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**Geotechnical investigation and  
testing — Laboratory testing of soil —**

**Part 3:  
Determination of particle density**

*Reconnaissance et essais géotechniques — Essais de laboratoire  
sur les sols —*

*Partie 3: Détermination de la masse volumique des grains*

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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#).

ISO 17892-3 was prepared by the European Committee for standardization (CEN) TC 341 *Geotechnical investigation and testing*, in collaboration with ISO/TC 182 *Geotechnics*, Subcommittee SC 1 *Geotechnical investigation and testing*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This International Standard cancels and replaces ISO/TS 17892-3:2004, which has been technically revised. It also incorporates the Technical Corrigendum ISO/TS 17892-3:2004/Cor.1:2006.

ISO 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 bulk density*
- *Part 3: Determination of particle density*
- *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 liquid and plastic limits*

This corrected version of ISO 17892-3:2015 incorporates the following corrections plus other minor editorial modifications.

Foreword: It has been clarified that this is a first edition of an International Standard that is replacing a Technical Specification.

3.1: The word 'dry' has been added to the definition.

4.3.2: A temperature range has been specified.

Figure 2: Labels  $V_S$  and  $V_r$  have been removed.

5.2.4.3: An alternative method to determine the volume of the specimen has been added.

6.1.2: A temperature has been specified for  $\rho_L$ .

6.2.2: A note has been added.

Formula (7): Formula has been modified with a factor of  $10^{-6}$  instead of  $10^6$ .

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## Introduction

This part of ISO 17892 covers areas in the international field of geotechnical engineering never previously standardized internationally. It is intended that this part of ISO 17892 presents broad good practice and significant differences with national documents is not anticipated. It is based on international practice (see Reference [1]).

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# Geotechnical investigation and testing — Laboratory testing of soil —

## Part 3: Determination of particle density

### 1 Scope

This part of ISO 17892 specifies methods for the determination of the particle density of soils.

This part of ISO 17892 is applicable to the laboratory determination of the particle density of soil within the scope of geotechnical investigations, and describes two methods, a pycnometer method by fluid displacement and a pycnometer method by gas displacement.

The fluid pycnometer method described in this part of ISO 17892 applies to soil types with particle sizes under about 4 mm, or soils crushed to meet this requirement. Larger pycnometers are used for coarser materials. The particle size of soils suitable for testing in the gas pycnometer is limited by the dimensions of the specimen container of the particular gas pycnometer being used.

NOTE 1 This part of ISO 17892 fulfils the requirements of the determination of particle density of soils for geotechnical investigation and testing in accordance with EN 1997-1 and EN 1997-2.

NOTE 2 The presence of dissolved salts in the pore water can affect the results of these tests. Techniques for compensating for dissolved salts are available but are beyond the scope of this standard.

### 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 17892-1, *Geotechnical investigation and testing — Laboratory testing of soil — Part 1: Determination of water content*

ISO 14688-1, *Geotechnical investigation and testing — Identification and classification of soil — Part 1: Identification and description*

### 3 Terms and definitions

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

#### 3.1

##### density of solid particles

$\rho_s$

dry mass of the particles divided by their volume

### 4 Apparatus

#### 4.1 Calibration requirements

See [Annex A](#) for calibration requirements of the following equipment.