International Standard

ISO 17505

Soil and waste characterization — Temperature dependent differentiation of total carbon (TOC_{400}, ROC, TIC_{900})

Caractérisation des sols et des déchets — Différenciation en fonction de la température du carbone total (COT_{400}, COR, CIT_{900})

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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Foreword

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This document was prepared by the European Committee for Standardization (CEN) (as EN 17505:2023) and was adopted, without modifications other than those given below, by Technical Committee ISO/TC 190, *Soil quality*, Subcommittee SC 3, *Chemical and physical characterization* under the fast-track procedure.

— EN ISO 10693 references have been changed to ISO 10693;

— EN 15936 has been added to the Bibliography;

— cross references in 6.2 have been corrected.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

Carbon occurs in soils and materials similar to soil in a variety of compounds and forms. When determining carbon in soils or soil-like materials, an overall determination of the different mass fractions is most feasible. The summarized declaration of carbon is yet done by differentiating organic and inorganic carbon (EN 15936, ISO 10694). In the proportion classified as “organic carbon”, a fraction of very stable highly aromatic and highly condensed carbon compounds can be present, sometimes in significant mass fractions. Since this black (pyrogenic) carbon is only very slowly decomposed and released, its environmental relevance has to be differently evaluated than the proportions of organic carbon which are faster chemical-biologically decomposed. The environmental relevance is estimated if e.g. the suitability of soils and soil-like materials for disposal in landfill is assessed. For a differentiated assessment, a separate declaration of the different mass fractions of organic, black (pyrogenic) and inorganic carbon is necessary. Using the specified temperature-gradient method and utilizing the combustion characteristic(s), the carbon fractions established according to this standard in soil and soil-like materials can be differentiated.

In respect of the hazard potential, the content of solely organically bonded carbon in solids determined with the described method can be important for disposal and/or recycling.

The method has been validated with the materials listed in Table 1, see also Annex A.

Table 1 — Materials used for validation

Material type	Materials used for validation
soils from natural material	mineral soils soil with anthropogenic admixtures (urban soils)
tailing material (tailings)	tailing material from coal mining
sediment	sediment
waste	waste incineration ash foundry sand construction waste

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Soil and waste characterization — Temperature dependent differentiation of total carbon (TOC_{400}, ROC, TIC_{900})

1 Scope

This document specifies a method for the differentiated determination of the organic carbon content (TOC_{400}) which is released at temperatures up to 400 °C, the residual oxidizable carbon (ROC) (including e.g. lignite (brown coal), hard coal, charcoal, black carbon, soot) and the inorganic carbon (TIC_{900}) which is released at temperatures up to 900 °C.

The basis of this method is the dry combustion or decomposition of carbon to CO_2 in the presence of oxygen or non-oxygen conditions using temperatures ranging from 150 °C to 900 °C in dry solid samples of sediment, soil, soil with anthropogenic admixtures and solid waste (see Table 1) with carbon contents of more than 1 g per kg (0,1 % C) (per carbon type in the test portion).

NOTE TIC_{900}, includes the TIC measured after acid addition e.g. by ISO 10694 or EN 15936. TOC_{400} is a fraction of TOC measured according to e.g. ISO 10694 or EN 15936.

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 16179, *Sludge, treated biowaste and soil — Guidance for sample pretreatment*

EN 15002, *Characterization of waste — Preparation of test portions from the laboratory sample*

ISO 11464, *Soil quality — Pretreatment of samples for physico-chemical analysis*

3 Terms and definitions

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

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

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
total organic carbon which is released up to 400 °C
TOC_{400}
quantity of carbon which is determined in the range between 150 °C – (400 ± 20) °C to the 1st signal minimum after the minimum holding time at (400 ± 20) °C, in the case of dry combustion in the presence of oxygen

Note 1 to entry: TOC_{400} is a fraction of TOC measured e.g. by ISO 10694 or EN 15936.

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