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Trdna alternativna goriva - Določevanje vsebnosti pepela (ISO/DIS 21656:2019)

Solid recovered fuels - Determination of ash content (ISO/DIS 21656:2019)

Feste Sekundärbrennstoffe - Bestimmung des Aschegehaltes (ISO/DIS 21656:2019)

Combustibles solides de récupération - Détermination de la teneur en cendres (ISO/DIS 21656:2019)

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ICS:

75.160.10	Trda goriva	Solid fuels

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Solid recovered fuels — Determination of ash content

Combustibles solides de récupération — Détermination de la teneur en cendre

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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.

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Introduction

This document covers the determination of ash content of solid recovered fuels. It is primarily geared toward laboratories, producers, suppliers and purchasers of solid recovered fuels but is also useful for the authorities and inspection organizations.

The method specified in this document is based on EN 15403.

For information about environmental aspect, see Annex B.

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Solid recovered fuels — Determination of ash content

1 Scope

This document specifies methods for the determination of ash content of all solid recovered fuels.

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 15442,[1)]*Solid recovered fuels — Methods for sampling*

EN 15443,[2)]*Solid recovered fuels — Methods for the preparation of the laboratory sample*

ISO/DIS 21637, *Solid recovered fuels — Terminology, definitions and descriptions*

ISO/DIS 21660-3, *Solid recovered fuels — Determination of moisture content using the oven dry method — Part 3: Moisture in general analysis sample*

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3 Terms and definitions

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

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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

Note 1 to entry: For the characterisation of solid recovered fuels (SRF) it is necessary to analyse the content of the volatile alkaline and therefore the temperature of 550°C is used for biomass SRF.

3.2
total 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, which also includes removed ash contributors

1) ISO/CD 21645:2019 "Solid recovered fuels — Method for sampling" is currently being processed for the preparation of the "DIS"-enquiry.

2) ISO/CD 21646:2019 "Solid recovered fuels — Sample preparation" is currently being processed for the preparation of the "DIS"-enquiry.

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3.3
removed ash contributors
rac
coarse inert material (i.e. metals, glass, stones, tiles etc.) removed from the pre-dried sample before preparation, in order to avoid damage to the preparation equipment,

Note 1 to entry: Removed ash contributors are included in the ash content calculations.

3.4
total organic matter
combustible part of solid recovered fuels, which consists of the sum of volatile matter and fixed carbon

Note 1 to entry: It is calculated as: 100 - moisture content - ash content.

Note 2 to entry: It is the mass fraction of the matter lost by ignition, also known as “Loss of Ignition" (LOI).

3.5
volatile matter
relative part of the analysed sample, after moisture removal, that is lost when material is heated up under specific conditions of temperature, time and in a reduced atmosphere (anoxic conditions)

3.6
fixed carbon
relative part of carbon contained in a material that can only be degraded in oxic conditions and high temperature

Note 1 to entry: It is calculated as: 100 - moisture content - volatile matter content - ash content.

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4 Principle

The sample is heated in air atmosphere up to a temperature of (550 ± 10) °C for Method A or (815 ± 10) °C for Method B under rigidly controlled conditions of time, sample mass and equipment specifications. The ash content is determined by calculation from the mass of the residue remaining after heating.

NOTE Difference in the ash content if determined at a higher temperature, 815 °C, according to Reference[1] as compared to 550 °C (major and minor elemental determination), is explained by the decomposition of carbonates forming CO2, by losses of volatile inorganic compounds and further oxidation of inorganic compounds (to higher oxidation states).

Automatic equipment (such as thermogravimetric analysers) may be used as long as the equipment is validated by parallel measurements to the reference method. The automatic equipment shall fulfil all the requirements regarding sample size, heating procedure, temperature, atmosphere and weighing accuracy. Deviations from this paragraph shall be reported and justified.

5 Apparatus

5.1 Dish, consisting of inert material such as porcelain, silica or platinum, with a depth from 10 mm to 20 mm and such a size that the sample loading does not exceed 0,1 g/cm^2 bottom area.

5.2 Furnace, capable of maintaining a zone of uniform temperature at the levels required in Clause 7 and to reach these levels in the specified heating rates. The ventilation rate through the furnace should be such that no lack of oxygen arises during the heating procedure.

NOTE A ventilation rate from 5 air changes/min to 10 air changes/min should be suitable.

5.3 Balance, capable of weighing the dish containing the sample to the nearest 0,1 mg.

5.4 Desiccator, without desiccant.

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NOTE The use of a desiccator without desiccant is specified in ISO 1171 and emphasised here since ashes from solid recovered fuels are often more hygroscopic than coal ashes.

5.5 Sieve

5.6 Container, sealed airtight.

6 Sampling and sample preparation

6.1 General

The general analysis sample shall be taken and prepared in accordance with EN 15442and EN 15443. It shall be ground to pass through a sieve with an aperture size of ≤ 1 mm. The general analysis sample shall be received in the laboratory in the container (5.6). The general analysis sample shall either be oven-dried or its moisture content determined in accordance with ISO/DIS 21660-3. The general analysis sample shall be mixed carefully before weighing (see also Clause 7).

6.2 Pre-drying

Pre-drying shall be performed according to EN 15443.

Pre-drying of wet samples is carried out to minimize moisture loss in the subsequent sample-division processes, to facilitate the sample preparation processes, and to minimize biological activity. If it is necessary to dry a sample by heating, it shall be dried in an oven at a temperature not exceeding the temperature according EN 15443.

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6.3 Removed ash contributors (rac)

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Coarse inert material (i. e. metals, glass, stones) removed from the pre-dried sample before preparation, in order to avoid damage to the preparation equipment.

rac from pre dried samples shall be considered as dry (rac,db).

A_{rac} is weighed separately, calculated as weight percent and added to the determined ash content according to calculation in clause 8.2.

7 Procedure

7.1 General

A minimum of two determinations shall be carried out on the general analysis sample.

7.2 Method A – ash content at 550 °C

The purpose is to accurately determine the major and minor elemental composition.

Heat the empty dish (5.1) in the furnace (5.2) to (550 ± 10) °C for at least 60 min. Allow the dish to cool down in a desiccator. After the dish is cooled, weigh it to the nearest 0,1 mg and record the mass.

Place about 1 g of the general analysis sample on the bottom of the dish and spread in an even layer over the bottom surface. Weigh the dish plus the sample to the nearest 0,1 mg and record the mass. If the general analysis sample is oven-dried, both the dish and the sample shall be dried at (105 ± 10) °C as a precautionary measure and then weighed.

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