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Träskyddsmedel och träbaserade produkter – Innehåll av den totala mängden organiskt kol (TOC) i trä och träbaserade produkter

Wood and wood based products – Dosage of the total organic carbon (TOC) in wood and wood based products



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EUROPEAN STANDARD

EN 16718

NORME EUROPÉENNE

EUROPÄISCHE NORM

November 2015

ICS 79.060.01

English Version

Wood and wood based products - Dosage of the total organic carbon (TOC) in wood and wood based products

Produits de préservation du bois et matériaux à base de bois - Dosage du carbone organique total (COT) dans les bois et matériaux à base de bois

Holz und Holzprodukte - Bestimmung des gesamten organischen Kohlenstoffs (TOC) in Holz und Holzprodukten

This European Standard was approved by CEN on 12 September 2015.

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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European foreword

This document (EN 16718:2015) has been prepared by Technical Committee CEN/TC 38 “Durability of wood and wood-based products”, the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by May 2016, and conflicting national standards shall be withdrawn at the latest by May 2016.

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Introduction

Bio-based products from forestry and agriculture have a long history of application. The last decades have seen the emergence of new bio-based products in the market. Acknowledging the need for common standards for bio-based products, the European Commission issued mandate M/492, resulting in a series of standards developed by CEN/TC 411.

For business to business transactions, claims which are relevant to describe characteristics of bio-based products in a business to business environment will be given in the near future. Data are by consequence required to generate and transfer information in the industrial chain and/or as an input for product specific standards and certification schemes.

The work to be done by the CEN/TC 411/WG 3 concerns the determination of the bio-based carbon in order to determine the level of bio-based content of a product or materials. A document (CEN/TR 16721) has been prepared by Technical Committee CEN/TC 411 "Bio-based products", and describes a list of methods and an "overview of methods to determine the bio-based content and related methods" for Bio-based products.

As part of the task force of CEN/TC 175, devoted to carbon foot printing and LCA, a European Standard was published on the simplified calculation of the amount of biomass carbon stored in wood (using 50 % of the anhydrous wood mass): EN 16449.

This standard EN 16718 describes the methods based on analytical measurements. These methods can be considered as complementary to the radiocarbon based method and methods based on evaluation by calculation (mass balance approaches). One of these analytical methods is a method based on measurement of stable isotopic ratio present in biomass in order to determine the biomass content of the product.

The development of this method described in this report is ongoing with close collaboration between FCBA and the "Institut des Sciences Analytiques" CNRS in order to determine the bio-based content of wood raw materials, glues and panels made with these raw materials for end use manufactured products with this new method. The objective is to propose correlated analysis (with the TOC method proposed by FCBA) to determine the carbon content to purpose a quick and low cost method easy to handle.

References:

- <http://www.biobasedeconomy.eu/standardisation/cen-tc411/>
- http://www2.afnor.org/espace_normalisation/structure.aspx?commid=86489

The tests that have resulted in the specification of this document were performed in the context of work conducted by the FCBA [timber certification body] Technological Institute aimed at determining a method for supplying data on organic carbon contents that could be used to calculate carbon balances.

The storage of biomass carbon in wood-based products is the preservation of the carbon absorbed by the tree from atmospheric CO₂ through photosynthesis.

The carbon thus captured in the material is of benefit to the climate throughout the lifespan of the product, which can be several dozen years for a construction product, for example. The French Standard NF P01-010 (2004), which lays out the format of environmental and health statements (FDES) for construction products, provides the option of indicating the following supplementary information, in addition to the "Climate change" indicator, which is calculated from the flows of greenhouse gases associated with the product life cycle: "for some construction products (e.g. plant-based products), CO₂ storage during the "service life" stage can be given if measurements are taken based on standardized test methods."

Furthermore, the Guide to Best Practices on environmental labelling of mass-market consumer products (BP X30-323) includes in Annex G: “Carbon accounting integrating time lag” which also requires knowledge of the biomass carbon contents of the products.

The purpose of this document is therefore to propose a laboratory measurement method of the amount of biomass carbon that will provide values of carbon or CO₂ equivalent stored in wood-based products, with the aim to integrate this information in the environmental statements of these products according to the texts referenced above.

While measurement is not systematically necessary for solid wood products, for example, given the common knowledge on the densities of the various wood species and on the proportion of carbon contained in wood, this experimental measurement may prove to be necessary for products made of wood-based composite materials.

The organic carbon contained in wood and wood-based materials is found in several different forms. Cumulative measurements, such as total organic carbon (TOC), need to be used. Isotopic ratio enables the differentiation between synthetic and natural products. IRMS (Isotope Ratio Mass Spectrometer) is a complementary method to the TOC method by an identification of the isotope ¹³C: both techniques are necessary to give reliable data on a bio-based content on a wood based material such as panel, board, and woods containing chemicals in general. A study is currently in progress in France on wood based materials: the results will enable to improve this present document and to give data with multi-isotopic determinations (¹³C, ¹⁵N, ²H, ¹⁸O).

1 Scope

This European Standard describes a method for determining total organic carbon by calculating the difference between the results of measurements of total carbon (TC) and total inorganic carbon (TIC). The identification of the bio-based content given by the stable isotopes such as ^{13}C is described also.

This method is applicable to all wood species, wood-based materials (panels, plywood, wood-polymer, etc.) and woods containing chemicals in general.

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.

EN 13183-1, *Moisture content of a piece of sawn timber — Part 1: Determination by oven dry method*

3 Terms and definitions

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

3.1

total carbon

TC

amount of carbon found in waste, in organic, inorganic and elemental-state forms

3.2

total inorganic carbon

TIC

amount of carbon released as carbon dioxide through acidification

3.3

total organic carbon

TOC

carbon that is transformed into carbon dioxide through combustion and not released through acidification as carbon dioxide

Note 1 to entry: The definitions given above are only applicable in this document and only partly overlap the scientific definitions of TC, TOC and TIC.

4 Principle

In this procedure, TOC is obtained by subtraction between the measurement results of TC and TIC.

The total carbon (TC) present in the undried sample is transformed into carbon dioxide through combustion in a flow of gas that contains oxygen and is free of carbon dioxide. To ensure combustion is total, catalysers and/or modifiers can be used. The amount of carbon dioxide released is measured using infrared spectrometry, gravimetry, coulometry, conductometry, thermal conductivity detection or flame ionization detection after reduction to methane, or any other appropriate technique.

The TIC is determined separately using another sub-sample, through acidification and purging of the released carbon dioxide, which is then measured using one of the techniques mentioned above.

The ^{13}C identification by IRMS is described in 7.7. This protocol is able also to work on other isotopes: ^{15}N , ^2H and ^{18}O , which could be useful for complex materials containing wood.