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# **Solid recovered fuels — Methods for the determination of ash melting behaviour by using characteristic temperatures**

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**National foreword**

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September 2010

ICS 75.160.10

Supersedes CEN/TS 15404:2006

English Version

**Solid recovered fuels - Methods for the determination of ash  
melting behaviour by using characteristic temperatures**

Combustibles solides de récupération - Méthode de  
détermination de la fusibilité des cendres

Feste Sekundärbrennstoffe - Verfahren zur Bestimmung  
des Schmelzverhaltens der Asche bei Anwendung  
charakteristischer Temperaturen

This Technical Report was approved by CEN on 12 June 2010. It has been drawn up by the Technical Committee CEN/TC 343.

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

**Management Centre: Avenue Marnix 17, B-1000 Brussels**

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## Foreword

This document (CEN/TR 15404:2010) has been prepared by Technical Committee CEN/TC 343 "Solid recovered fuels", the secretariat of which is held by SFS.

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 15404:2006.

CEN/TS 15404:2006 was not to be kept as a Technical Specification and respectively not converted into a European Standard due to lack of acceptable precision data (see [1], [2]).

This document differs from CEN/TS 15404:2006 as follows:

- a) symbol of shrinking temperature changed from ST to SST;
- b) charts and key of Figure 1 corrected;
- c) clause "Precision" deleted;
- d) clause on evaluation of results added;
- e) interlaboratory test results supplemented as graphs in an informative annex;
- f) whole document editorially revised.

## Introduction

Ash melting is a complex process where also shrinkage, sintering and swelling can occur.

The test methods described in this Technical Report provide information about fusion and melting behaviour of the composite inorganic constituents of the fuel ash at high temperatures.

The test methods available are empirical in most cases. The ashes used for the tests are homogeneous material, prepared from the fuel, and the determination is performed at a controlled rate of heating in a controlled atmosphere. In contrast, under full-scale conditions, the complex processes of combustion and fusion involve heterogeneous mixtures of particles, variable heating rates and gas compositions.

The methods described in this document should be used dependent of the following aspects and parameters, respectively:

- repeatability;
- reproducibility;
- reliability;
- time efforts (rapid test methods);
- cost effectiveness;
- possibilities for automatic testing.

The aim of this document consists in providing a common and successful practice for describing the ash melting behaviour.

The terms ash fusibility and ash softening are synonyms to ash melting.

## 1 Scope

This Technical Report describes exemplarily methods for the determination of shrinking, deformation, hemisphere and flow temperature for characterising the ash melting behaviour of all solid recovered fuels.

## 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.

prEN 15357:2008, *Solid recovered fuels — Terminology, definitions and descriptions*

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

ISO 3310-1, *Test sieves — Technical requirements and testing — Part 1: Test sieves of metal wire cloth*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in prEN 15357:2008 and the following apply.

### 3.1

#### **shrinking temperature**

SST

temperature at which shrinking of the test piece occurs, i.e. when the area of the test piece falls below 95 % of the original test piece area at 550 °C

NOTE Shrinking can be due to liberation of carbon dioxide, volatile alkali compounds, and/or sintering and partial melting.

### 3.2

#### **deformation temperature**

DT

temperature at which the first signs of roundings of the edges due to melting of the test piece occur

### 3.3

#### **hemisphere temperature**

HT

temperature at which the test piece forms approximately a hemisphere, i.e. when the height becomes equal to half the base diameter

### 3.4

#### **flow temperature**

FT

temperature at which the ash is spread out over the supporting tile in a layer, the height of which is half of the height of the test piece at the hemisphere temperature

NOTE Half of the height of the test piece is defined due to frequently occurring bubbling effects. This is especially important for automatic image evaluation. This definition is different to other standards.