SLOVENSKI STANDARD
SIST-TS CEN/TS 15401:2007

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Trdno alternativno gorivo - Metode za določanje nasipne gostote

Solid recovered fuels - Methods for the determination of bulk density

Feste Sekundärbrennstoffe - Verfahren zur Bestimmung der Schüttdichte

Combustibles solides de récupération - Méthodes pour la détermination de la densité apparente

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TECHNICAL SPECIFICATION

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English Version

Solid recovered fuels - Methods for the determination of bulk density

Combustibles solides de récupération - Méthodes pour la détermination de la densité apparente

Feste Sekundärbrennstoffe - Verfahren zur Bestimmung der Schüttdichte

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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Foreword

This document (CEN/TS 15401:2006) 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.

Introduction

Bulk density is one of the main quality parameters of solid recovered fuels (SRF). It is needed e.g. in a sampling process (volume of sampling tools, volume primary sample), in accessing transport capacity, storage space required or energy density (MWh/m^3) of SRF. Bulk density is not an absolute value, therefore conditions for its determination should be standardised in order to gain comparative measuring results. This Technical Specification specifies the determination of bulk density of solid recovered fuels which can be conveyed in a continuous material flow.

For practical reasons, two standard measuring containers with a volume of 5 l or 50 l are selectable for the determination.

The method specified in this Technical Specification is based on CEN/TS 15103 [1].

1 Scope

This Technical Specification specifies a method for the determination of bulk density of solid recovered fuels using a standard measuring container. This method is applicable to all solid recovered fuels with a nominal top size of maximal 100 mm.

NOTE 1 The reason for the limitation to maximal 100 mm is the practical maximum volume of a measurement container and thus dimensions of the aperture of the container. Particle dimension should not exceed 1/3 of this value.

NOTE 2 Bulk density of solid recovered fuels is subject to variation due to several impacts such as vibration, shock, pressure, biodegradation, drying and wetting. Measured bulk density can therefore deviate from practice conditions during transportation, storage or transhipment.

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 15414-2, *Solid recovered fuels — Determination of moisture content using the oven dry method — Part 2: Determination of total moisture by a simplified method*

CEN/TS 15415, *Solid recovered fuels — Determination of particle size distribution by screen method*

3 Terms and definitions

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

4 Symbols and units

The symbols and units used in this Technical Specification are listed in Table 1.

Table 1 — Symbols and units used in this Technical Specification

Symbol	Designation	Unit
m_1	Mass of the empty container	kg
m_2	Mass of the filled container	kg
M_{ar}	Mass fraction of moisture as received (wet basis)	%
V	Net volume of the measuring cylinder	m^3
ρ_{ar}	Bulk density of the sample as received at M_{ar}	kg/m^3
ρ_{dm}	Bulk density of the dry matter at M_{ar}	kg/m^3

5 Principle

The test portion is filled into a standard container of a given size and shape and weighed afterwards. Bulk density is calculated from the net weight per standard volume and reported for the measured moisture content.

6 Apparatus

6.1 Measuring containers

6.1.1 General

The container shall be cylindrically shaped and manufactured of a shock resistant, smooth-surfaced material. It shall be waterproof and resistant to deformation in order to prevent any variation in shape and volume. Grips may externally be fixed for easier handling. The height-diameter-ratio shall be in the range from 1,25 to 1,50.

6.1.2 Large container

The large measuring container shall have a filling volume of (50 ± 1) l. It shall have an effective (inner) diameter of 360 mm and an effective (inner) height of 491 mm (see Figure 1). Deviations from these dimensions are tolerable if the height-diameter-ratio remains as given in 6.1.1.

Dimensions in millimetres

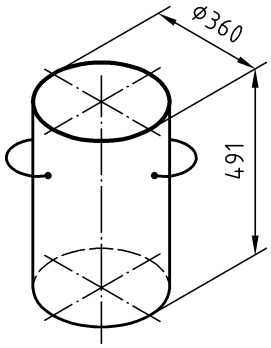

Figure 1 — Measuring container, large

6.1.3 Small container

The small measuring container shall have a filling volume of (5 ± 0,1) l. It shall have an effective (inner) diameter of 167 mm and an effective (inner) height of 228 mm (see Figure 2). Deviations from these dimensions are tolerable if the height-diameter-ratio remains as given in 6.1.1.

Dimensions in millimetres

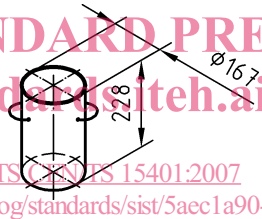

Figure 2 — Measuring container, small

6.2 Balances

6.2.1 Balance 1

A balance having a sufficient accuracy to enable the sample and container to be weighed to the nearest 10 g. This balance shall be used for measurements with the large container (6.1.2).

6.2.2 Balance 2

A balance having a sufficient accuracy to enable the sample and container to be weighed to the nearest 1 g. This balance shall be used for measurements with the small container (6.1.3).

6.3 Scantlings

A small scantling, preferably made of hard wood, approximately 600 mm long and having a cross section of about 50 mm × 50 mm.

NOTE A strong scantlings, preferably made of wood, of 150 mm height is recommended.

6.4 Wooden board

A flat wooden board (e.g. oriented strand board (= OSB)) with a thickness of about 15 mm and of a sufficient size for the container to be dropped onto for shock exposure.