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Solid recovered fuels - Determination of moisture content using the oven dry method -  
Part 2: Determination of total moisture by a simplified method

Feste Sekundärbrennstoffe - Bestimmung des Wassergehaltes unter Verwendung des  
Verfahrens der Ofentrocknung - Teil 2: Bestimmung des Gehaltes an Gesamtwasser  
mittels eines vereinfachten Verfahrens

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Combustibles solides de récupération - Détermination de l'humidité par la méthode de  
séchage a l'étuve - Partie 2: Détermination de l'humidité totale par une méthode  
simplifiée

**Ta slovenski standard je istoveten z: CEN/TS 15414-2:2006**

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**ICS:**

75.160.10 Trda goriva Solid fuels

**SIST-TS CEN/TS 15414-2:2007 en**

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English Version

**Solid recovered fuels - Determination of moisture content using  
the oven dry method - Part 2: Determination of total moisture by  
a simplified method**

Combustibles solides de récupération - Détermination de  
l'humidité par la méthode de séchage à l'étuve - Partie 2:  
Détermination de l'humidité totale par une méthode  
simplifiée

Feste Sekundärbrennstoffe - Bestimmung des  
Wassergehaltes unter Verwendung des Verfahrens der  
Ofentrocknung - Teil 2: Bestimmung des Gehaltes an  
Gesamtwasser mittels eines vereinfachten Verfahrens

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.

CEN members are the national standards bodies of 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 United Kingdom.

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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 15414-2:2006) has been prepared by Technical Committee CEN/TC 343 “Solid recovered fuels”, the secretariat of which is held by SFS.

CEN/TS 15414 “*Solid recovered fuels — Determination of moisture content using the oven dry method*” consists of three parts:

- *Part 1: Determination of total moisture by a reference method*
- *Part 2: Determination of total moisture by a simplified method*
- *Part 3: Moisture in general analysis sample*

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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## 1 Scope

This Technical Specification specifies a method for the determination of total moisture content of solid recovered fuels by drying a sample in an oven. This method is suitable for use for routine production control on site, e.g. if a high precision of the determination of moisture content is not required. It is applicable to all solid recovered fuels.

NOTE 1 The total moisture content of recovered fuels is not an absolute value and therefore standardised conditions for its determination are indispensable to enable comparative determinations.

NOTE 2 The term moisture content when used with recovered materials can be misleading since solid recovered materials e.g. biomass frequently contains varying amounts of volatile compounds (extractives) which can evaporate when determining moisture content by oven drying.

NOTE 3 This Technical Specification is based on CEN/TS 14774-2 [1].

## 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*

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## 3 Terms and definitions

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

## 4 Principle

The sample of recovered fuel is dried at a temperature of 105 °C in air atmosphere until constant mass is reached. The percentage of moisture is calculated from the loss in mass of the sample.

## 5 Apparatus

**5.1 Drying oven**, capable of being controlled at  $(105 \pm 2)$  °C (see declaration of the manufacturer) and in which the air atmosphere changes between three and five times per hour. The air velocity should be such that the sample particles are not dislodged from their drying container (5.2).

**5.2 Drying container**, of non-corrodible and heat-resistant material, e.g. metal tray, glass dish, porcelain dish.

**5.3 Balance**, with a sufficient accuracy to enable the sample and drying container (5.2), as received, to be weighed to the nearest 0,1 g.

## 6 Sample preparation

**6.1** The sample shall be taken and prepared in accordance with prCEN/TS 15442 and prCEN/TS 15443. It shall be delivered into the laboratory in sealed water resistant and airtight containers or bags.

NOTE Precautions should be carried out to ensure not losing moisture during preparation of the sample. Coarse materials, for example, small wood and chunk wood, should be prepared by using equipment appropriate for the fuel type, e.g. slow rotation grinder, shredder, to a thickness of maximum 30 mm for the test material.

**6.2** The sample shall be weighed immediately after the sample preparation. The sample mass shall be at least 300 g but preferably greater than 500 g.

NOTE 1 Solid recovered fuels are heterogeneous materials in many cases. Therefore, a sample size of minimum 300 g is necessary to obtain representative test portions.

NOTE 2 For large particle size samples with a nominal top size of 100 mm, a sample mass of 1 kg to 2 kg should be preferred.

## 7 Procedure

**7.1** Weigh an empty clean drying container (5.2) to the nearest 0,1 g, transfer the sample from the container or bag to the drying container (5.2). In case of moisture left on the inner surfaces of the bag or container, this amount of moisture shall be included in the calculation of the moisture content. Dry the sample packing (container, bag etc.) in the drying oven (5.1) and weigh the packing before and after drying. If the packing material cannot resist a temperature of 105 °C, it shall be allowed to dry at room temperature by placing it open in the laboratory. As an alternative for some types of solid recovered fuels which can re-absorb condensed moisture (e.g. saw dust), it is permissible that the bag or container together with the sample it contains is shaken such that the condensed moisture is fully re-absorbed into the sample.

NOTE 1 As the necessary drying time among other things depends on the thickness of the sample layer, sample layers too depth should be avoided.

Do not use larger dimensions of the drying container (5.2) than necessary in relation to the size of the sample due to buoyancy when hot weighing is undertaken (see CEN/TS 15414-1).

NOTE 2 Several drying containers can be handled at the same time.

**7.2** Weigh the drying container (5.2) with the sample and place it in the drying oven (5.1) controlled at  $(105 \pm 2)$  °C. Heat the drying container (5.2) with the sample until constant mass is reached as specified in 7.3.

Do not overload the drying oven (5.1).

NOTE There should be enough empty room over the sample layer and also between the drying containers (5.2).

**WARNING — For some materials present in solid recovered fuels there can be a risk of self-ignition when drying at 105 °C.**

**7.3** Solid recovered fuels are hygroscopic and therefore the drying container (5.2) with the sample shall be re-weighed to the nearest 0,1 g when still hot within 10 s to 15 s to avoid absorption of moisture. Use heat-insulating material on the balance pan to protect it from direct contact with the hot drying container (5.2). Constancy in mass is defined as a change not exceeding 0,2 % of the total loss in mass during a further period of heating at  $(105 \pm 2)$  °C over a period of 60 min. The drying time required depends on the particle size of the sample, the rate of atmosphere change in the drying oven (5.1), the thickness of the sample layer etc.

NOTE 1 Generally the drying time should not exceed 24 h to prevent unnecessary losses of volatile compounds.

NOTE 2 The required drying time should be determined in pre-tests on similar fuel types with comparable particle size.

## 8 Calculation

The moisture content,  $M_{ar}$ , in the solid recovered fuel, as received, expressed as a percentage by mass, shall be calculated using Equation (1):

$$M_{ar} = \frac{(m_2 - m_3) + m_4}{(m_2 - m_1)} \times 100 \quad (1)$$

where

$m_1$  is the mass of the empty drying container (5.2), in grams;

$m_2$  is the mass of the drying container (5.2) and sample before drying, in grams;

$m_3$  is the mass of the drying container (5.2) and sample after drying, in grams;

$m_4$  is the mass of the moisture associated with the packing, in grams.

The test result shall be calculated on wet basis to two decimal places and rounded to the nearest 0,1 % for reporting.

## 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 at least the following information:

- a) identification of the laboratory and the testing date;
- b) identification of the product or sample tested;
- c) a reference to this Technical Specification, i.e. CEN/TS 15414-2;
- d) any deviation from this Technical Specification;
- e) test results on wet basis;
- f) any unusual features observed during the test procedure which may have affected the test result.