



# SLOVENSKI STANDARD SIST EN ISO 21644:2021

01-marec-2021

Nadomešča:

SIST EN 15440:2011

SIST EN 15440:2011/AC:2011

---

## Trdna alternativna goriva - Metode za določevanje biomase (ISO 21644:2021)

Solid recovered fuels - Methods for the determination of biomass content (ISO 21644:2021)

Feste Sekundärbrennstoffe - Verfahren zur Bestimmung des Gehaltes an Biomasse (ISO 21644:2021)

Combustibles solides de récupération - Méthode de détermination de la teneur en biomasse (ISO 21644:2021)

Ta slovenski standard je istoveten z: **EN ISO 21644:2021**

---

### ICS:

27.190	Biološki viri in drugi alternativni viri energije	Biological sources and alternative sources of energy
75.160.10	Trda goriva	Solid fuels

**SIST EN ISO 21644:2021**

**en,fr,de**

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST EN ISO 21644:2021](#)

<https://standards.iteh.ai/catalog/standards/sist/783ffa0a-6384-4196-897c-36632ff62c4c/sist-en-iso-21644-2021>

EUROPEAN STANDARD

EN ISO 21644

NORME EUROPÉENNE

EUROPÄISCHE NORM

January 2021

ICS 75.160.10

Supersedes EN 15440:2011

English Version

## Solid recovered fuels - Methods for the determination of biomass content (ISO 21644:2021)

Combustibles solides de récupération - Méthode de détermination de la teneur en biomasse (ISO 21644:2021)

Feste Sekundärbrennstoffe - Verfahren zur Bestimmung des Gehaltes an Biomasse (ISO 21644:2021)

This European Standard was approved by CEN on 22 November 2020.

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, 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.



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

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

<b>Contents</b>	<b>Page</b>
<b>European foreword.....</b>	<b>3</b>

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

SIST EN ISO 21644:2021  
<https://standards.iteh.ai/catalog/standards/sist/783ffa0a-6384-4196-897c-36632f662c4c/sist-en-iso-21644-2021>

## European foreword

This document (EN ISO 21644:2021) has been prepared by Technical Committee ISO/TC 300 "Solid recovered materials, including solid recovered fuels" in collaboration with Technical Committee CEN/TC 343 "Solid Recovered Fuels" the secretariat of which is held by SFS.

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 July 2021, and conflicting national standards shall be withdrawn at the latest by July 2021.

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

This document supersedes EN 15440:2011.

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, 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 the United Kingdom.

**iTeh STANDARD PREVIEW**  
**Endorsement notice**  
**(standards.iteh.ai)**

The text of ISO 21644:2021 has been approved by CEN as EN ISO 21644:2021 without any modification.

<https://standards.iteh.ai/catalog/standards/sist/783ffa0a-6384-4196-897c-36632ff62c4c/sist-en-iso-21644-2021>

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

SIST EN ISO 21644:2021

<https://standards.iteh.ai/catalog/standards/sist/783ffa0a-6384-4196-897c-36632f662c4c/sist-en-iso-21644-2021>

INTERNATIONAL  
STANDARD

ISO  
21644

First edition  
2021-01

---

---

**Solid recovered fuels — Methods for  
the determination of biomass content**

*Combustibles solides de récupération – Méthode de détermination de  
la teneur en biomasse*

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST EN ISO 21644:2021](https://standards.iteh.ai/catalog/standards/sist/783ff0a-6384-4196-897c-36632ff62c4c/sist-en-iso-21644-2021)

<https://standards.iteh.ai/catalog/standards/sist/783ff0a-6384-4196-897c-36632ff62c4c/sist-en-iso-21644-2021>



Reference number  
ISO 21644:2021(E)

© ISO 2021

## iTeh STANDARD PREVIEW (standards.iteh.ai)

SIST EN ISO 21644:2021

<https://standards.iteh.ai/catalog/standards/sist/783ffa0a-6384-4196-897c-36632f662c4c/sist-en-iso-21644-2021>



### **COPYRIGHT PROTECTED DOCUMENT**

© ISO 2021

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

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

Published in Switzerland



<b>Contents</b>		Page
<b>Foreword</b> .....		<b>iv</b>
<b>Introduction</b> .....		<b>v</b>
<b>1 Scope</b> .....		<b>1</b>
<b>2 Normative references</b> .....		<b>1</b>
<b>3 Terms and definitions</b> .....		<b>1</b>
<b>4 Symbols and abbreviations</b> .....		<b>3</b>
<b>5 Principle</b> .....		<b>4</b>
<b>6 Determination of biomass content</b> .....		<b>4</b>
6.1 Sampling.....		<b>4</b>
6.2 Sample preparation.....		<b>4</b>
6.3 Applicable methods.....		<b>4</b>
<b>7 Expression of results</b> .....		<b>5</b>
<b>8 Performance characteristics</b> .....		<b>5</b>
<b>9 Test report</b> .....		<b>6</b>
<b>Annex A (normative) Determination of the biomass content based on the <sup>14</sup>C method</b> .....		<b>7</b>
<b>Annex B (normative) Determination of biomass content using the selective dissolution method (SDM)</b> .....		<b>25</b>
<b>Annex C (normative) Determination of biomass content using the manual sorting method (Msort)</b> .....		<b>34</b>
<b>Annex D (informative) Limitations of the determination methods</b> .....		<b>39</b>
<b>Annex E (informative) Performance data</b> .....		<b>42</b>
<b>Bibliography</b> .....		<b>45</b>

## ISO 21644:2021(E)

### 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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 300, *Solid recovered fuels*.

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](http://www.iso.org/members.html).

## Introduction

The biomass content of solid recovered fuels is relevant for the evaluation of the impact of energy production on greenhouse gas emission. Instrumental methods, wet chemical and manual procedures are available for the calculation of the renewable energy fraction. Instrumental methods are based on the determination of  $^{14}\text{C}$  content while manual procedures are based on separation of different fractions by visual inspection. The wet chemical procedure differentiate biomass from non-biomass materials as function of the acid dissolution behaviour.

The fraction of biomass is expressed:

- by mass;
- by energy content (gross or net calorific value);
- by carbon content.

This document is primarily intended for laboratories, producers, suppliers and purchasers of solid recovered fuels, but is also useful for the authorities and inspection organizations.

## iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN ISO 21644:2021](https://standards.iteh.ai/catalog/standards/sist/783ffa0a-6384-4196-897c-36632f662c4c/sist-en-iso-21644-2021)

<https://standards.iteh.ai/catalog/standards/sist/783ffa0a-6384-4196-897c-36632f662c4c/sist-en-iso-21644-2021>

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST EN ISO 21644:2021](#)

<https://standards.iteh.ai/catalog/standards/sist/783ffa0a-6384-4196-897c-36632ff62c4c/sist-en-iso-21644-2021>

# Solid recovered fuels — Methods for the determination of biomass content

## 1 Scope

This document specifies three methods for the determination of the biomass content in solid recovered fuels: the  $^{14}\text{C}$  content method, the selective dissolution and the manual sorting methods.

## 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.

ISO 21637:2020, *Solid recovered fuels — Terminology, definitions and descriptions*

ISO 21645<sup>1)</sup>, *Solid recovered fuels — Methods for sampling*

ISO 21646<sup>2)</sup>, *Combustibles solides de récupération — Préparation des échantillons*

ISO 21654<sup>3)</sup>, *Solid recovered fuels — Determination of calorific value*

ISO 21656<sup>4)</sup>, *Solid recovered fuels — Determination of ash content*

ISO 21663, *Solid recovered fuels — Methods for the determination of total carbon (C), hydrogen (H), nitrogen (N) and sulphur (S) by the instrumental method*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 21637:2020 and the following apply.

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

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

### 3.1

#### ash content on dry basis

mass of inorganic residue remaining after ignition of a fuel under specified conditions, expressed as mass fraction in percent of the dry matter in the fuel, also includes removed ash contributors

Note 1 to entry: This is typically expressed as a percentage of the mass of dry matter in the fuel source.

Note 2 to entry: Depending on the combustion efficiency the ash may contain combustibles.

Note 3 to entry: If a complete combustion is realized, ash contains only inorganic, non-combustible components.

[SOURCE: ISO 21637:2020, 3.3]

- 1) Under preparation. Stage at the time of publication ISO/FDIS 21645.
- 2) Under preparation. Stage at the time of publication ISO/DIS 21646.
- 3) Under preparation. Stage at the time of publication ISO/FDIS 21654.
- 4) Under preparation. Stage at the time of publication ISO/FDIS 21656.

**ISO 21644:2021(E)****3.2****biogenic**

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

**3.3****biomass**

material of biological origin excluding material embedded in geological formations and/or fossilized

[SOURCE: ISO 16559:2014, 4.32, modified — Notes 1 and 2 to entry have been removed.]

**3.4****calorific value**

quantity of heat produced by the complete combustion, at a constant pressure equal to 1 013,25 mbar, of a unit volume or mass of gas, the constituents of the combustible mixture being taken at reference conditions and the products of combustion being brought back to the same conditions

[SOURCE: EN 437: 2018, modified — Second paragraph (the list) has been removed.]

**3.5****gross calorific value**

calorific value where the water produced by combustion is assumed to be condensed

[SOURCE: ISO 21637:2020, 3.34]

**3.6****isotope abundance**

fraction of atoms of a particular isotope of an element

**3.7****laboratory sample**

part of the *sample* (3.13) sent to or received by the laboratory

Note 1 to entry: When the laboratory sample is further prepared (reduced) by subdividing, mixing, grinding, or by combinations of these operations, the result is the test sample. When no preparation of the laboratory sample is required, the laboratory sample is the test sample. A test portion is removed from the test sample for the performance of the test or for analysis.

Note 2 to entry: The laboratory sample is the final sample from the point of view of sample collection, but it is the initial sample from the point of view of the laboratory.

Note 3 to entry: Several laboratory samples may be prepared and sent to different laboratories or to the same laboratory for different purposes. When sent to the same laboratory, the set is generally considered as a single laboratory sample and is documented as a single sample.

**3.8****moisture**

water removable under specific conditions

[SOURCE: ISO 21637:2020, 3.46]

**3.9****net calorific value at constant volume**

calorific value where the water produced by combustion is assumed to be in the vapour state

[SOURCE: ISO 21637:2020, 3.47]

**3.10****nominal minimum particle size**

aperture size of the sieve used for determining the particle size distribution of solid recovered fuels through which no more than 5 % by mass of the material passes

**3.11****nominal top size**

smallest aperture size of the sieve used for determining the particle size distribution of solid recovered fuels through which at least 95 % by mass of the total material passes through the sieve

[SOURCE: ISO 21637:2020, 3.48]

**3.12****percentage modern Carbon  
pmC**

carbon mass fraction from biogenic origin

Note 1 to entry: The internationally accepted radiocarbon dating reference value is 95 percent of the activity, in AD 1950, of this NBS oxalic acid SRM4990B.

Note 2 to entry: In 2015, the value of 100 % biogenic carbon was set at 102 pmC.

Note 3 to entry: The biogenic origin is expressed in percentage.

**3.13****sample**

quantity of material, from a larger amount for which the quality is to be determined

[SOURCE: ISO 21637:2020, 3.63, modified — Notes 1–3 to entry have been removed.]

**3.14****sample preparation**

actions taken to obtain representative *laboratory samples* (3.7) or test portions from the original *sample* (3.13) as received

[SOURCE: ISO 21637:2020, 3.66]

[SIST EN ISO 21644:2021](https://standards.iteh.ai/catalog/standards/sist/783ffa0a-6384-4196-897c-166378662c4c/sist-en-iso-21644-2021)

[https://standards.iteh.ai/catalog/standards/sist/783ffa0a-6384-4196-897c-](https://standards.iteh.ai/catalog/standards/sist/783ffa0a-6384-4196-897c-166378662c4c/sist-en-iso-21644-2021)

[166378662c4c/sist-en-iso-21644-2021](https://standards.iteh.ai/catalog/standards/sist/783ffa0a-6384-4196-897c-166378662c4c/sist-en-iso-21644-2021)

**4 Symbols and abbreviations**

For the purposes of this document, the following symbols and abbreviations apply.

C	symbol for element carbon
D	diameter (mm)
<sup>14</sup> C	carbon isotope with an atomic mass of 14 u
LSC	Liquid Scintillation Counter or Liquid Scintillation Counting
Msort	manual sorting method
RSD	relative standard deviation
SDM	selective dissolution method
SRF	solid recovered fuel
TC	total carbon content
u	atomic mass unit
w	mass fraction expressed as a percentage by mass
w <sub>cal</sub>	content expressed as a percentage of the energy content
w <sub>TC</sub>	content expressed as a percentage of the total carbon content