

Wood and wood-based products - Calculation of the biogenic carbon content of wood and conversion to carbon dioxide

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN 16449:2014 sisaldab Euroopa standardi EN 16449:2014 inglisekeelset teksti.	This Estonian standard EVS-EN 16449:2014 consists of the English text of the European standard EN 16449:2014.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 12.03.2014.	Date of Availability of the European standard is 12.03.2014.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

ICS 79.040

Standardite reprodutseerimise ja levitamise õigus kuulub Eesti Standardikeskusele

Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonsesse süsteemi või edastamine ükskõik millises vormis või millisel teel ilma Eesti Standardikeskuse kirjaliku loata on keelatud.

Kui Teil on küsimusi standardite autorikaitse kohta, võtke palun ühendust Eesti Standardikeskusega:
Aru 10, 10317 Tallinn, Eesti; www.evs.ee; telefon 605 5050; e-post info@evs.ee

The right to reproduce and distribute standards belongs to the Estonian Centre for Standardisation

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, without a written permission from the Estonian Centre for Standardisation.

If you have any questions about copyright, please contact Estonian Centre for Standardisation:
Aru 10, 10317 Tallinn, Estonia; www.evs.ee; phone 605 5050; e-mail info@evs.ee

ICS 79.040

English Version

Wood and wood-based products - Calculation of the biogenic carbon content of wood and conversion to carbon dioxide

Produits en bois et dérivés du bois - Calcul du contenu en carbone biogénique du bois et conversion en dioxyde de carbone

Holz und Holzprodukte - Berechnung des biogenen Kohlenstoffgehalts im Holz und Umrechnung in Kohlenstoffdioxid

This European Standard was approved by CEN on 20 December 2013.

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. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists 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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



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

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

Contents		Page
Foreword		3
Introduction		4
1	Scope	5
2	Normative references	5
3	Terms and definitions	5
4	Wood – the basic material	5
5	Calculating carbon dioxide based on biogenic carbon content	5
Annex A (informative) Formula (1), Calculation example		7
Bibliography		8

Foreword

This document (EN 16449:2014) has been prepared by Technical Committee CEN/TC 175 "Round and sawn timber", 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 September 2014, and conflicting national standards shall be withdrawn at the latest by September 2014.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

By the process of photosynthesis, growing trees absorb (sequester) atmospheric carbon dioxide which is then, together with the release of some of the oxygen back into the atmosphere, incorporated, within the cambium, into the cells of the tree as both wood and bark.

The absorbed carbon dioxide is effectively fixed in the wood as biogenic carbon. When using wood, that biogenic carbon is transferred to the product system. Wood products therefore constitute a pool (reservoir) of biogenic carbon for the duration of their service lifetime as those products. At end-of-life, that carbon leaves the product system; in the case of use for energy generation the biogenic carbon is oxidized to carbon dioxide and released back into the atmosphere.

This European Standard provides a calculation method to quantify the amount of atmospheric carbon dioxide based on that biogenic carbon content.

The information can also be used to estimate the potential benefits associated with carbon storage in wood and wood-based products; for example, by building designers in the early stages of the building design process. It also provides the basis for that information as required by product category rules and the development of EPDs.

EN 16485, *Round and sawn timber - Environmental Product Declarations - Product category rules for wood and wood-based products for use in construction*, addresses the aspects of wood and wood-based products as required for life-cycle assessment.

This European Standard can also be used in the context of the work of other CEN committees, e.g. CEN/TC 112, CEN/TC 124, CEN/TC 350 and CEN/TC 411.

1 Scope

This European Standard provides a calculation method to quantify the amount of atmospheric carbon dioxide based on the biogenic carbon content of wood.

2 Normative references

Not applicable.

3 Terms and definitions

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

3.1

moisture content

mass of moisture in wood expressed as a percentage of its oven-dry mass

[SOURCE: EN 844-4:1997]

4 Wood – the basic material

Wood, depending on the tree species, comprises, in varying amounts, cellulose (40 % to 55 %), hemicellulose (12 % to 15 %), lignin (15 % to 30 %) and extractives (2 % to 15 %). From that it is determined that wood is, by weight, 50 % carbon. For the purpose of this European Standard, the value of the carbon fraction of woody biomass is taken as 0,5. The other main elemental constituents are oxygen (44 %) and hydrogen (6 %). Some species also contain small amounts of mineral deposits which are of no significance in this instance.

Trees and wood also contain moisture in various forms and in various amounts. Wood will generally be dried down to moisture contents commensurate with end use. The moisture content of some wood-based products will be commensurate with the manufacturing process.

The amount of moisture in wood has a bearing on both size and density; as moisture is removed wood shrinks and density decreases. As the amount of absorbed carbon dioxide is being determined based on the given volume and density of wood and wood-based products being used, the moisture content of the wood at that time will also be required.

NOTE EN 350-2, *Durability of wood and wood-based products - Natural durability of solid wood - Part 2: Guide to natural durability and treatability of selected wood species of importance in Europe*, provides density values at 12 % moisture content for the listed species.

12 % is commonly used as the reference moisture content when determining the properties of wood; in the absence of more specific product details, 12 % moisture content and the density values as provided in EN 350-2 may be used as default values.

5 Calculating carbon dioxide based on biogenic carbon content

The calculation is based on the atomic weights of carbon (12) and carbon dioxide (44).

Based on the product biogenic carbon content and the volume of wood, density and moisture content the following formula shall be used:

$$P_{CO_2} = \frac{44}{12} \times cf \times \frac{\rho_w \times V_w}{1 + \frac{w}{100}} \quad (1)$$