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Trdna alternativna goriva - Določevanje premostitvenih lastnosti razsutega materiala

Solid recovered fuels - Determination of bridging properties of bulk material

Feste Sekundärbrennstoffe - Bestimmung der Neigung zur Brückenbildung von Schüttgut

Combustibles solides de récupération - Méthode de détermination des propriétés de formation de voûte dans les matériaux en vrac

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75.160.10	Trda goriva	Solid fuels

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TECHNICAL SPECIFICATION

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Supersedes CEN/TS 15406:2006

English Version

Solid recovered fuels - Determination of bridging properties of bulk material

Combustibles solides de récupération - Méthode de détermination des propriétés de formation de voûte dans les matériaux en vrac

Feste Sekundärbrennstoffe - Bestimmung der Neigung zur Brückenbildung von Schüttgut

This Technical Specification (CEN/TS) was approved by CEN on 12 June 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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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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Contents

Foreword

This document (CEN/TS 15406:2010) 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 15406:2006.

CEN/TS 15406:2006 is not be converted into a European Standard as the test method specified in this document was not validated (see [1], [2]).

This document differs from CEN/TS 15406:2006 mainly as follows:

a) Figures 1 and 2 replaced by new examples of figures for a bridging apparatus;

b) dimensions of the shear tester changed;

c) automatic equipment allowed;

d) repeatability limit specified;

e) whole document editorially revised.

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.

Introduction

This Technical Specification describes the determination of bridging properties of solid recovered fuels (SRF), which is conveyable in a continuous material flow. Bridging or arching is a complex parameter describing the situation when particles form a stable bridge over an opening that can be several times the length of the single particles. Bridging is dependent on several influencing factors, e.g. the conveying or transport system, particle size and shape, moisture content, bulk density, bed depth.

The behaviour of SRF in bins, hoppers, feeders, and other handling equipment depends on bridging properties [3]. Knowing these properties, already in phase of product development, is essential for avoiding flow problems.

Bridging properties are also important for quality control. By checking the relative bridging properties of a given bulk solid before it is placed into a system, unsatisfactory batches can be rejected or recycled, thereby preventing costly handling problems downstream.

Bridging is not an absolute value and therefore there is a need for standardising the conditions for the determination of bridging tendency in order to gain comparative measuring results.

Bridging of solid recovered fuels is subject to variation due to several impacts such as filling layer, particle shape, and storage time in silos. Measured bridging values can therefore deviate from real conditions in silos and conveyer systems.

1 Scope

This Technical Specification specifies a method for the determination of bridging properties of solid recovered fuels using standard measuring equipment. The method is applicable to all solid recovered fuels with maximum dimensions of the particle of 100 mm.

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.

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 the preparation of the laboratory sample*

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*

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 and particle size distribution by screen method*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in prEN 15357:2008 apply.

4 Determination of bridging properties for non-coalescing materials

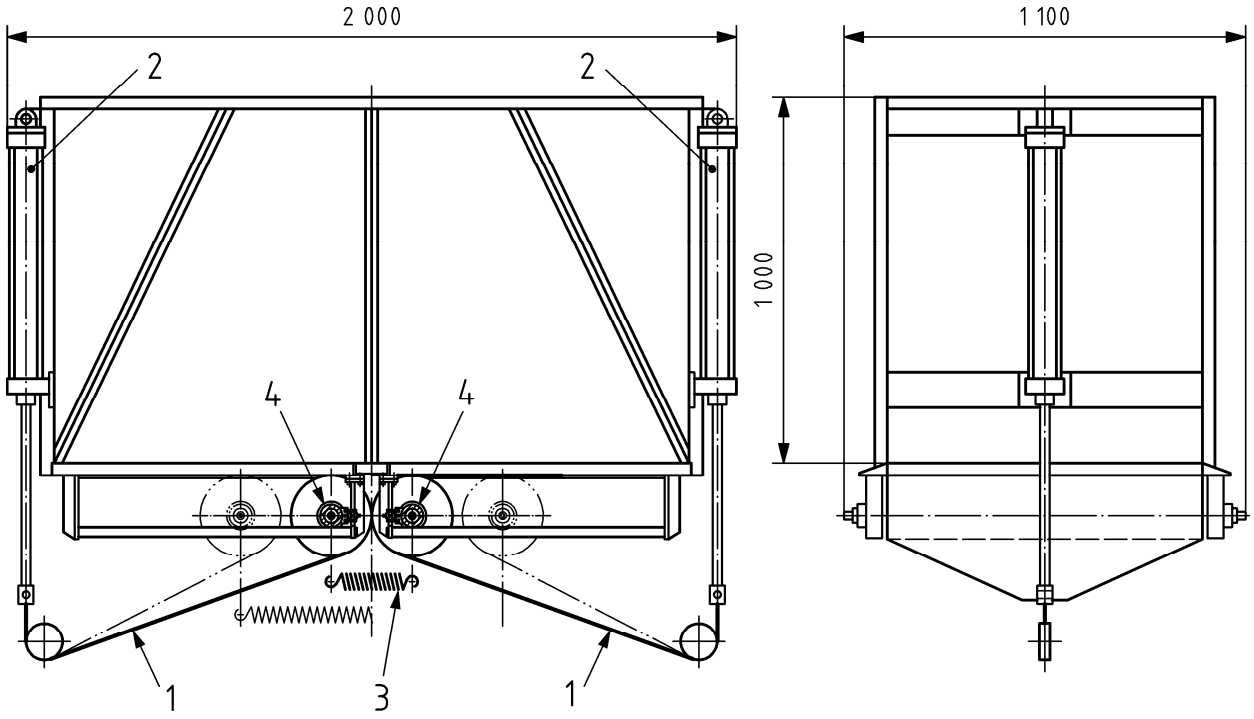
4.1 Principle

A sample is subjected to bridging by placing it over an expandable slot opening in an equipment of standardised dimensions. By increasing the slot opening, the building of a bridge is facilitated which ultimately will collapse; the size of the slot opening at this time represents the bridging value of the fuel tested.

4.2 Apparatus

4.2.1 Bridging apparatus, consisting of a container with an effective area of $[(1{,}1 \pm 0{,}01) \times (2 \pm 0{,}01)]$ m^2 and a minimum height of $(0{,}75 \pm 0{,}01)$ m, the sides of the container manufactured of oriented strand board (OSB) plates. (See Figure 1 and Figure 2.)

Dimensions in millimetres



a) Front view b) Side view

Key

1 rubber mat
2 piston
3 spring
4 steel coil

Figure 1 — Example for an assembling of a bridging apparatus in front and side view

The bottom of the container shall be made of two solid rubber mats with the following dimensions:

— width: (1,1 ± 0,01) m

— minimum length: 2,2 m

— thickness: (0,01 ± 0,001) m

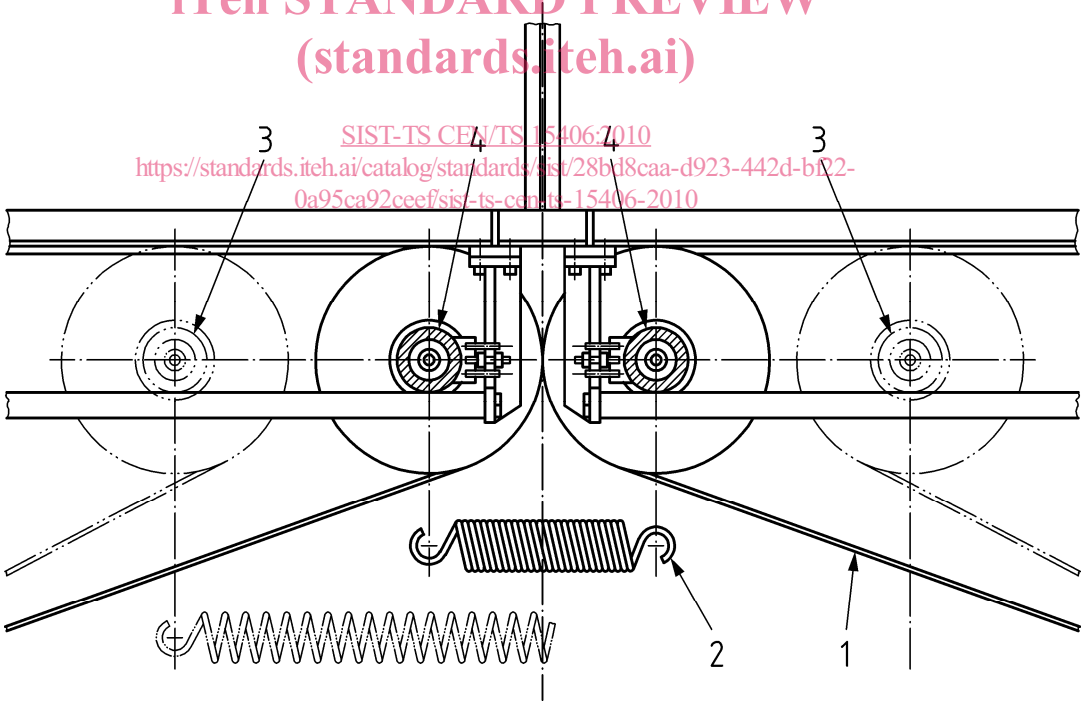
One end of each rubber mat (see positions 1 in Figure 1) shall be fixed to the lower edge of the end plate of the container. The opposite ends shall be fixed to the pneumatic pistons (see positions 2 in Figure 1), after turning around the steel coils (see positions 4 in Figure 1) situated below the bottom of the container. The steel coils shall have external diameters of (0,32 ± 0,001) m. The centre of the coils shall be placed at a distance of (0,43 ± 0,05) m below the horizontal plane of the container underside.

The coils are rolled in the direction of the side surfaces of the container by the movement of the pistons, forming a slot opening in the bottom of the container from the middle outward. When the force of the pistons is released, a spring (see position 3 in Figure 1) causes the two steel coils to return in the initial position, closing the slot opening.

This arrangement allows a constant opening movement minimizing the friction with the particles of the material.

To facilitate the handling, the container may be equipped with wheeled legs.

Figure 2 shows a section of Figure 1 to demonstrate the operation principle of the bridging apparatus more detailed.



Key

1 rubber mat
2 spring
3 steel coil in initial position
4 steel coil in opening phase

Figure 2 — Operation principle of the bridging apparatus