Irish Standard
I.S. EN ISO 13833:2013

Stationary source emissions - Determination of the ratio of biomass (biogenic) and fossil-derived carbon dioxide - Radiocarbon sampling and determination (ISO 13833:2013)

I.S. EN ISO 13833:2013

Incorporating amendments/corrigenda/National Annexes issued since publication:

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SWiFT xxx: A rapidly developed recommendatory document based on the consensus of the participants of an NSAI workshop.

This document replaces:

This document is based on:
EN ISO 13833:2013

Published:
16 April, 2013

This document was published
under the authority of the NSAI
and comes into effect on:
16 April, 2013

ICS number:
13.040.40

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Údarás um Chaighdeáin Náisiúnta na hÉireann

I.S. EN ISO 13833:2013

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 13833

April 2013

ICS 13.040.40

English Version

Stationary source emissions - Determination of the ratio of biomass (biogenic) and fossil-derived carbon dioxide - Radiocarbon sampling and determination (ISO 13833:2013)

Émissions de sources fixes - Détermination du rapport du dioxyde de carbone de la biomasse (biogénique) et des dérivés fossiles - Échantillonnage et détermination du radiocarbone (ISO 13833:2013)

Emissionen aus stationären Quellen - Bestimmung des Verhältnisses von Kohlendioxid aus Biomasse (biogen) und aus fossilen Quellen - Probenahme und Bestimmung des radioaktiven Kohlenstoffs (ISO 13833:2013)

This European Standard was approved by CEN on 1 March 2013.

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EUROPÄISCHES KOMITEE FÜR NORMUNG

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Ref. No. EN ISO 13833:2013: E

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Foreword

This document (EN ISO 13833:2013) has been prepared by Technical Committee ISO/TC 146 "Air quality" in collaboration with Technical Committee CEN/TC 264 “Air quality” the secretariat of which is held by DIN.

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of an identical text or by endorsement, at the latest by October 2013, and conflicting national standards shall be withdrawn at the latest by October 2013.

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.

Endorsement notice

The text of ISO 13833:2013 has been approved by CEN as EN ISO 13833:2013 without any modification.

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I.S. EN ISO 13833:2013

INTERNATIONAL STANDARD

ISO 13833

First edition
2013-04-01

Stationary source emissions — Determination of the ratio of biomass (biogenic) and fossil-derived carbon dioxide — Radiocarbon sampling and determination

Émissions de sources fixes — Détermination du rapport du dioxyde de carbone de la biomasse (biogénique) et des dérivés fossiles — Échantillonnage et détermination du radiocarbone

Reference number
ISO 13833:2013(E)

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Published in Switzerland

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

ISO 13833 was prepared by Technical Committee ISO/TC 146, *Air quality*, Subcommittee SC 1, *Stationary source emissions*.

Introduction

Reliable data for biogenic carbon dioxide (CO_2) emissions are needed for carbon emission trading and in order to provide more accurate inventories.

When combusting mixtures of fuels from fossil and biogenic origin, it is often difficult to determine the exact ratio of biogenic and fossil CO_2 in the total CO_2 that is emitted through the stack gas, because the biogenic and fossil composition of the combusted fuels is not always known or cannot be determined with sufficient accuracy. This is the case when solid recovered fuels (SRF) are used.

The contribution of solid, liquid, and gaseous biofuels to energy production is likely to increase. A reliable and robust method for the determination of the ratio of fossil and biogenic CO_2 in the total emitted CO_2 of stack gas will enhance the implementation of these products, as reliable data for carbon emission trading can be generated with this approach.

Different methods exist to determine the ratio of fossil and biogenic CO_2 in stack gas. The radiocarbon (^{14}C isotope) method has been applied since the 1950s in a variety of sample types, like food, fuels, polymers, and atmospheric and combustion CO_2 to determine the ratio of biogenic and fossil carbon (Reference [18]). Biogenic and fossil carbon can be distinguished based on the measured amount of the ^{14}C isotope in the sample. Another, relatively new applied method is the "balance method", which combines standard data on the chemical composition of biogenic and fossil organic matter with routinely measured operating data of the plant (Reference [10]). Similar methods using stoichiometric methods, for example, can also be used.

This International Standard gives sampling and analysis methods for the determination of the ratio of biomass and fossil fuel-derived CO_2 in the total emitted CO_2 from exhaust gases of stationary sources, based on the radiocarbon (^{14}C isotope) method. Sample strategies for integrated sampling for periods from 1 h up to 1 month are given. Radiocarbon determination procedures include accelerated mass spectrometry (AMS), beta-ionization (BI), and liquid scintillation (LS) measurement procedures for the determination of the radiocarbon content.

The International Organization for Standardization (ISO) draws attention to the fact that it is claimed that compliance with this document may involve the use of patents concerning the use of the radiocarbon isotope as biogenic marker: a) *Method for determining the relationship of renewable to non-renewable sources of energy*; b) *Method for determining the fossil fuel content in a fuel stream, as well as a an incineration furnace*.

ISO takes no position concerning the evidence, validity and scope of these patent rights.

The holders of these patent rights have assured ISO that they are willing to negotiate licences under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, statements of the holders of these patent rights are registered with ISO. Information may be obtained from:

a) European Cement Research Academy (ECRA)

   Tannenstrasse 2, D-40476, DÜSSELDORF. Tel.: +49 211 23 98 38 0; E-mail: info@ecra-online.org

b) Energy Research Centre of the Netherlands

   Westerduinweg 3, PO Box 1, NL-1755 ZG PETTEN. Tel.: +31 224 56 4475; E-mail: denuijl@ecn.nl

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ISO (www.iso.org/patents) maintains on-line databases of patents relevant to its documents. Users are encouraged to consult the databases for the most up to date information concerning patents.

Stationary source emissions — Determination of the ratio of biomass (biogenic) and fossil-derived carbon dioxide — Radiocarbon sampling and determination

1 Scope

This International Standard specifies sampling methods and analysis methods for the determination of the ratio of biomass- and fossil-derived carbon dioxide (CO_2) in the CO_2 from exhaust gases of stationary sources, based on the radiocarbon (^{14}C isotope) method. The lower limit of application is a biogenic to total CO_2 fraction of 0,02. The working range is a biogenic to total CO_2 fraction of 0,02 to 1,0.

2 Normative references

The following referenced documents are indispensable for the application 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.

ISO 7934, *Stationary source emissions — Determination of the mass concentration of sulfur dioxide — Hydrogen peroxide/barium perchlorate/Thorin method*

ISO 10396, *Stationary source emissions — Sampling for the automated determination of gas emission concentrations for permanently-installed monitoring systems*

ISO 15713, *Stationary source emissions — Sampling and determination of gaseous fluoride content*

3 Terms and definitions

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

3.1
biogenic
produced in natural processes by living organisms but not fossilized or derived from fossil resources

3.2
biomass
material of biological origin excluding material embedded in geological formation or transformed to fossil

3.3
isotope abundance
fraction of atoms of a particular isotope of an element

3.4
organic carbon
amount of carbon bound in an organic material

3.5
percentage modern carbon
pmC
normalized and standardized value for the amount of the ^{14}C isotope in a sample, calculated relative to the standardized and normalized ^{14}C isotope amount of oxalic acid standard reference material, SRM 4990c[1)]

Note 1 to entry: In 2009, the value of 100 % bio-based carbon was set at 105 pmC.

1) SRM 4990c is the trade name of a product supplied by the US National Institute of Standards and Technology.