



**SLOVENSKI STANDARD**  
**SIST-TS CEN/TS 15403:2007**

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**Trda goriva - Metode za določitev vsebnosti pepela**

Solid recovered fuels - Methods for the determination of ash content

Feste Sekundärbrennstoffe - Verfahren zur Bestimmung des Aschegehaltes

Combustibles solides de récupération - Méthodes pour la détermination de la teneur en cendre

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**Ta slovenski standard je istoveten z: CEN/TS 15403:2006**

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**ICS:**

75.160.10 Trda goriva Solid fuels

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English Version

## Solid recovered fuels - Methods for the determination of ash content

Combustibles solides de récupération - Méthodes pour la détermination de la teneur en cendre

Feste Sekundärbrennstoffe - Verfahren zur Bestimmung des Aschegehaltes

This Technical Specification (CEN/TS) was approved by CEN on 25 March 2006 for provisional application.

The period of validity of this CEN/TS is limited initially to three years. After two years the members of CEN will be requested to submit their comments, particularly on the question whether the CEN/TS can be converted into a European Standard.

CEN members are required to announce the existence of this CEN/TS in the same way as for an EN and to make the CEN/TS available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force (in parallel to the CEN/TS) until the final decision about the possible conversion of the CEN/TS into an EN is reached.

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

Management Centre: rue de Stassart, 36 B-1050 Brussels

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## Foreword

This document (CEN/TS 15403:2006) has been prepared by Technical Committee CEN/TC 343 “Solid recovered fuels”, the secretariat of which is held by SFS.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to announce this Technical Specification: Austria, Belgium, 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.

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## **Introduction**

This Technical Specification 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 Technical Specification is based on CEN/TS 14775 [1] as well as ISO 1171 [2].

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## 1 Scope

This Technical Specification specifies a method for the determination of ash content of all solid recovered fuels.

## 2 Normative references

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

CEN/TS 15357:2006, *Solid recovered fuels — Terminology, definitions and descriptions*

prCEN/TS 15442, *Solid recovered fuels — Methods for sampling*

prCEN/TS 15443, *Solid recovered fuels — Methods for laboratory sample preparation*

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

## 3 Terms and definitions

For the purposes of this Technical Specification, the terms and definitions given in CEN/TS 15357:2006 and the following apply.

### 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

## 4 Principle

The sample is heated in air atmosphere up to a temperature of  $(550 \pm 10)^\circ\text{C}$  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.

## 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  $0,1 \text{ g/cm}^2$  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.

NOTE The use of a desiccator without desiccant is specified in ISO 1171 [2] 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**

The general analysis sample shall be taken and prepared in accordance with prCEN/TS 15442 and prCEN/TS 15443. It shall be ground to pass through a sieve with an aperture size of  $\leq 1$  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 CEN/TS 15414-3. The general analysis sample shall be mixed carefully before weighing (see also Clause 7).

**7 Procedure**

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

Heat the empty dish (5.1) in the furnace (5.2) to  $(550 \pm 10)$  °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  $(105 \pm 10)$  °C as a precautionary measure and then weighed.

Place the loaded dish in the cold furnace. Heat the sample in the furnace according to the following heating routine:

- a) raise the furnace temperature evenly to  $(250 \pm 10)$  °C over a period of 50 min (i.e. a rise of 5 K/min). Maintain at this temperature level for 60 min to allow the volatiles to leave the sample before ignition;
- b) continue to raise the furnace temperature evenly to  $(550 \pm 10)$  °C over a period of 60 min (i.e. a rise of 5 K/min) and keep this temperature level for at least 120 min.

Remove the dish with its content from the furnace. Allow the dish and its content to cool on a thick metal plate for 5 min to 10 min and then transfer to a desiccator without desiccant and allow to cool to ambient temperature. Weigh the ash and the dish to the nearest 0,1 mg as soon as ambient temperature is reached and record the mass. Calculate the ash content of the sample as detailed in Clause 8. If there is any doubt of complete incineration (for instance presence of soot at visual inspection), then add droplets of water or ammonium nitrate to the sample before it is reloaded into the cold furnace and reheated to  $(550 \pm 10)$  °C for a period of further 30 min until the change in mass is lower than 0,2 mg.

**8 Calculation**

The ash content on dry basis,  $A_{db}$ , of the general analysis sample, expressed as mass fraction in percent on a dry basis, shall be calculated by Equation (1):

$$A_{db} = \frac{(m_3 - m_1)}{(m_2 - m_1)} \times 100 \times \frac{100}{100 - M_{ad}} \tag{1}$$

where



$m_1$  is the mass of the empty dish, in grams;

$m_2$  is the mass of the dish plus the general analysis sample, in grams;

$m_3$  is the mass of the dish plus ash, in grams;

$M_{ad}$  is the mass fraction of moisture of the general analysis sample on wet basis, in percent.

The result shall be reported as the mean of duplicate determinations to the nearest 0,1 %.

## 9 Precision

Because of the varying nature of the solid recovered fuels covered by this Technical Specification, at the present time it is not possible to give a precision statement (repeatability or reproducibility) for this test method.

## 10 Test report

The test report shall include the following information:

- a) identification of the laboratory and the testing date;
- b) identification of the sample tested;
- c) a reference to this Technical Specification, i.e. CEN/TS 15403;
- d) test results and the basis which is reported on, e.g. „on dry basis“ or „on wet basis“;
- e) any deviation from this Technical Specification;
- f) any unusual features observed during the determination which may have affected the test result and details of any operations not included in this Technical Specification or regarded as optional.