforated metal plate and electroformed sheet - Nominal sizes of openings*.

ISO 3310-1, *Test sieves - Technical requirements and testing - Part 1: Test sieves of metal wire cloth*.

ISO 3310-2, *Test sieves - Technical requirements and testing - Part 2: Test sieves of perforated metal plate*.