



SLOVENSKI STANDARD
SIST EN 15051-2:2014+A1:2017
01-julij-2017

Nadomešča:
SIST EN 15051-2:2014

**Izpostavljenost na delovnem mestu - Meritve prašnosti razsutih materialov - 2. del:
Metoda z vrtečim bobnom (vključno z dopnilom A1)**

Workplace exposure - Measurement of the dustiness of bulk materials - Part 2: Rotating drum method

Exposition am Arbeitsplatz - Messung des Staubungsverhaltens von Schüttgütern - Teil 2: Verfahren mit rotierender Trommel

Exposition sur les lieux de travail - Mesurage du pouvoir de resuspension des matériaux pulvérulents en vrac - Partie 2: Méthode du tambour rotatif

Ta slovenski standard je istoveten z: EN 15051-2:2013+A1:2016

ICS:

13.040.30 Kakovost zraka na delovnem mestu Workplace atmospheres
mestu

SIST EN 15051-2:2014+A1:2017 **en,fr,de**

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EUROPEAN STANDARD

EN 15051-2:2013+A1

NORME EUROPÉENNE

EUROPÄISCHE NORM

November 2016

ICS 13.040.30

Supersedes EN 15051-2:2013

English Version

Workplace exposure - Measurement of the dustiness of bulk materials - Part 2: Rotating drum method

Exposition sur les lieux de travail - Mesurage du pouvoir de resuspension des matériaux pulvérulents en vrac - Partie 2 : Méthode du tambour rotatif

Exposition am Arbeitsplatz - Messung des Staubungsverhaltens von Schüttgütern - Teil 2: Verfahren mit rotierender Trommel

This European Standard was approved by CEN on 28 September 2013 and includes Amendment 1 approved by CEN on 6 September 2016.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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European foreword

This document (EN 15051-2:2013+A1:2016) has been prepared by Technical Committee CEN/TC 137 “Assessment of workplace exposure to chemical and biological agents”, the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by May 2017, and conflicting national standards shall be withdrawn at the latest by May 2017.

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 includes Amendment 1 approved by CEN on 2 September 2016.

This document $\boxed{A1}$ supersedes EN 15051-2:2013 $\boxed{A1}$.

The start and finish of text introduced or altered by amendment is indicated in the text by tags $\boxed{A1}$ $\boxed{A1}$.

The major technical changes between this European Standard and the previous edition are as follows:

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- a) EN 15051:2006 has been split in three parts (see below);
- b) the test methods given are no longer referred as reference test methods;
- c) the test of equivalence between an alternative (candidate) test method and any of the test methods now given in this European Standard and in EN 15051-3:2013 has been deleted.

EN 15051 *Workplace exposure — Measurement of the dustiness of bulk materials* consists of the following parts:

- *Part 1: Requirements and choice of test methods;*
- *Part 2: Rotating drum method;*
- *Part 3: Continuous drop method.*

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

This European Standard gives details of the design and operation of the rotating drum test method that classifies the dustiness of solid bulk materials, in terms of health-related fractions.

A dustiness classification is presented to provide users (e.g. manufacturers, producers, occupational hygienists and workers) with information on the potential for dust emissions when the bulk material is handled or processed in workplaces. It provides the manufacturers of bulk materials with information that can help to improve their products. It allows the users of the bulk materials to assess the effects of pre-treatments, and also to select less dusty products, if available. It is envisaged that different branches of industry might develop their own classification schemes using experimentally determined dustiness values of the bulk materials of interest.

Although this European Standard does not discuss the analysis of dust released from bulk materials (except in terms of health-related fractions), the test method produces samples with the potential for chemical analysis of the contents.

This European Standard was developed based on the results of the European project SMT4-CT96-2074 "Development of a Method for Dustiness Testing" (see [1]). This project investigated the dustiness of 12 bulk materials, with the intention to test as wide a range of bulk materials as possible, i.e. magnitude of dustiness, industrial sectors, chemical composition and particle size distribution. Meanwhile the method has been applied to investigate the dustiness values of more than 220 different bulk materials.

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1 Scope

This European Standard specifies the rotating drum test apparatus and associated test method for the reproducible production of dust from a bulk material under standard conditions, and the measurement of the inhalable, thoracic and respirable fractions of this dust, with reference to existing European Standards, where relevant (see Clause 6).

This method is suitable for general bulk material handling processes, including all those processes where the bulk material is dropped, or can be dropped. It differs from the continuous drop method presented in EN 15051-3 in this European Standard, the same bulk material is repeatedly dropped, while in EN 15051-3, the bulk material is dropped only once, but continuously.

Furthermore, this European Standard specifies the environmental conditions, the sample handling and analytical procedures, and the method of calculating and presenting the results. A classification scheme for dustiness is specified, to provide a standardised way to express and communicate the results to users of the bulk materials.

This European Standard is applicable to powdered, granular or pelletised bulk materials. A standard sample volume is used.

This European Standard is not applicable to test the dust released when solid bulk materials are mechanically reduced (e.g. cut, crushed) or to evaluate handling procedures for the bulk materials.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 1540, *Workplace exposure — Terminology* SIST EN 15051-2:2014+A1:2017
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EN 15051-1:2013, *Workplace exposure — Measurement of the dustiness of bulk materials — Part 1: Requirements and choice of test methods*

EN 22768-1, *General tolerances — Part 1: Tolerances for linear and angular dimensions without individual tolerance indications (ISO 2768-1)*

ISO 15767, *Workplace atmospheres — Controlling and characterizing uncertainty in weighing collected aerosols*

3 Terms and definitions

For the purpose of this document, the terms and definitions given in EN 1540 and EN 15051-1 apply.

NOTE In particular, the following terms of EN 1540 are used in this document: airborne dust, collected sample, dustiness, inhalable fraction, respirable fraction, thoracic fraction and health related fractions.

4 Requirements

4.1 General

The test procedures described in EN 15051-1:2013, Clause 5 shall be applied.

4.2 Condition of the bulk material

The bulk material shall be delivered in air-tight containers and shall be tested in the state in which it was received (moisture content, particle size distribution, etc.).

EN 15051-2:2013+A1:2016 (E)**4.3 Sample and environmental control**

Bulk materials that have a large specific surface area are sensitive to environmental conditions such as relative humidity, temperature and electrostatic effects. Additionally, the bulk materials' moisture content, compaction, agglomeration etc. will have an influence on the results of the dustiness measurements. Therefore, for accurate results the test atmosphere shall be within a narrow range of temperature and humidity. In all cases the environmental conditions shall be documented.

The following test conditions shall apply:

- relative humidity (RH): $(50 \pm 10) \%$;
- temperature: $(21 \pm 3) ^\circ\text{C}$.

The test apparatus shall be electrically grounded.

NOTE In many cases, a separate determination of the particle size can be valuable.

4.4 Moisture content

The moisture content of the bulk material shall be determined and documented according to the procedure given in EN 15051-1:2013, 5.4 and Annex A.

4.5 Bulk density

The bulk density of the test material shall be determined and documented according to the procedure given in EN 15051-1:2013, Annex B.

4.6 Test procedure

The dustiness shall be tested according to the rotating drum test method described in Clause 5.

4.7 Replicate tests

Replicate tests shall be carried out according to 5.7.

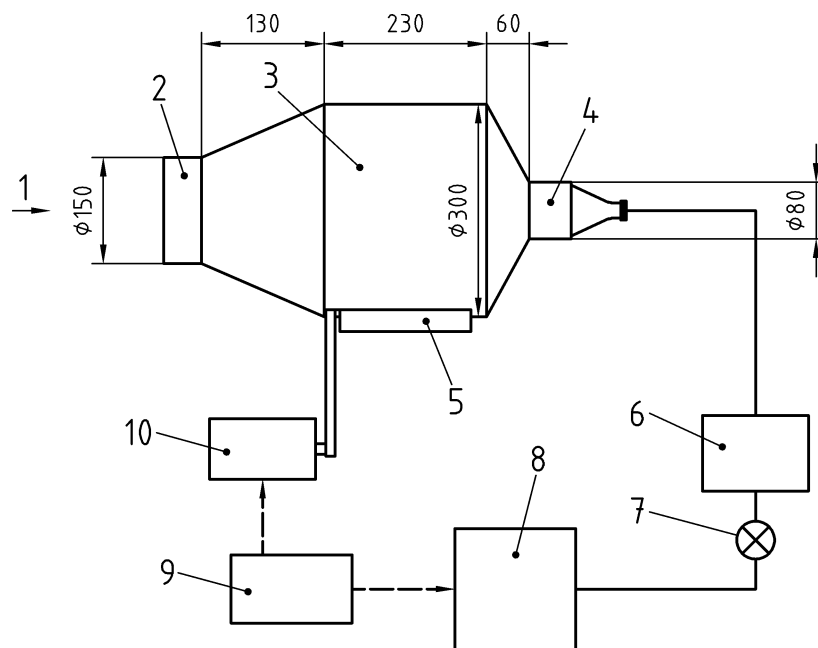
4.8 Reporting

The test results shall be reported as specified in Clause 7.

5 Rotating drum method**5.1 Description of test apparatus**

The test apparatus required to determine the dustiness of bulk materials is shown in Figure 1.

Dimensions in millimetres

**Key**

- 1 air flow
- 2 inlet stage (protective filter)
- 3 dust generation section - rotating drum
- 4 outlet stage/dust sampling system (two particle size-selective foam stages and a back-up filter)
- 5 rollers
- 6 in-line mass flow meter
- 7 control valve
- 8 vacuum pump
- 9 timer (timing control circuit)
- 10 drive motor

General tolerances according to EN 22768-1

Figure 1 — Outline of the rotating drum test apparatus