SLOVENSKI STANDARD
SIST EN 15290:2011

Nadomešča:
SIST-TS CEN/TS 15290:2006

Trdna biogoriva - Določevanje makro elementov - Al, Ca, Fe, Mg, P, K, Si, Na in Ti

Solid biofuels - Determination of major elements - Al, Ca, Fe, Mg, P, K, Si, Na and Ti

Feste Biobrennstoffe - Bestimmung von Hauptelementen - Al, Ca, Fe, Mg, P, K, Si, Na und Ti

Biocombustibles solides - Dosage des éléments majeurs - Al, Ca, Fe, Mg, P, K, Si, Na et Ti

Ta slovenski standard je istoveten z: EN 15290:2011

ICS:

75.160.10	Trda goriva	Solid fuels

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EUROPEAN STANDARD

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English Version

Solid biofuels - Determination of major elements - Al, Ca, Fe, Mg, P, K, Si, Na and Ti

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Feste Biobrennstoffe - Bestimmung von Hauptelementen - Al, Ca, Fe, Mg, P, K, Si, Na und Ti

This European Standard was approved by CEN on 25 December 2010.

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COMITÉ EUROPÉEN DE NORMALISATION
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Foreword

This document (EN 15290:2011) has been prepared by Technical Committee CEN/TC 335 “Solid biofuels”, the secretariat of which is held by SIS.

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of an identical text or by endorsement, at the latest by August 2011, and conflicting national standards shall be withdrawn at the latest by August 2011.

This document supersedes CEN/TS 15290:2006.

In the pre-normative project BIONORM I&II a robustness test has been performed to find out if all critical parameters in the standard were addressed. Based on the results of that test it has been concluded that all critical parameters were covered. Only minor technical changes were necessary which have been implemented in the revised text. The revision also includes a change of deliverable from Technical Specification to European Standard and updated normative references.

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, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

Introduction

The elements described as major elements of solid biofuels are in fact major elements of the fuel ashes more than of the fuels. The determination of these elements may be used to assess ash behaviour in a thermal conversion process or to assess utilisation of ashes. Moreover, fuel contamination or process additives are indicated by high values of certain elements. Contamination of fuel with sand or soil is indicated by high values of several elements.

In this European Standard, wet chemical methods are described. As an alternative, X-ray fluorescence (XRF) may be used when validated with suitable materials (biomass reference materials).

1 Scope

This European Standard specifies methods for the determination of major elements of solid biofuels respectively of their ashes, which are Al, Ca, Fe, Mg, P, K, Si, Na, Ti. The determination of other elements such as barium (Ba) and manganese (Mn) is also possible with the methods described in this European Standard.

The European Standard includes two parts: Part A describes the direct determination on the fuel, this method is also applicable for sulfur and minor elements, Part B gives a method of determination on a prepared 550 °C ash.

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.

EN 14588:2010, *Solid biofuels — Terminology, definitions and descriptions*

EN 14774-3, *Solid biofuels — Determination of moisture content — Oven dry method — Part 3: Moisture in general analysis sample*

EN 14775, *Solid biofuels — Determination of ash content*

FprEN 14780, *Solid biofuels — Sample preparation*

EN 15296, *Solid biofuels — Conversion of analytical results from one basis to another*

EN ISO 7980, *Water quality — Determination of calcium and magnesium — Atomic absorption spectrometric method (ISO 7980:1986)*

EN ISO 11885, *Water quality — Determination of selected elements by inductively coupled plasma optical emission spectrometry (ICP-OES) (ISO 11885:2007)*

EN ISO 17294-2, *Water quality — Application of inductively coupled plasma mass spectrometry (ICP-MS) — Part 2: Determination of 62 elements (ISO 17294-2:2003)*

ISO 9964-1, *Water quality — Determination of sodium and potassium — Part 1: Determination of sodium by atomic absorption spectrometry*

ISO 9964-2, *Water quality — Determination of sodium and potassium — Part 2: Determination of potassium by atomic absorption spectrometry*

ISO 9964-3, *Water quality — Determination of sodium and potassium — Part 3: Determination of sodium and potassium by flame emission spectrometry*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 14588:2010 and the following apply.

3.1
Reference Material
RM
material or substance, one or more of whose property values are sufficiently homogeneous and well established to be used for the calibration of an apparatus, the assessment of a measurement method, or for assigning values to materials

3.2
Certified Reference Material
CRM
reference material, accompanied by a certificate, one or more of whose property values are certified by a procedure which establishes traceability to an accurate realisation of the unit in which the property values are expressed, and for which each certified value is accompanied by an uncertainty at a stated level of confidence

3.3
NIST Standard Reference Material®
SRM
CRM issued by NIST that also meets additional NIST-specific certification criteria and is issued with a certificate or certificate of analysis that reports the results of its characterisations and provides information regarding the appropriate use(s) of the material

4 Symbols and abbreviations

4.1 Symbols

Al Aluminium

Ca Calcium

Fe Iron

Mg Magnesium

P Phosphorus

K Potassium

Si Silicon

Na Sodium

Ti Titanium

4.2 Abbreviations

CRM	Certified Reference Material
ICP-OES	Inductively Coupled Plasma – Optical Emission Spectrometry
ICP-MS	Inductively Coupled Plasma – Mass Spectrometry
FAAS	Flame Atomic Absorption Spectrometry
FES	Flame Emission Spectrometry
SRM	Standard Reference Material

5 Principle

The sample is digested in a closed vessel by the help of reagents, temperature and pressure. The digestion is either carried out directly on the fuel (part A) or on a 550 °C prepared ash (part B).

The detection of the elements may be done by ICP-OES, ICP-MS, FAAS or FES.

6 Reagents

6.1 General

All reagents should be of analytical grade or better. If minor elements are also to be determined, the best qualities should be used.

6.2 Water

Water containing negligible amounts of major elements, i.e. amounts that do not contribute significant to the determinations. Deionised water will normally fulfil this requirement.

6.3 Nitric acid (HNO_3)

≥ 65 % (w/w), ρ = 1,41 g/ml

6.4 Hydrogen peroxide (H_2O_2)

30 % (w/w), ρ = 1,11 g/ml

6.5 Hydrofluoric acid (HF)

40 % (w/w), ρ = 1,13 g/ml

CAUTION — Hydrofluoric acid may lead to health hazards.

6.6 Boric acid (H_3BO_3)

4 % (w/w)

6.7 Use of Certified Reference Materials (CRM or SRM)

Use certified reference materials, issued by an internationally recognized authority, to check if the accuracy of the calibration meets the required performance characteristics. Examples of certified reference materials are: NBS 1570 spinach leaves, NBS 1571 orchard leaves, NBS 1573 tomato leaves and NBS 1575 pine needles.

When, due to matrix effects or concentration range limitations, no good recoveries for the certified reference materials can be obtained, calibration with at least two CRM or SRM materials may solve these problems. In that case CRM or SRM materials other than used for the calibration shall be used for verification purposes.

NOTE A CRM or SRM is prepared and used for three main purposes: (1) to help develop accurate methods of analysis; (2) to calibrate measurement systems used to facilitate exchange of goods, institute quality control, determine performance characteristics, or measure a property at the state-of-the-art limit; and (3) to ensure the long-term adequacy and integrity of measurement quality assurance programs.