



NSAI
Standards

Irish Standard
I.S. EN 17199-3:2019

Workplace exposure - Measurement of dustiness of bulk materials that contain or release respirable NOAA or other respirable particles - Part 3: Continuous drop method

I.S. EN 17199-3:2019

Incorporating amendments/corrigenda/National Annexes issued since publication:

The National Standards Authority of Ireland (NSAI) produces the following categories of formal documents:

I.S. xxx: Irish Standard — national specification based on the consensus of an expert panel and subject to public consultation.

S.R. xxx: Standard Recommendation — recommendation based on the consensus of an expert panel and subject to public consultation.

SWiFT xxx: A rapidly developed recommendatory document based on the consensus of the participants of an NSAI workshop.

This document replaces/revises/consolidates the NSAI adoption of the document(s) indicated on the CEN/CENELEC cover/Foreword and the following National document(s):

NOTE: The date of any NSAI previous adoption may not match the date of its original CEN/CENELEC document.

This document is based on:

EN 17199-3:2019

Published:

2019-03-27

This document was published under the authority of the NSAI and comes into effect on:

2019-04-14

ICS number:

13.040.30

NOTE: If blank see CEN/CENELEC cover page

NSAI
1 Swift Square,
Northwood, Santry
Dublin 9

T +353 1 807 3800
F +353 1 807 3838
E standards@nsai.ie
W NSAI.ie

Sales:
T +353 1 857 6730
F +353 1 857 6729
W standards.ie

Údarás um Chaighdeáin Náisiúnta na hÉireann

National Foreword

I.S. EN 17199-3:2019 is the adopted Irish version of the European Document EN 17199-3:2019, Workplace exposure - Measurement of dustiness of bulk materials that contain or release respirable NOAA or other respirable particles - Part 3: Continuous drop method

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

For relationships with other publications refer to the NSAI web store.

Compliance with this document does not of itself confer immunity from legal obligations.

In line with international standards practice the decimal point is shown as a comma (,) throughout this document.

This page is intentionally left blank

EUROPEAN STANDARD

EN 17199-3

NORME EUROPÉENNE

EUROPÄISCHE NORM

March 2019

ICS 13.040.30

English Version

Workplace exposure - Measurement of dustiness of bulk materials that contain or release respirable NOAA or other respirable particles - Part 3: Continuous drop method

Exposition sur les lieux de travail - Mesurage du pouvoir de resuspension des matériaux en vrac contenant ou émettant des nano-objets et leurs agrégats et agglomérats (NOAA) ou autres particules en fraction alvéolaire - Partie 3: Méthode de la chute continue

Exposition am Arbeitsplatz - Messung des Staubungsverhaltens von Schüttgütern, die Nanoobjekte oder Submikrometerpartikel enthalten oder freisetzen - Teil 3: Verfahren mit kontinuierlichem Fall

This European Standard was approved by CEN on 8 February 2019.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

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.

CEN members are the national standards bodies of 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, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

| Contents | Page |
|--|------|
| European foreword | 3 |
| Introduction | 4 |
| 1 Scope | 5 |
| 2 Normative references | 5 |
| 3 Terms and definitions | 6 |
| 4 Symbols and abbreviations | 6 |
| 5 Principle | 6 |
| 6 Equipment | 8 |
| 6.1 General | 8 |
| 6.2 Test apparatus | 9 |
| 7 Requirements | 11 |
| 7.1 General | 11 |
| 7.2 Engineering control measures | 11 |
| 7.3 Conditioning of the test material | 11 |
| 7.4 Conditioning of the test equipment | 12 |
| 8 Preparation | 12 |
| 8.1 Test sample | 12 |
| 8.2 Moisture content of the test material | 12 |
| 8.3 Bulk density of the test material | 12 |
| 8.4 Sampling for analytical or imaging purposes | 12 |
| 8.5 Preparation of test apparatus | 12 |
| 9 Test procedure | 13 |
| 10 Evaluation of data | 15 |
| 10.1 Respirable dustiness mass fraction | 15 |
| 10.2 Number-based dustiness index | 15 |
| 10.3 Number-based emission rate | 16 |
| 10.4 Additional results of the tests | 16 |
| 10.5 Morphology and chemical characterization of the particles | 16 |
| 11 Test report | 17 |
| Annex A (informative) Description and characteristic properties of the continuous drop method | 18 |
| A.1 General | 18 |
| A.2 Energy input and dust developing procedure | 18 |
| A.3 Analytical methods and results | 19 |
| Annex B (informative) Illustration of an experimental CDD set-up example | 20 |
| Bibliography | 24 |

European foreword

This document (EN 17199-3:2019) 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 September 2019 and conflicting national standards shall be withdrawn at the latest by September 2019.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

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, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

EN 17199-3:2019 (E)

Introduction

Dustiness measurement and characterization 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. They provide the manufactures of bulk materials containing NOAA with information that can help to improve their products and reduce their dustiness. It allows the users of the bulk materials containing NOAA to assess the controls and precautions required for handling and working with the material and the effects of pre-treatment (e.g. modify surface properties or chemistry). It also allows the users to select less dusty products, if available. The particle size distribution of the aerosol and the morphology and chemical composition of its particles can be used by occupational hygienists, scientists and regulators to further characterize the aerosol in terms of particle size distribution and chemical composition and to thus aid users to evaluate and control the health risk of airborne dust.

This document gives details on the design and operation of the continuous drop method that measures the dustiness of bulk materials that contain or release respirable NOAA or other respirable particles in terms of dustiness indices or emission rates. Dustiness indices as well as emission rates can be number-based or mass-based. In addition, the test method characterizes the released aerosol by measuring the particle size distribution and emission rate using on-line methods and collects samples for off-line analysis (as required) for their morphology and chemical composition. This test uses the same dust generation methods and the same set-up including dimensions of the apparatus specified in EN 15051-3. The determination of the inhalable and respirable dustiness mass fractions (see EN 481 [1]) of the released dust from a bulk material containing NOAA is carried out separately according to EN 15051-1 and EN 15051-3.

The continuous drop method is useful for addressing the ability of bulk materials including nanomaterials (in powder form), to release airborne particles (aerosol) during agitation, the so-called dustiness.

The continuous drop method has been designed to simulate workplace scenarios and to represent general bulk material handling processes, including processes where bulk material is tipped, poured, mixed, scooped, dropped or similar; either mechanical or by hand.

The continuous drop method presented here differs from the rotating drum, the small rotating drum and the vortex shaker method presented in EN 17199-2 [2], EN 17199-4 [3] and EN 17199-5 [4] respectively. The rotating drum and small rotating drum methods perform, both, repeated pouring or agitation of the same sample bulk material while the vortex shaker method simulates vigorous agitation of a bulk material.

This document was developed based on the results of pre-normative research [5]. This project investigated the dustiness of ten bulk materials (including nine bulk nanomaterials) with the intention to test as wide a range of bulk materials as possible in terms of magnitude of dustiness, chemical composition and primary particle size distribution as indicated by a large range in specific surface area.

1 Scope

This document provides the methodology for measuring the dustiness of bulk materials that contain or release respirable NOAA or other respirable particles, under standard and reproducible conditions and specifies for that purpose the continuous drop method.

This document specifies the selection of instruments and devices and the procedures for calculating and presenting the results. It also gives guidelines on the evaluation and reporting of the data.

The methodology described in this document enables

- a) the measurement of the respirable and, optionally, the inhalable dustiness mass fractions,
- b) the measurement of the number-based dustiness index of particles in the particle size range from about 10 nm to about 1 μm ,
- c) the measurement of the number-based emission rate of particles in the particle size range from about 10 nm to about 1 μm ,
- d) the measurement of the number-based particle size distribution of the released aerosol in the particle size range from about 10 nm to about 10 μm , and
- e) the collection of released airborne particles in the respirable dustiness mass fraction for subsequent observations and analysis by analytical electron microscopy.

This document is applicable to the testing of a wide range of bulk materials including powders, granules or pellets containing or releasing respirable NOAA or other respirable particles in either unbound, bound uncoated and coated forms.

NOTE 1 Currently no number-based classification scheme in terms of dustiness indices or emission rates have been established. Eventually, when a large number of measurement data has been obtained, the intention is to revise this document and to introduce such a classification scheme, if applicable.

NOTE 2 The methods specified in this document have not been evaluated for nanofibers and nanoplates.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

CEN ISO/TS 80004-2, *Nanotechnologies - Vocabulary - Part 2: Nano-objects (ISO/TS 80004-2)*

EN 1540, *Workplace exposure - Terminology*

EN 13205-2, *Workplace exposure - Assessment of sampler performance for measurement of airborne particle concentrations - Part 2: Laboratory performance test based on determination of sampling efficiency*

EN 15051-1, *Workplace exposure - Measurement of the dustiness of bulk materials - Part 1: Requirements and choice of test methods*

EN 15051-3, *Workplace exposure - Measurement of the dustiness of bulk materials - Part 3: Continuous drop method*

EN 16897, *Workplace exposure - Characterization of ultrafine aerosols/nanoaerosols - Determination of number concentration using condensation particle counters*

This is a free preview. Purchase the entire publication at the link below:

[Product Page](#)

-
- [Looking for additional Standards? Visit Intertek Inform Infostore](#)
 - [Learn about LexConnect, All Jurisdictions, Standards referenced in Australian legislation](#)
-