ICS 13.040.30 SLOVENSKÁ TECHNICKÁ NORMA Apríl 2019

STN	**Pracovná expozícia Meranie inhalačnej expozície nanočasticiam a ich agregátom a aglomerátom Metriky (indikátory), ktoré sa majú použiť, ako je koncentrácia častíc, povrchová koncentrácia a hmotnostná koncentrácia**	**STN EN 16966** 83 3613

Workplace exposure - Measurement of exposure by inhalation of nano-objects and their aggregates and agglomerates - Metrics to be used such as number concentration, surface area concentration and mass concentration

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

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English Version

Workplace exposure - Measurement of exposure by inhalation of nano-objects and their aggregates and agglomerates - Metrics to be used such as number concentration, surface area concentration and mass concentration

Exposition sur les lieux de travail - Mesurage de l'exposition par inhalation de nano-objets et de leurs agrégats et agglomérats - Métriques à utiliser telles que concentration en nombre, concentration en surface et concentration en masse

Exposition am Arbeitsplatz - Messung der inhalativen Exposition gegenüber Nanoobjekten und deren Aggregaten und Agglomeraten - Zu verwendende Metriken wie Anzahlkonzentration, Oberflächenkonzentration und Massenkonzentration

This European Standard was approved by CEN on 27 August 2018.

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

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European foreword

This document (EN 16966:2018) 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of an identical text or by endorsement, at the latest by May 2019, and conflicting national standards shall be withdrawn at the latest by May 2019.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.

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Introduction

Historically, workers' occupational exposure to airborne non-radioactive particles has been expressed as mass concentrations. The main exception has been fibres of various compositions that have been given as a number concentration for fibres within specified diameter and length limits. Other exceptions are units of glycine per cubic metre for enzymes and number of colony-forming units for airborne microbiological organisms.

Engineered/manufactured nanomaterials are now being used on a wide scale. Only for a few nanomaterials is there currently large enough knowledge of which parameters of the exposure are critical for specific health end-points. Scientific documents for the elaboration of OELs for airborne nano-objects and their aggregates and agglomerates (NOAA) greater than 100 nm are limited, and nano-object specific legally binding Occupational Exposure Limits (OELs) have not been established. However, for some NOAA recommended OELs have been published. Currently, there is no overall agreement on the metric of occupational exposure to airborne NOAA. Nevertheless, all existing legally binding OELs are respected, as substances in their non-nanoscale or microscale form may have recognised OELs. Concentrations of airborne particles can be expressed as a number, surface area or mass concentrations. For spherical particles these are mathematically related to the integral over all particle sizes of the number of particles (per size) times the corresponding particle size raised to zero, two and three, respectively. The different expressions of particle concentrations are generally referred to as different metrics.

Instruments used for the determination of concentrations of airborne particles are generally based on a specific measurement principle that measures the particles in only one of the metrics. Particle concentrations given by these metrics are related to each other via the particle size distribution. In general it is difficult, not to say impossible, to recalculate a concentration given in one metric into another if the complete size distribution is not known and the particles are not spherical or of varying/unknown effective density. It is therefore important that the user of measurement data on occupational exposure to NOAA understands the concepts of particle metrics.

For comprehensive exposure assessments of NOAA, it is recommended that the occupational exposure is determined in parallel for more than one metric, as it is presently unknown which metric later will be considered as most relevant for the critical health effect.

1 Scope

This European Standard specifies the use of different metrics for the measurement of exposure by inhalation of NOAA during a basic assessment and a comprehensive assessment, respectively, as described in EN 17058 [1].

This document demonstrates the implications of choice of particle metric to express the exposure by inhalation to airborne NOAA, e.g. released from nanomaterials[1] and present the principles of operation, advantages and disadvantages of various techniques that measure the different aerosol metrics.

Potential problems and limitations are described and need to be addressed when occupational exposure limit values might be adopted in the future and compliance measurements will be carried out.

Specific information is mainly given for the following metrics/measurement techniques:

— Number/Condensation Particle Counters by optical detection;

— Number size distribution/differential mobility analysing systems by electrical mobility;

— Surface area/electrical charge on available particle surface;

— Mass/chemical analyses (e.g. Inductively Coupled Plasma atomic Mass Spectrometry (ICP-MS), X-Ray Fluorescence (XRF)) on size-selective samples (e.g. by impaction or diffusion).

This document is intended for those responsible for selecting measurement methods for occupational exposure to airborne NOAA.

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.

EN 1540, *Workplace exposure — Terminology*

[1] Currently, the EU has a recommendation for a definition of nanomaterial [SOURCE: *Official Journal of the European Union* L275/38, 20 October 2011]. In this document the ISO definition on nanomaterial is used.