SRI LANKA STANDARD 12000-Part 2:2012
ISO/TS 80004-1:2010

NANOTECHNOLOGIES
PART 2: VOCABULARY - CORE TERMS

SRI LANKA STANDARDS INSTITUTION

Sri Lanka Standard
NANOTECHNOLOGIES
PART 2: VOCABULARY - CORE TERMS

SLS 12000-Part 2:2012
ISO/TS 80004-1:2010

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This standard does not purport to include all the necessary provisions of a contract.

Sri Lanka Standard
NANOTECHNOLOGIES- VOCABULARY-
PART 2: CORE TERMS

NATIONAL FOREWORD

This standard was approved by the National Mirror Committee on Nanotechnology and authorized for adoption and publication as a Sri Lanka Standard by the Council of the Sri Lanka Standards Institution on 2012.01.22.

This Sri Lanka Standard is identical with **ISO/TS 80004-1:2010** Nanotechnologies- Vocabulary- Part 2: Core terms, published by the International Organization for Standardization (ISO).

TERMINOLOGY AND CONVENTIONS

The text of the International Standard has been accepted as suitable for publication, without any deviation as a Sri Lanka Standard. However, certain terminology and conventions are not identical with those used in Sri Lanka Standards. Attention is therefore drawn to the following:

a) Wherever the words “International Standard” appear referring to this standard they should be interpreted as “Sri Lanka Standard”.

b) The comma has been used throughout as a decimal marker. In Sri Lanka Standards, it is the current practice to use a full point on the baseline as the decimal marker.

Wherever page numbers are quoted, they are “ISO” page numbers.

CROSS REFERENCES

Corresponding Sri Lanka standards for International Standards listed under references in **ISO/TS 80004-1:2010** are not available.

SLS 12000 -2 : 2012

TECHNICAL SPECIFICATION

ISO/TS 80004-1

First edition
2010-10-15

Nanotechnologies — Vocabulary —

Part 1: **Core terms**

Nanotechnologies — Vocabulaire —

Partie 1: Termes «cœur»

Reference number
ISO/TS 80004-1:2010(E)

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

In other circumstances, particularly when there is an urgent market requirement for such documents, a technical committee may decide to publish other types of document:

— an ISO Publicly Available Specification (ISO/PAS) represents an agreement between technical experts in an ISO working group and is accepted for publication if it is approved by more than 50 % of the members of the parent committee casting a vote;

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An ISO/PAS or ISO/TS is reviewed after three years in order to decide whether it will be confirmed for a further three years, revised to become an International Standard, or withdrawn. If the ISO/PAS or ISO/TS is confirmed, it is reviewed again after a further three years, at which time it must either be transformed into an International Standard or be withdrawn.

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.

ISO/TS 80004-1 was prepared jointly by Technical Committee ISO/TC 229, *Nanotechnologies*, and Technical Committee IEC/TC 113, *Nanotechnology standardization for electrical and electronic products and systems*. The draft was circulated for voting to the national bodies of both ISO and IEC.

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 3: Carbon nano-objects*

The following parts are under preparation:

— *Part 2: Nano-objects — Nanoparticle, nanofibre and nanoplate* [1)]

— *Part 4: Nanostructured materials*

— *Part 5: Nano/bio interface*

— *Part 6: Nanoscale measurement and instrumentation*

— *Part 7: Diagnostics and therapeutics for healthcare*

— *Part 8: Nanomanufacturing processes*

1) ISO/TS 27687:2008 will be revised as ISO/TS 80004-2.

Introduction

Many predict that applications of nanotechnologies will ultimately pervade 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.

An essential tool is the harmonization of terminology and definitions, in order to promote common understanding and consistent usage across the industrial sectors 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, and

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.

Nano-object (2.5) and **nanoscale** (2.1) are examples of core terms in nanotechnologies. These respective definitions 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 actual size range of nano-objects may fall outside the precise boundaries normally associated with the concept of scale, by indicating that the upper and lower boundaries are approximate.

As commercial applications continue to emerge, certainty will be tempered by current scientific understanding. There remains debate concerning whether to acknowledge that fullerenes are molecular rather than nanoscale in nature. It is also acknowledged that health and safety considerations associated with intentionally produced and incidental nano-objects do not abruptly end at dimensions of 100 nm. As knowledge expands, it is abundantly clear that a robust terminology will need to capture and convey effectively the performance aspects of intentionally produced nano-objects and nanostructured materials in their definitions, apart from their fundamental size and shape.

Terminology development is proceeding at an intensive pace and needs to be responsive to the needs of the community. There are a number of associated challenges. Care needs to be taken to ensure that the terminology system as a communication tool is not too rigid, too flexible or too general. A definition that is too rigid might overemphasize an aspect that might not be pivotal in every case, or it might not be flexible enough to describe new and related discoveries, whereas a system that is too general might assign meaning to an unanticipated usage that is in fact very different.

It needs to be recognized that nanomaterials, which have dimensions or contain structural regions in the nanoscale, might have intrinsic properties or functionalities that are distinct from those associated with individual atoms, molecules or bulk materials. Furthermore, it is important to recognize that articles fabricated to contain nanomaterials are not necessarily nanomaterials themselves.

It will be an ongoing challenge to communicate complex concepts in definitions in a manner that is meaningful and practical for stakeholders in research, commercial applications and government. 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 our 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, nanotechnologies have evolved and continue 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 intentionally to be in harmony with a rational framework and hierarchical system of terminology for nanotechnologies. Figure 1 provides an example, which is applicable to the definitions for **nanomaterial** (2.4), **nano-object** (2.5) and **nanostructured material** (2.7). This hierarchy is not intended to exclude the possibility for a nano-object to have internal structure or surface structure in the nanoscale.

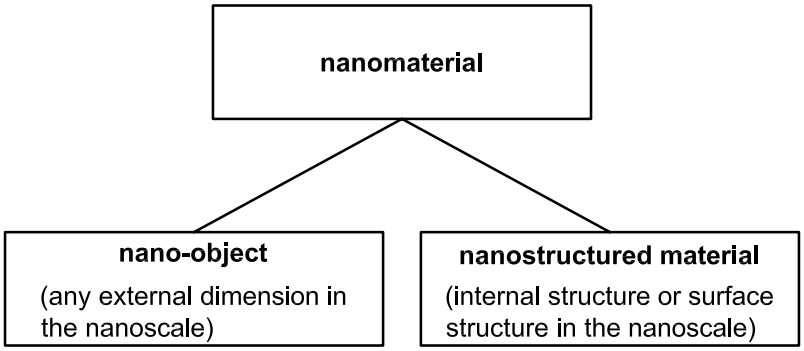

Figure 1 — Nanomaterial framework

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.

2 Terms and definitions

2.1
nanoscale
size range from approximately 1 nm to 100 nm

NOTE 1 Properties that are not extrapolations from a larger size will typically, but not exclusively, be exhibited in this size range. For such properties the size limits are considered approximate.

NOTE 2 The lower limit in this definition (approximately 1 nm) is introduced to avoid single and small groups of atoms from being designated as nano-objects or elements of nanostructures, which might be implied by the absence of a lower limit.

[ISO/TS 27687:2008, definition 2.1]

2.2
nanoscience
study, discovery and understanding of matter in the **nanoscale** (2.1), where size- and structure-dependent properties and phenomena, as distinct from those associated with individual atoms or molecules or with bulk materials, can emerge

2.3
nanotechnology
application of scientific knowledge to manipulate and control matter in the **nanoscale** (2.1) in order to make use of size- and structure-dependent properties and phenomena, as distinct from those associated with individual atoms or molecules or with bulk materials

NOTE Manipulation and control includes material synthesis.

2.4
nanomaterial
material with any external dimension in the **nanoscale** (2.1) or having internal structure or surface structure in the nanoscale

NOTE 1 This generic term is inclusive of **nano-object** (2.5) and **nanostructured material** (2.7).

NOTE 2 See also **engineered nanomaterial** (2.8), **manufactured nanomaterial** (2.9) and **incidental nanomaterial** (2.10).

2.5
nano-object
material with one, two or three external dimensions in the **nanoscale** (2.1)

NOTE Generic term for all discrete nanoscale objects.

[ISO/TS 27687:2008, definition 2.2]

2.6
nanostructure
composition of inter-related constituent parts, in which one or more of those parts is a **nanoscale** (2.1) region

NOTE A region is defined by a boundary representing a discontinuity in properties.

2.7
nanostructured material
material having internal **nanostructure** (2.6) or surface nanostructure

NOTE This definition does not exclude the possibility for a **nano-object** (2.5) to have internal structure or surface structure. If external dimension(s) are in the nanoscale, the term nano-object is recommended.

2.8
engineered nanomaterial
nanomaterial (2.4) designed for a specific purpose or function

2.9
manufactured nanomaterial
nanomaterial (2.4) intentionally produced for commercial purposes to have specific properties or specific composition

2.10
incidental nanomaterial
nanomaterial (2.4) generated as an unintentional by-product of a process

NOTE 1 The process includes manufacturing, bio-technological or other processes.

NOTE 2 See ISO/TS 27628:2007, definition 2.21, for definition of “ultrafine particle”.

2.11
nanomanufacturing
intentional synthesis, generation or control of **nanomaterials** (2.4), or fabrication steps in the **nanoscale** (2.1), for commercial purposes

2.12
nanomanufacturing process
ensemble of activities to intentionally synthesize, generate or control **nanomaterials** (2.4), or fabrication steps in the **nanoscale** (2.1), for commercial purposes

2.13
nanoscale phenomenon
effect attributable to **nano-objects** (2.5) or **nanoscale** (2.1) regions

2.14
nanoscale property
characteristic of a **nano-object** (2.5) or **nanoscale** (2.1) region

Bibliography

[1] ISO/TS 27628:2007, *Workplace atmospheres — Ultrafine, nanoparticle and nano-structured aerosols — Inhalation exposure characterization and assessment*

[2] ISO/TS 27687:2008[2)], *Nanotechnologies — Terminology and definitions for nano-objects — Nanoparticle, nanofibre and nanoplate*

[3] ASTM E2456-06, *Standard Terminology Relating to Nanotechnology*

2) To be revised as ISO/TS 80004-2.

Alphabetical index

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SRI LANKA STANDARDS INSTITUTION

The Sri Lanka Standards Institution (SLSI) is the National Standards Organization of Sri Lanka established under the Sri Lanka Standards Institution Act No. 6 of 1984 which repealed and replaced the Bureau of Ceylon Standards Act No. 38 of 1964. The Institution functions under the Ministry of Technology & Research.

The principal objects of the Institution as set out in the Act are to prepare standards and promote their adoption, to provide facilities for examination and testing of products, to operate a Certification Marks Scheme, to certify the quality of products meant for local consumption or exports and to promote standardization and quality control by educational, consultancy and research activity.

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