



BSI Standards Publication

Solid recovered fuels — Determination of moisture content using the oven dry method

Part 2: Determination of total moisture
content by a simplified method

National foreword

This Draft for Development is the UK implementation of CEN/TS 15414-2:2010. It supersedes DD CEN/TS 15414-2:2006 which is withdrawn.

This publication is not to be regarded as a British Standard.

It is being issued in the Draft for Development series of publications and is of a provisional nature. It should be applied on this provisional basis, so that information and experience of its practical application can be obtained.

Comments arising from the use of this Draft for Development are requested so that UK experience can be reported to the international organization responsible for its conversion to an international standard. A review of this publication will be initiated not later than 3 years after its publication by the international organization so that a decision can be taken on its status. Notification of the start of the review period will be made in an announcement in the appropriate issue of *Update Standards*.

According to the replies received by the end of the review period, the responsible BSI Committee will decide whether to support the conversion into an international Standard, to extend the life of the Technical Specification or to withdraw it. Comments should be sent to the Secretary of the responsible BSI Technical Committee at British Standards House, 389 Chiswick High Road, London W4 4AL.

The UK participation in its preparation was entrusted to Technical Committee PTI/17, Solid biofuels.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Amendments issued since publication

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TECHNICAL SPECIFICATION
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CEN/TS 15414-2

June 2010

ICS 75.160.10

Supersedes CEN/TS 15414-2:2006

English Version

**Solid recovered fuels - Determination of moisture content using
 the oven dry method - Part 2: Determination of total moisture
 content 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 Gesamtgehaltes
 an Wasser mittels eines vereinfachten Verfahrens

This Technical Specification (CEN/TS) was approved by CEN on 27 March 2010 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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Foreword

This document (CEN/TS 15414-2:2010) 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 15414-2:2006.

CEN/TS 15414 „*Solid recovered fuels — Determination of moisture content using the oven dry method*“ consists of the following 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* (EN)

This document differs from CEN/TS 15414-2:2006 only by editorial changes.

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

1 Scope

This Technical Specification specifies a method for the determination of total moisture content of solid recovered fuels (SRF) 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 SRF can be misleading since these materials often contain varying amounts of volatile compounds (extractives) which can evaporate if determining moisture content by oven drying.

NOTE 3 This Technical Specification is based on EN 14774-2.

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 15442, *Solid recovered fuels — Methods for sampling*

prEN 15443, *Solid recovered fuels — Methods for laboratory sample preparation*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in prEN 15357:2008 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 mass fraction of moisture in percent is calculated from the loss in mass of the sample.

5 Apparatus

5.1 Drying oven, capable of being controlled at (105 ± 2) °C (see declaration of the manufacturer) and in which the air atmosphere changes between three and five times per hour. The air velocity shall 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, capable of weighing the sample and drying container (5.2), as received, to the nearest 0,1 g.

6 Sample preparation

6.1 The sample shall be taken and prepared in accordance with prEN 15442 and prEN 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 that the moisture content remains constant 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 As the necessary drying time among other things depends on the thickness of the sample layer, sample layers too deep 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).

7.2 Weigh the drying container (5.2) with the sample and place it in the drying oven (5.1) controlled at (105 ± 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). Mass constancy is reached if the change of mass not exceeds 0,2 % of the total loss in mass during a further period of heating at (105 ± 2) °C over a duration 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

Calculate the moisture content, M_{ar} , in the solid recovered fuel, as received, expressed as mass fraction in percent, using Equation (1):

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

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 result for each individual determination shall be calculated on wet basis to two decimal places, and the mean value of the individual results shall be calculated and rounded to the nearest 0,1 %. The mean value shall be recorded in the test report.

9 Precision

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

10 Test report

The test report shall include at least the following information:

- a) name of the testing laboratory;
- b) date of the test;
- c) identification of the product or sample tested;
- d) reference to this Technical Specification, i.e. CEN/TS 15414-2;
- e) test results on wet basis according to Clause 8;
- f) any deviation from this Technical Specification;
- g) any unusual features observed during the test procedure which may have affected the test results.

Bibliography

CEN/TS 15414-1, *Solid recovered fuels — Determination of moisture content using the oven dry method — Part 1: Determination of total moisture by a reference method*

EN 14774-2, *Solid biofuels — Methods for determination of moisture content — Oven dry method — Part 2: Total moisture — Simplified method*

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