



**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

SIST-TS CEN/TS 15402:2007

<https://standards.iteh.ai/catalog/standards/sist/db09cde8-db63-4d16-8f4e-bcf0ace7e749/sist-ts-cen-ts-15402-2007>

English Version

## Solid recovered fuels - Methods for the determination of the content of volatile matter

Combustibles solides de récupération - Méthodes pour la détermination de la teneur en composés volatils

Feste Sekundärbrennstoffe - Verfahren zur Bestimmung des Gehaltes an flüchtigen Substanzen

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.

[SIST-TS CEN/TS 15402:2007](https://standards.iteh.ai/catalog/standards/sist/db09cde8-db63-4d16-8f4e-bcf0ace7e749/sist-ts-cen-ts-15402-2007)

<https://standards.iteh.ai/catalog/standards/sist/db09cde8-db63-4d16-8f4e-bcf0ace7e749/sist-ts-cen-ts-15402-2007>



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

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

## Contents

page

Foreword.....	3
Introduction .....	4
1 Scope .....	5
2 Normative references .....	5
3 Terms and definitions .....	5
4 Principle.....	5
5 Apparatus .....	5
6 Sampling and sample preparation .....	9
7 Procedure .....	9
8 Calculation.....	9
9 Precision.....	10
10 Test report .....	10
Bibliography .....	11

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST-TS CEN/TS 15402:2007](https://standards.iteh.ai/catalog/standards/sist/db09cde8-db63-4d16-8f4e-bcf0ace7e749/sist-ts-cen-ts-15402-2007)  
<https://standards.iteh.ai/catalog/standards/sist/db09cde8-db63-4d16-8f4e-bcf0ace7e749/sist-ts-cen-ts-15402-2007>

## Foreword

This document (CEN/TS 15402:2006) 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.

## iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST-TS CEN/TS 15402:2007](https://standards.iteh.ai/catalog/standards/sist/db09cde8-db63-4d16-8f4e-bcf0ace7e749/sist-ts-cen-ts-15402-2007)

<https://standards.iteh.ai/catalog/standards/sist/db09cde8-db63-4d16-8f4e-bcf0ace7e749/sist-ts-cen-ts-15402-2007>

## Introduction

The volatile matter is determined as the loss in mass less that due to moisture, when solid recovered fuel is heated out of contact with air under standardised conditions. The test is empirical and, in order to ensure reproducible results, it is essential that the rate of heating, the final temperature and the overall duration of the test are carefully controlled. It is also essential to exclude air from the solid recovered fuel during heating to prevent oxidation. The fit of the crucible lid is therefore critical.

The moisture content of the sample is determined at the same time as the volatile matter so that the appropriate correction can be made. Mineral matter associated with the sample can also lose mass under the conditions of the test, the magnitude of the loss being dependent on both the nature and the quantity of the minerals present.

This Technical Specification 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 15148 [1] as well as ISO 562 [2].

## iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST-TS CEN/TS 15402:2007](https://standards.iteh.ai/catalog/standards/sist/db09cde8-db63-4d16-8f4e-bcf0ace7e749/sist-ts-cen-ts-15402-2007)

<https://standards.iteh.ai/catalog/standards/sist/db09cde8-db63-4d16-8f4e-bcf0ace7e749/sist-ts-cen-ts-15402-2007>

## 1 Scope

This Technical Specification specifies the requirements and a method for the determination of volatile matter of 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 apply.

## 4 Principle

A test portion of the general analysis sample is heated out of contact with ambient air at  $(900 \pm 10)$  °C for 7 min. The percentage of volatile matter is calculated from the loss in mass of the test portion after deducting the loss in mass due to moisture.

## 5 Apparatus

### 5.1 Furnace

The furnace shall be heated electrically and capable of maintaining a zone with uniform temperature of  $(900 \pm 10)$  °C. It may be of the stop-ended type or fitted at the back with a flue with a diameter of about 25 mm and a length of 150 mm (see Figure 1).

NOTE 1 It is important for furnaces with flues that the furnace door seals well. The flue should not reach far out of the oven and should be fitted with a butterfly valve to restrict airflow through the furnace.

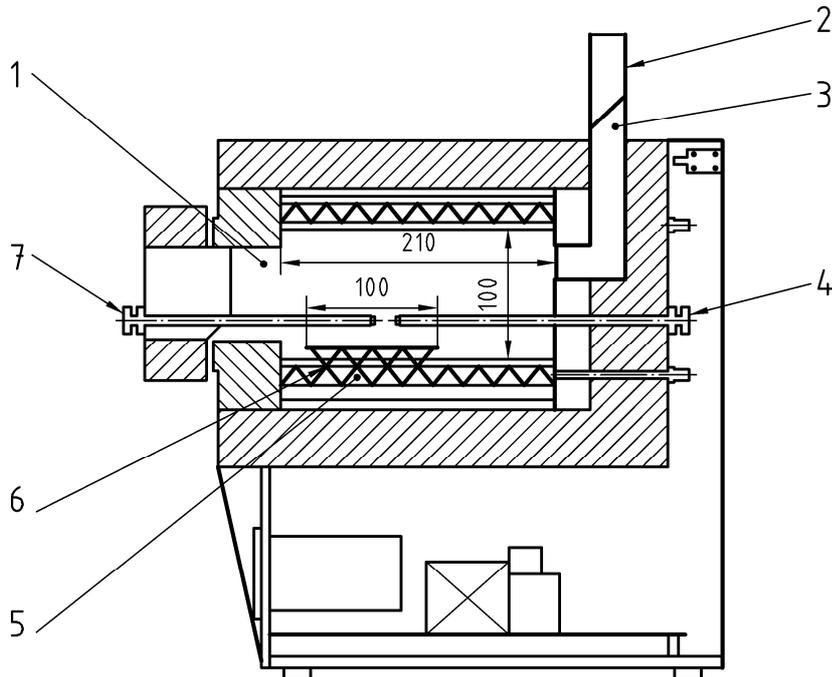
The heat capacity of the furnace shall be such that, with an initial temperature of  $(900 \pm 10)$  °C, the temperature is regained within 4 min after insertion of a cold stand and its crucibles. The temperature shall be measured with a thermocouple, as specified in 5.2.

NOTE 2 Observing the temperature is very important in order to compensate for inherent deviations of the temperature measurement and lack of uniformity regarding the temperature distribution.

Usually the furnace will be designed specifically either for multiple determinations using a number of crucibles in one stand or for receiving one crucible and its stand. In the first case, the zone of uniform temperature shall be at least 160 mm × 100 mm; in the latter case, a zone of diameter 40 mm is sufficient.

A position for the crucible stand shall be chosen within the zone of uniform temperature and this position shall be used for all determinations.

Dimensions in millimetres



iTeh STANDARD PREVIEW  
(standards.iteh.ai)

**Key**

- 1 chamber, 200 mm width
- 2 flue
- 3 valve
- 4 thermocouple
- 5 heating system
- 6 zone of uniform temperature
- 7 check thermocouple

<https://standards.iteh.ai/catalog/standards/sist/db09cdeb-db63-4d16-8f4e-bcf0ace7e749/sist-ts-cen-ts-15402-2007>

**Figure 1 — Example of suitable furnace**

**5.2 Thermocouple**

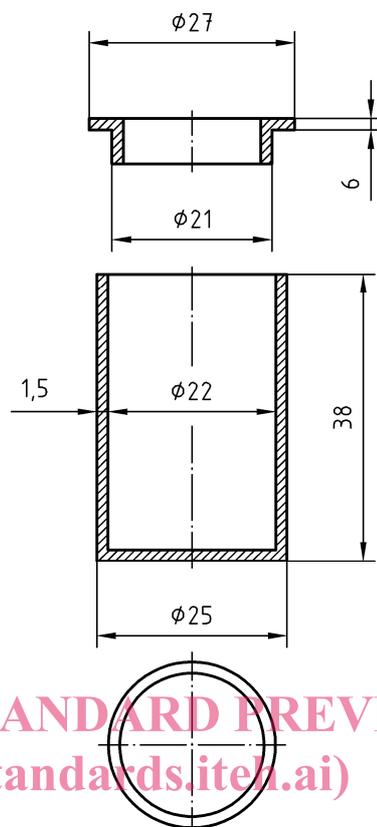
The thermocouple shall be unsheathed, of wire no thicker than 1 mm. It should be long enough to reach the centre of the underside of each crucible when placed into the zone of uniform temperature on being inserted through the front or rear of the furnace. The thermo junction shall be placed midway between the base of the crucible in its stand and the floor of the furnace. If the stand holds more than one crucible, the temperature under each crucible shall be checked in the same manner.

If desired, a sheathed thermocouple may be permanently installed in the furnace (5.1) (see Figure 1) with its thermo junction as close as possible to the centre of the zone of uniform temperature; in this case furnace temperature readings shall be correlated at frequent intervals with those of the unsheathed thermocouple which is thus inserted only if necessary.

NOTE The temperature/electromotive force relationship of a thermo junction maintained at elevated temperatures gradually changes with time.

**5.3 Crucible**

The crucible shall be cylindrical, with a well-fitting lid, both of fused silica. The crucible with lid shall have a mass from 10 g to 14 g and dimensions approximating to those shown in Figure 2. The fit of the lid on the crucible is critical to the determination and a lid shall be selected to match the crucible such that the horizontal clearance between them is no greater than 0,5 mm. After selection, the crucible and the lid shall be ground together to give smooth surfaces and then be given a common distinguishing mark.



iTeh STANDARD PREVIEW  
(standards.iteh.ai)

SIST-TS CEN/TS 15402:2007

<https://standards.iteh.ai/catalog/standards/sist/db09cde8-db63-4d16-8f4e-bcf0ad1074/sist-ts-cen-ts-15402-2007>

Figure 2 — Silica crucible and lid

If performing multiple determinations on highly swelling solid recovered fuels, it can be necessary to use taller crucibles; these may be up to 45 mm in height without affecting the determined volatile matter, provided that the specified rate of temperature recovery is maintained.

#### 5.4 Crucible stand

The crucible stand which the crucible (5.3) is placed on in the furnace (5.1), shall be such that the appropriate rate of heating is achievable. For example, it may consist of the following:

- for single determinations, a ring of heat-resistant steel wire as shown in Figure 3 a), with ceramic discs with a diameter of 25 mm and a thickness of 2 mm, resting on the inner projection of its legs

or

- for multiple determinations, a tray of heat-resistant steel wire as shown in Figure 3 b), of appropriate size, with ceramic plates with a thickness of 2 mm supporting the crucibles.

#### 5.5 Balance

The balance shall be readable to the nearest 0,1 mg.