



**NSAI**  
Standards

Irish Standard  
I.S. EN 15411:2011

Solid recovered fuels - Methods for the determination of the content of trace elements (As, Ba, Be, Cd, Co, Cr, Cu, Hg, Mo, Mn, Ni, Pb, Sb, Se, Tl, V and Zn)

## I.S. EN 15411:2011

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English Version

**Solid recovered fuels - Methods for the determination of the content of trace elements (As, Ba, Be, Cd, Co, Cr, Cu, Hg, Mo, Mn, Ni, Pb, Sb, Se, Tl, V and Zn)**

Combustibles solides de récupération - Méthodes de détermination de la teneur en éléments à l'état de traces (As, Ba, Be, Cd, Co, Cr, Cu, Hg, Mo, Mn, Ni, Pb, Sb, Se, Tl, V et Zn)

Feste Sekundärbrennstoffe - Verfahren zur Bestimmung des Gehaltes an Spurelementen (As, Ba, Be, Cd, Co, Cr, Cu, Hg, Mo, Mn, Ni, Pb, Sb, Se, Tl, V und Zn)

This European Standard was approved by CEN on 15 July 2011.

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.

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## Contents

Page

|   |           |
|---|-----------|
| Foreword.....   | 3         |
| Introduction .....  | 4         |
| 1 Scope .....   | 5         |
| 2 Normative references .....  | 5         |
| 3 Terms and definitions .....   | 5         |
| 4 Safety remarks .....  | 6         |
| 5 Principle.....  | 6         |
| 6 Apparatus .....   | 6         |
| 7 Reagents.....   | 7         |
| 8 Procedure .....   | 7         |
| 8.1 Sample conservation and pre-treatment.....  | 7         |
| 8.2 Sample preparation .....  | 8         |
| 9 Digestion procedure .....   | 8         |
| 9.1 Method A.....   | 8         |
| 9.2 Method B (informative) .....  | 8         |
| 9.3 Method C (informative) .....  | 8         |
| 10 Analysis of the digestion solutions .....  | 9         |
| 10.1 Preparation of the solution for analysis .....   | 9         |
| 10.2 Analytical step.....   | 9         |
| 11 Expression of results .....  | 9         |
| 12 Quality control.....   | 9         |
| 13 Performance characteristics .....  | 10        |
| 14 Test report .....  | 10        |
| <b>Annex A (normative) Guidelines - Characteristics of the laboratory sample for chemical analysis of SRF .....</b> | <b>11</b> |
| <b>Annex B (informative) Performance data.....</b>  | <b>13</b> |
| <b>Annex C (informative) Major results of ruggedness testing .....</b>  | <b>22</b> |
| <b>Bibliography .....</b>   | <b>25</b> |

## **Foreword**

This document (EN 15411:2011) has been prepared by 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 March 2012, and conflicting national standards shall be withdrawn at the latest by March 2012.

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.

This document supersedes CEN/TS 15411:2006.

This document differs from CEN/TS 15411:2006 only editorially.

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 the United Kingdom.

## **Introduction**

Accurate determination of trace element content in solid recovered fuels is important for environmental and technical reasons both in the production and combustion stage. After digestion of the solid recovered fuels using different methods, a number of analytical techniques can be used for the quantification of the trace element content. They include Inductively Coupled Plasma with optical or mass detection, graphite furnace Atomic Absorption Spectrometry and, when available, dedicated specific method (e.g. for mercury).

## 1 Scope

This European Standard specifies three methods of digestion for solid recovered fuels:

- a) microwave assisted digestion with hydrofluoric, nitric and hydrochloric acid mixture;
- b) hot water bath digestion of with hydrofluoric, nitric and hydrochloric acid mixture, after ashing of the SRFs sample;
- c) oven digestion with nitric, perchloric and hydrofluoric acid mixture.

Instrumental determination of As, Ba, Be, Cd, Cr, Co, Cu, Pb, Mn, Mo, Ni, Sb, Se, Tl, V, Zn is performed by Inductively Coupled Plasma with optical or mass detection or graphite furnace Atomic Absorption Spectrometry. Hg can be analysed only after the microwave assisted procedure or, alternatively, by a direct analysis method (Hg direct – AMA).

The effectiveness of the digestion can be verified by qualitative X-ray fluorescence (XRF) analysis on the remaining residue. If necessary, an alternative digestion method (among those proposed) is used.

Method a) is recommended for general use, but the amount of the test portion can be very low in case of high concentration of organic matter.

Method b) is recommended for Solid Recovered Fuel (SRF) with high organic matter concentration that can be difficult to digest with the other methods. This method is not suitable for mercury.

Method c) is recommended for Solid Recovered Fuel (SRF) samples for which the other methods leave a significant insoluble residue.

Alternative digestion methods can be applied if their performance is proved to be comparable with those of the methods mentioned in a) to c) (see Annex C).

## 2 Normative references

The following referenced documents are indispensable for the application of this European Standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 13656, *Characterization of waste — Microwave assisted digestion with hydrofluoric (HF), nitric (HNO<sub>3</sub>) and hydrochloric (HCl) acid mixture for subsequent determination of elements*

EN 15357:2011, *Solid recovered fuels — Terminology, definitions and descriptions*

EN 15403, *Solid recovered fuels — Determination of ash content*

EN 15413, *Solid recovered fuels — Methods for the preparation of the test sample from the laboratory sample*

EN 15414-3, *Solid recovered fuels — Determination of moisture content using the oven dry method — Part 3: Moisture in general analysis sample*

EN ISO 3696:1995, *Water for analytical laboratory use — Specification and test methods (ISO 3696:1987)*

## 3 Terms and definitions

For the purpose of this document, the terms and definitions given in EN 15357:2011 and the following apply.

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