ICS 01.040.07, 07.030 SLOVENSKÁ TECHNICKÁ NORMA Apríl 2016

STN	**Nanotechnológie. Slovník. Časť 1: Základné termíny (ISO/TS 80004-1: 2015).**	**STN P CEN ISO/TS 80004-1** 60 3010

Nanotechnologies - Vocabulary - Part 1: Core terms (ISO/TS 80004-1:2015)

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 03/16

Táto predbežná STN je určená na overenie. Pripomienky zasielajte ÚNMS SR najneskôr do 31. 12. 2017.

Obsahuje: CEN ISO/TS 80004-1:2015, ISO/TS 80004-1:2015

Oznámením tejto normy sa ruší
STN P CEN ISO/TS 80004-1 (60 3010) z apríla 2015

122577

TECHNICAL SPECIFICATION

SPÉCIFICATION TECHNIQUE

TECHNISCHE SPEZIFIKATION

CEN ISO/TS 80004-1

December 2015

ICS 07.030; 01.040.07

Supersedes CEN ISO/TS 80004-1:2014

English Version

Nanotechnologies - Vocabulary - Part 1: Core terms (ISO/TS 80004-1:2015)

Nanotechnologies - Vocabulaire - Partie 1: Termes "coeur" (ISO/TS 80004-1:2015)

Nanotechnologien - Fachwörterverzeichnis - Teil 1: Kernbegriffe (ISO/TS 80004-1:2015)

This Technical Specification (CEN/TS) was approved by CEN on 14 October 2015 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.

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, 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: Avenue Marnix 17, B-1000 Brussels

Ref. No. CEN ISO/TS 80004-1:2015 E

Contents

Page

European foreword

This document (CEN ISO/TS 80004-1:2015) has been prepared by Technical Committee ISO/TC 229 "Nanotechnologies" in collaboration with Technical Committee CEN/TC 352 “Nanotechnologies” the secretariat of which is held by AFNOR.

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 ISO/TS 80004-1:2014.

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, 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.

Endorsement notice

The text of ISO/TS 80004-1:2015 has been approved by CEN as CEN ISO/TS 80004-1:2015 without any modification.

TECHNICAL SPECIFICATION

ISO/TS 80004-1

Second edition
2015-12-01

Nanotechnologies — Vocabulary —

Part 1: Core terms

Nanotechnologies — Vocabulaire —

Partie 1: Termes “coeur”

Reference number
ISO/TS 80004-1:2015(E)

COPYRIGHT PROTECTED DOCUMENT

ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

Contents

Page

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

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received. www.iso.org/patents

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: http://www.iso.org/iso/home/standards_development/resources-for-technical-work/foreword.htm

The committee responsible for this document is ISO/TC 229, *Nanotechnologies*, and Technical Committee IEC/TC 113, *Nanotechnology standardization for electrical and electronic products and systems*.

This second edition cancels and replaces the first edition (ISO/TS 80004-1:2010), which has been technically revised.

Documents in the 80000 to 89999 range of reference numbers are developed by collaboration between ISO and IEC.

ISO/TS 80004 consists of the following parts, under the general title *Nanotechnologies — Vocabulary*:

— *Part 1: Core terms*

— *Part 2: Nano-objects*

— *Part 3: Carbon nano-objects*

— *Part 4: Nanostructured materials*

— *Part 5: Nano/bio interface*

— *Part 6: Nano-object characterization*

— *Part 7: Diagnostics and therapeutics for healthcare*

— *Part 8: Nanomanufacturing processes*

The following parts are under preparation:

— *Part 9: Nano-enabled electrotechnical products and systems*

— *Part 10: Nano-enabled photonic components and systems*

— *Part 11: Nanolayer, nanocoating, nanofilm, and related terms*

— *Part 12: Quantum phenomena in nanotechnology*

— *Part 13: Graphene and other two-dimensional materials*

Introduction

By control of matter in the *nanoscale* (2.1), *nanotechnology* (2.3) brings together processes and techniques that are used to research, design and manufacture materials, devices, and systems. It enables management of characteristics such as material size, shape, morphology, chemical composition and molecular configuration for the improvement, or development of, new process and product properties.

Applications of nanotechnologies are expected to impact virtually every aspect of life and enable dramatic advances in communication, health, manufacturing, materials and knowledge-based technologies. Even if this is only partially realized, there is a need to provide industry and researchers with suitable tools to assist with the development, application and communication of nanotechnologies.

A crucial objective is the harmonization of terminology and definitions, in order to promote common understanding and consistent usage across communities where nanotechnologies are being developed and used. In the context of the ISO/TS 80004- series of standards, "terminology" refers to the following:

a) a structured or conceptual presentation of vocabulary employed in nanotechnologies,

b) assigned definitions for specific units of the language in this vocabulary.

This part of ISO/TS 80004 presents terminology and definitions for core terms in this emerging vocabulary, and serves as the foundation for a broader vocabulary constituted collectively by the ISO/TS 80004- series of standards.

As nanotechnologies continue to evolve, the terms and definitions to facilitate communications have become increasingly specific and precise. For many communities, the meaning of terms such as "nanoscale", "*nanomaterial*" (2.4) and "nanotechnology" are inferred by logical application of the SI unit of scale. The prefix 'nano-' specifically means a measure of 10^{-9} units, and the nature of this unit is determined by the word that follows. In the ISO/TS 80004 vocabulary series, however, terms such as "*nano-object*" (2.5) and "nanoscale" employ size and geometric boundaries to express fundamental and measurable aspects of nanomaterials. In the case of the term *nanoscale*, the definition acknowledges that the length range of nano-objects might fall outside the precise boundaries normally associated with the concept of scale, by indicating that the upper and lower boundaries are approximate.

The lower limit (approximately 1 nm) in the definition of nanoscale is introduced to avoid single and small groups of atoms, as well as individual molecules, from being designated as nano-objects or elements of *nanostructures* (2.6), which might be implied by the absence of a lower limit. It should also be recognized that fullerene molecules and single layer planar structures (e.g. graphene) that have dimensions below 1 nm are, in practice, considered to be nanomaterials because they are important building blocks for nanotechnology.

Further, size-dependent biological effects, specifically particle-cell interactions, and environmental interactions related to nanotechnology, involve structures below 1 nm and above 100 nm. In addition to size, the complex interplay of parameters such as aspect ratio, core chemistry, agglomeration state, physical state, surface properties and others will influence biological and environmental interactions associated with nanostructured materials.

Terminology development is proceeding at an intensive pace and needs to be responsive to the needs of stakeholders. As knowledge expands, a robust terminology will need to effectively convey not only the size and shape-based metrics of nanomaterials but also the performance-based/properties-based aspects of intentionally produced nano-objects and nanostructured materials in their definitions.

It will be an on-going challenge to communicate complex concepts in definitions in a manner that is meaningful and practical for stakeholders in research, commercial applications, government and consumer communities. It is emphasized that the definition of "nanoscale" in the ISO/TS 80004 vocabulary series is a general descriptor serving to facilitate communication concerning nanotechnologies.

The development of core terms and their definitions has benefited from discussion over time concerning scientific, regulatory and consumer usage. The science is still emerging, as is the capacity to measure

and characterize nanomaterials, or more generally matter in the nanoscale. Care needs to be taken to ensure the latest scientific information is incorporated into the terminology as it becomes available. Since the inception of ISO/TC 229 and IEC/TC 113, nanotechnology has evolved and continues to evolve. It is important to acknowledge that the associated terms and their definitions will likewise follow an evolutionary path.

Many of the definitions in this part of ISO/TS 80004 are determined to be in harmony with a framework and hierarchical system of terminology for nanotechnologies. Furthermore, it is also important to recognize that articles fabricated to contain nanomaterials are not necessarily nanomaterials themselves.

Figure 1 illustrates the relationships between "nanomaterial", "nano-object" and "*nanostructured material*" (2.7). However, this hierarchy is not intended to exclude the possibility for a nano-object to have internal or surface nanostructure. This figure should therefore be considered as schematic or idealized.

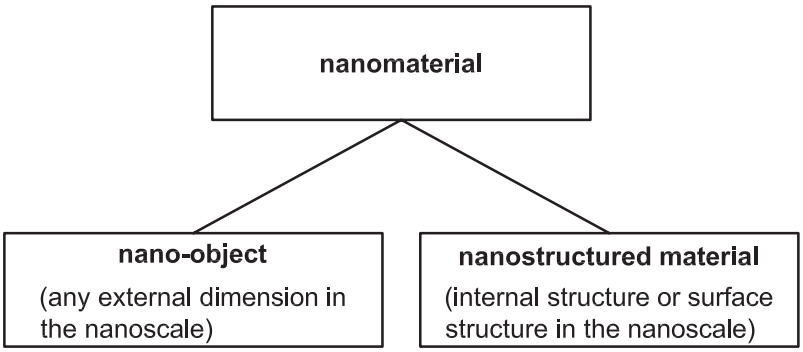

Figure 1 — Nanomaterial framework

Nanotechnologies — Vocabulary —

Part 1:
Core terms

1 Scope

This part of ISO/TS 80004 lists terms and definitions related to core terms in the field of nanotechnologies. It is intended to facilitate communications between organizations and individuals in industry and those who interact with them.