



SLOVENSKI STANDARD
oSIST prEN 17685-1:2021
01-september-2021

Zemeljska dela - Kemijski preskusi - 1. del: Določanje deleža organskih snovi pri žaroizgubi

Earthworks - Chemical tests - Part 1: Determination of organic matter content by loss on ignition

Erdarbeiten — Chemische Prüfverfahren — Teil 1: Bestimmung des Gehalts an organischen Stoffen durch Glühverlust

Terrassements — Essais chimiques — Partie 1 : Détermination de la teneur en matière organique par perte au feu

ITEH STANDARD PREVIEW
(standards.iteh.ai)
<https://standards.iteh.ai/catalog/standards/sist/1432501f-0693-45c7-b91b-120e82bb4bac/osist-pr-en-17685-1-2021>

Ta slovenski standard je istoveten z: prEN 17685-1

ICS:

13.080.99	Drugi standardi v zvezi s kakovostjo tal	Other standards related to soil quality
93.020	Zemeljska dela. Izkopavanja. Gradnja temeljev. Dela pod zemljo	Earthworks. Excavations. Foundation construction. Underground works

oSIST prEN 17685-1:2021

en,fr,de

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[oSIST prEN 17685-1:2021](#)

<https://standards.iteh.ai/catalog/standards/sist/1432501f-0693-45c7-b91b-120e82bb4bac/osist-pren-17685-1-2021>

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

DRAFT
prEN 17685-1

July 2021

ICS 13.080.99; 93.020

English Version

Earthworks - Chemical tests - Part 1: Determination of organic matter content by loss on ignition

Terrassements - Essais chimiques - Partie 1 :
Détermination de la teneur en matière organique par
perte au feu

Erdarbeiten - Chemische Tests - Teil 1: Bestimmung
des Gehalts an organischen Stoffen durch Glühverlust

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 396.

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

This draft European Standard was established by CEN in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Warning : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.



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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

prEN 17685-1:2021 (E)

Contents		Page
European foreword		3
Introduction		4
1	Scope	5
2	Normative references	5
3	Terms and definitions	5
4	Abbreviations and symbols	5
5	Principle of the test	6
6	Apparatus	7
7	Pretreatment	7
8	Test procedure	7
9	Expression of results and determination of the loss on ignition	8
10	Test report	8
Annex A (informative) Example of a test data sheet		10
Annex B (normative) Determination of the organic matter content of clayed soils		11

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[oSIST prEN 17685-1:2021](https://standards.iteh.ai/catalog/standards/sist/1432501f-0693-45c7-b91b-120e82bb4bac/osist-pren-17685-1-2021)

<https://standards.iteh.ai/catalog/standards/sist/1432501f-0693-45c7-b91b-120e82bb4bac/osist-pren-17685-1-2021>

European foreword

This document (prEN 17685-1:2021) has been prepared by Technical Committee CEN/TC 396 “Earthworks”, the secretariat of which is held by AFNOR.

This document is currently submitted to the CEN Enquiry.

iTeh STANDARD PREVIEW (standards.iteh.ai)

[oSIST prEN 17685-1:2021](https://standards.iteh.ai/catalog/standards/sist/1432501f-0693-45c7-b91b-120e82bb4bac/osist-pren-17685-1-2021)

<https://standards.iteh.ai/catalog/standards/sist/1432501f-0693-45c7-b91b-120e82bb4bac/osist-pren-17685-1-2021>

prEN 17685-1:2021 (E)

Introduction

This document describes a method for the determination of the loss on ignition (w_{LOI}) of fine, intermediate, composite and coarse soils, organic soils and anthropogenic materials (according to EN 16907-2) after ignition under air at 550°C. Methods are given in Annex B in order to estimate the organic matter content (C_{OM}) from the value of w_{LOI} .

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[oSIST prEN 17685-1:2021](https://standards.iteh.ai/catalog/standards/sist/1432501f-0693-45c7-b91b-120e82bb4bac/osist-pren-17685-1-2021)

<https://standards.iteh.ai/catalog/standards/sist/1432501f-0693-45c7-b91b-120e82bb4bac/osist-pren-17685-1-2021>

1 Scope

This document describes a method for the determination of the loss on ignition (w_{LOI}) of fine, intermediate, composite and coarse soils, organic soils and anthropogenic materials (according to EN 16907-2) after ignition under air at 550°C.

The loss of mass suffered by these materials at 550 °C is usually due to the release of volatile compounds, water (absorbed, crystalized or structural) and gases from decomposition of organic matter and inorganic substances such as sulfur, sulphides or hydroxides (e.g. H₂O, CO₂, SO₂).

A method is given in Annex B in order to estimate the organic matter content (C_{OM}) from the value of w_{LOI} for clayed soils.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

EN 932-2, *Tests for general properties of aggregates — Part 2: methods for reducing laboratory samples*

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

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

3.1

constant mass

successive weightings after drying at least 1h apart not differing by more than 0,1 %

4 Abbreviations and symbols

Abbreviations for terms and tests

LOI	Loss of ignition
COM	Organic Matter Content

prEN 17685-1:2021 (E)

Symbols for Quantities

C_{OM}	Organic matter content, deduced from w_{LOI}	dimensionless (%)
D_{max}	Maximum diameter of particles in a soil mass	mm
m_a	mass of the empty crucible	g
m_c	mass of the crucible containing the dried sample	g
m_d	mass of the crucible containing the ignited sample	g
w_L	Liquid limit	dimensionless (%)
w_{LOI}	Loss of ignition: Mass fraction lost by burning up a dried sample to constant mass at a specified temperature	dimensionless (%)
w_R	Residue of ignition : Mass fraction remaining after burning up a dried sample to constant mass at a specified temperature	dimensionless (%)

ITeH STANDARD PREVIEW
(standards.iteh.ai)

5 Principle of the test

A weighted dried test portion is burned in a furnace to constant mass at $550\text{ °C} \pm 25\text{ °C}$ under air. The difference in mass before and after the ignition process is used to calculate the loss of ignition. The determination is performed on a dried sample.

NOTE 1 Carbonates dissociate at temperatures higher than 550 °C .

NOTE 2 Interferences and sources of error: LOI is an empirical parameter, thus there is no interference connected to its determination. However, the determination of LOI is used for the assessment of the content of organic matter C_{OM} in the sample.

- Elementary carbon in the sample will be included in the loss of ignition value. Furthermore, any volatilization or chemical reaction of inorganic compounds will also be included in the loss on ignition value;
- Chemically bound water could be released during heating, thereby contributing to the loss of ignition;
- Samples containing iron, other metals in low bonding state or in metallic state could be oxidized during heating, thereby contributing to the loss of ignition with a negative mass gain;
- Sulfides present in the sample could be oxidized to sulfate during heating, thereby contribution to the loss of ignition with a negative mass gain;
- Calcium hydroxide or calcium oxide can react with carbon dioxide to form calcium carbonates, thereby contribution to the loss of ignition with a negative mass gain;
- In addition to mineral soil particles, the weighed ashes after ignition could contain some residues of the ignited organic matter.

6 Apparatus

- 6.1 Ventilated oven**, thermostatically controlled to maintain a temperature of $110\text{ °C} \pm 5\text{ °C}$;
- 6.2 Crucible suitable**, for ignition at 550 °C , e.g. made of nickel platinum, porcelain or silica, approximately 50 mm to 70 mm diameter;
- 6.3 Muffle furnace**, or equivalent equipment, capable of maintaining a temperature of $550\text{ °C} \pm 25\text{ °C}$;
- 6.4 Metal plate**, or comparable plate, suitable for the initial cooling of crucibles;
- 6.5 Desiccator**, with an active drying agent, such as silica gel;
- 6.6 Balance**, with a maximum permissible measurement error less than 3 mg;
- 6.7 Test sieve**, conforming to ISO 3310-1, of 2 mm aperture.

7 Pretreatment

The laboratory samples shall be reduced in accordance with EN 932-2.

The minimum mass necessary for the test, depending on D_{\max} , is given in Table 1:

Table 1 — Mass material required depending on D_{\max}

D_{\max} (mm)	1	5	≥ 10
Mass (g)	200	300	$8 D_{\max}^2$

The steps are as follows:

- Dry the entire material at a temperature of $110\text{ °C} \pm 5\text{ °C}$ till constant mass;
- Sieve through at 2 mm sieve;
- Weigh the material passing the 2 mm sieve. The mass shall be greater or equal to 50 g;
- Crush the elements passing through the 2 mm sieve.

8 Test procedure

Perform the following procedure on at least two samples:

- Place a crucible in the furnace and heat to $550\text{ °C} \pm 25\text{ °C}$ for at least 20 min. Transfer the crucible from the furnace to a desiccator after initial cooling on a metal plate and finish cooling to ambient temperature;
- Weigh the empty crucible (m_a);
- Place into the crucible 0,5 g to 15 g of the test portion. The sample layer in the crucible should not exceed a height of 5 mm. Weigh the crucible and its contents (m_c);

Sample in crucibles should not exceed a height of 5 mm in order to avoid the decrease of the LOI value by the own refractive behaviour of the same sample at higher thicknesses. Therefore, a big-sized crucible may be necessary if a sample of 5 g to 15 g is tested.

prEN 17685-1:2021 (E)

It is recommended for sludge, peat, treated biowaste, and waste to test a sample of 0,5 g to 5 g. For soils with low amount of organic matter, it is recommended to test a sample of 5 g to 15 g.

- Place the crucible into the furnace. Raise the furnace temperature to $550\text{ °C} \pm 25\text{ °C}$ and hold this temperature for at least 2 h. If the test portion has high organic content, losses may occur as a result of rapid ignition or deflagration of the sample. In this case, heat the sample slowly to $250\text{ °C} \pm 15\text{ °C}$ over a period of 1 h, allowing pyrolysis of the sample. Then the temperature is raised slowly to $550\text{ °C} \pm 25\text{ °C}$ also over a period of 1 h, temperature that is finally kept for at least 2 h;
- Place the hot crucible containing the residue of ignition on a metal plate for a few minutes. While still warm, transfer the crucible to a desiccator and leave to cool to ambient temperature. As soon as the ambient temperature is reached, weigh the crucible containing the ignition residue (m_d).

9 Expression of results and determination of the loss on ignition

The loss of ignition of a total dried test sample shall be calculated from Formula (1) and the residue on ignition of the dry matter of a solid sample expressed in percent shall be calculated from Formula (2):

$$w_{LOI} = \frac{m_c - m_d}{m_c - m_a} \times 100 \quad (1)$$

$$w_R = 100 - w_{LOI} \quad (2)$$

where

w_{LOI} is the loss on ignition of the dry mass of a solid sample, in percent (%);

w_R is the residue on ignition of the dry mass of a solid sample, in percent (%);

m_a is the mass of the empty crucible, in grams (g);

m_c is the mass of the crucible containing the dried sample, in grams (g);

m_d is the mass of the crucible containing the ignited sample, in grams (g).

The final result is the average of at least 2 results.

NOTE A correction can be applied to the result in order to take into account the source of errors (see informative Annex B for details) and estimate the organic matter content C_{OM} .

10 Test report

The test report shall affirm that the test was carried out in accordance with this part of EN 17685 and shall contain the following information:

- general elements related to the identification and organization, especially regarding operator having carried out the test;
- the date of the test;
- identification of the business;
- identification of the specimen tested, e.g. by borehole number, sample number and sample depth and any other relevant details required, e.g. depth of specimen within a sample, method of sample selection, if relevant;