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BSI Standards Publication

Nanotechnology — Nanoparticles in powder form — Characteristics and measurements

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National foreword

This Published Document is the UK implementation of CEN ISO/TS 17200:2015. It is identical to ISO/TS 17200:2013.

The UK participation in its preparation was entrusted to Technical Committee NTI/1, Nanotechnologies.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Foreword

The text of ISO/TS 17200:2013 has been prepared by Technical Committee ISO/TC 229 “Nanotechnologies” of the International Organization for Standardization (ISO) and has been taken over as CEN ISO/TS 17200:2015 by Technical Committee CEN/TC 352 “Nanotechnologies” the secretariat of which is held by AFNOR.

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Endorsement notice

The text of ISO/TS 17200:2013 has been approved by CEN as CEN ISO/TS 17200:2015 without any modification.

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2. www.iso.org/directives

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The committee responsible for this document is ISO/TC 229, *Nanotechnologies*.

Introduction

As is commonly noticed for every technology concerned with the development of new materials, and for nanotechnology in particular, information sharing on material characteristics by sellers and buyers, and sometimes also by regulators, is important and is facilitated by the development of appropriate material specifications. For a comprehensive exchange of information, it is essential to agree on the description of the material characteristics. However, many characteristics of nanomaterials cannot be determined using general and well-established measurement methods. This may become the cause for inconsistency in experimental results and induce confusion in commerce and technology transfer. Furthermore, the rapid discovery of new materials from nanotechnology increases the number of characteristics that need to be specified for an appropriate dissemination of information.

In order to address this need, a systematic arrangement of characteristics has been carried out across different fields of application specific to each nano-object by identifying a list of fundamental characteristics commonly used in these circumstances and by developing tailor-made technical specifications for the list, as seen in ISO/TS 11931 and ISO/TS 11937.

Another approach that was followed for ISO/TS 12805 resulted in the development of a list of characteristics applicable to specifying nano-objects that are useful to the wider community of users of information on nano-objects.

To increase the reach of outcomes from these efforts, members of ISO/TC 229 have discussed and planned the systematic development of an ISO technical specification for defining a list of fundamental characteristics that are widely applicable to a broad range of nano-objects. This Technical Specification is intended to define the list of fundamental characteristics universally for nanoparticles in powder form, which covers a very broad range of nano-objects.

In order to develop a common understanding among sellers, buyers, and regulators, this Technical Specification uses the chemical composition, crystal structure, particle size, and surface area as fundamental measures for characterizing nano-objects from a chemical, physical, and surface scientific point of view that is of significant interest to users of the nano-objects. However, since measurement procedures used for determining the characteristics of nano-objects often rely on various idealized assumptions, the resulting characteristics of nano-objects with identical name may not guarantee the equivalence of measured results. This issue can be addressed by adopting well-recognized measurement methods that can provide reliable measurement results.

The measurement methods adopted in this Technical Specification are well known in the industry. Instruments used for measurement and data processing software are well developed and provide reliable measurement results when operated under a valid quality system.

The description of measurement methods is limited in this Technical Specification to important supplementary notices. For basic information about applying the methods, it is assumed that operating instructions are provided with any instruments, appropriate data processing software is available, and analysis has the required technical skills. The methods are applicable to situations where procedures are subcontracted to independent test laboratories. Since quantitative criteria concerning characteristics depend on the specific intentions among users, they are not described in this Technical Specification. These criteria are subject to agreement between users of this Technical Specification, namely, sellers, buyers, and regulators of nanoparticles in powder form.

Nanotechnology is a rapidly growing and evolving field. Users of this Technical Specification should maintain familiarity with the legislative environment and latest developments in human and environmental health and safety regarding nanotechnology.

If the seller or the buyer wishes to assess the environmental, safety, or health risks of the material, they may refer to ISO/TR 12885:2008 for further guidance. It has been assumed in the preparation of this Technical Specification that the execution of its provisions will be entrusted to appropriately qualified and experienced people.

TECHNICAL SPECIFICATION **ISO/TS 17200:2013(E)**

Nanotechnology — Nanoparticles in powder form — Characteristics and measurements

1 Scope

This Technical Specification lists fundamental characteristics which are commonly determined for nanoparticles in powder form. The Technical Specification prescribes specific measurement methods for each of these characteristics.

This Technical Specification does not specify acceptable quantitative criteria for the characteristics because they are subject to agreement between sellers, buyers, and regulators.

Excluded in this Technical Specification are characteristics specifically related to health, safety, and environmental issues, as well as characteristics that pertain to specific applications of nanoparticles in powder form.

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.

ISO 9277:2010, *Determination of the specific surface area of solids by gas adsorption — BET method*

ISO 13322-1, *Particle size analysis — Image analysis methods — Part 1: Static image analysis methods*

ISO 14488, *Particulate materials — Sampling and sample splitting for the determination of particulate properties*

ISO/TS 27687, *Nanotechnologies — Terminology and definitions for nano-objects — Nanoparticle, nanofibre and nanoplate*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/TS 27687 and the following apply.

3.1
transmission electron microscopy
TEM
method that produces magnified images or diffraction patterns of the specimen by an electron beam which passes through the specimen and interacts with it

[SOURCE: ISO 29301:2010]

3.2
X-ray diffraction
XRD
method to determine crystallographic and geometrical information about a sample by observing the diffraction pattern due to an X-ray beam scattered by a sample

