



RESPONSE FORM for 2018

Standardization needs and suggestions to EURAMET for consideration in their upcoming EMPIR calls

In the frame of the between CEN, CENELEC and EURAMET, CEN and CENELEC have been invited by the EURAMET Management to put forward their **testing and measurement needs in research** for consideration by metrology institutes for future calls under EMPIR*.

Relevant technical groups (sector fora, advisory boards, coordination groups, TCs, WGs...) are invited to contribute with

- a short introduction or an overview paper of their unaddressed standardization needs for testing and measurement, and
- a contact person (secretary, chair, convenor, liaison officer, etc.) whom proposers for the Potential Research Topics can contact,

by using this Response Form and send it at any time during the year to:

STAIR EMPIR WG, Mr Ortwin Costenoble: empir@nen.nl

Deadline for the consultation: **19 December 2017**. All late submissions will be submitted to EURAMET but cannot be guaranteed inclusion at the opening of STAGE 1.

Only identified needs with a proof by the standardization experts will be considered in time. Proof of need by the TC/SC is highly recommended for a successful submission.

Source of the identified need (identification of TC, WG, etc, incl. title)	<input checked="" type="checkbox"/> CEN/TC 137/WG 3 <input type="checkbox"/> CLC/TC 0/WG 0 <input type="checkbox"/> ISO/TC 0/SC 0 / WG 0 <input type="checkbox"/> IEC/TC 0/SC 0 / WG 0 <input type="checkbox"/> Other, namely <i>Identification, Title</i>
European entity responsible for submission of the need	<i>CEN/TC 137 Assessment of workplace exposure to chemical and biological agents</i>
Person that can be contacted for more detail (name, e-mail and telephone number)	<i>Carsten Möhlmann carsten.moehlmann@dguv.de +4922412312673 Germany</i>
Unaddressed need (short description)	<i>Workplace exposure determination for nano-objects includes the need for determination of particle dimensions and properties using microscopy techniques (like SEM, TEM AFM etc.).</i>
Further explanation of need (TC business plan, road map, formal decision, work item, etc.)	<i>The determination and assessment of nano-objects like nanofibres, nanoplatelets and nanoparticles is currently not sufficiently described by standards. The analysis methods need to be linked to metrology in order to relate the dimensions of nano-objects to standards. Besides primary nano-objects, also their aggregates and agglomerates (NOAA) are of interest. Dimensions</i>

	<p><i>include: length, thickness, aspect ratio and elongation. Properties include rigidity. Nano-objects need to be sampled from an airborne state and will subsequently be analysed and counted in most cases in an electron microscope. Counting rules/criteria for the determination of the concentration and characterisation (e.g. classification of structures and morphology) of airborne NOAA using electron microscopic methods (SEM and TEM) need to be developed especially for nanofibers and platelets (e.g. carbon nanotubes and graphene nanoplatelets). A link to existing dimension standards in metrology is crucial and shall be applied in the chain for determining particle concentrations in workplace air.</i></p> <p><i>CEN/TC137/WG3 intends to develop guidelines for sampling and characterising NOAA, e.g. counting rules for nanofibres, in the coming next six years. Its business plan states as one priority the guidance for the assessment of exposure by inhalation to chemical agents for comparison with limit values and measuring strategy.</i></p>
Enclosures	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

*For more information, please consult:

[EMPIR website](#)

[CEN/CENELEC website "Standards and metrology"](#)

CEN/TC 137: Standardization needs on Metrology for consideration in 2018 EMPIR calls

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CEN/TC 137 WG 3

- ▶ **CEN/TC 137** “Assessment of workplace exposure to chemical and biological agents”
- ▶ includes methodologies for exposure measurements and analysis of hazardous substances, but not establishing limit values

- ▶ **CEN TC 137 Working Group 3:** Particulate Matter (convenor: Dr. Göran Lidén, secr. Caroline van Hoek, NEN)
- ▶ members: HSL, IFA, IGF, IUTA, University Stockholm, TNO, INAIL, INRS, IMA, Nanoinspect, NRCWE, FIOH, INSHT

- ▶ **CEN TC 137 Working Group 3** scope: The purpose of working group is to prepare standards for the monitoring of airborne particles in the workplace, including the performance of sampling instruments and other test methods.

- ▶ Over the last few years, number of standards related to nanoaerosols and addressing safe work with nanomaterials have been drafted under the framework of the EC Mandate M/461.

Pre-normative research CEN TC 137 WG3 and development of standards (2013-2018)

▶ **Inter-laboratory comparisons of real-time instruments:**

- Inter-comparison of personal monitors for nanoparticles exposure at work places and in the environment. A M Todea et al. Science of The Total Environment, 2017, 605–606. (IGF test chamber)
- The comparability of the counting efficiency of condensation particle counters (CPC). V Neumann et al. In preparation. (IGF test chamber)
- Inter-comparison of ELPI (HSL, INRS) in calm air chamber (HSL, Buxton). Data in analysis.

▶ **Standards:**

- EN 16897:2017 - Workplace exposure - Characterization of ultrafine aerosols/nanoaerosols - Determination of number concentration using condensation particle counters.

Pre-normative research CEN TC 137 WG3 and development of standards (2013-2018)

▶ Inhalation exposure pre-normative research:

- Evaluation of Decision Rules in a Tiered Assessment of Inhalation Exposure to Nanomaterials. D Brouwer et al. Ann. Occup. Hyg., 2016, 1–11.

▶ Standards:

- prEN 17058 Workplace exposure - Assessment of inhalation exposure to nano-objects and their agglomerates and aggregates
- prEN 16966 Workplace exposure - Metrics to be used for the measurement of inhalation exposure to nano-objects and their agglomerates and aggregates such as number concentration, surface area concentration and mass concentration

Pre-normative research CEN TC 137 WG3 and development of standards (2013-2018)

▶ **Dustiness pre-normative research:**

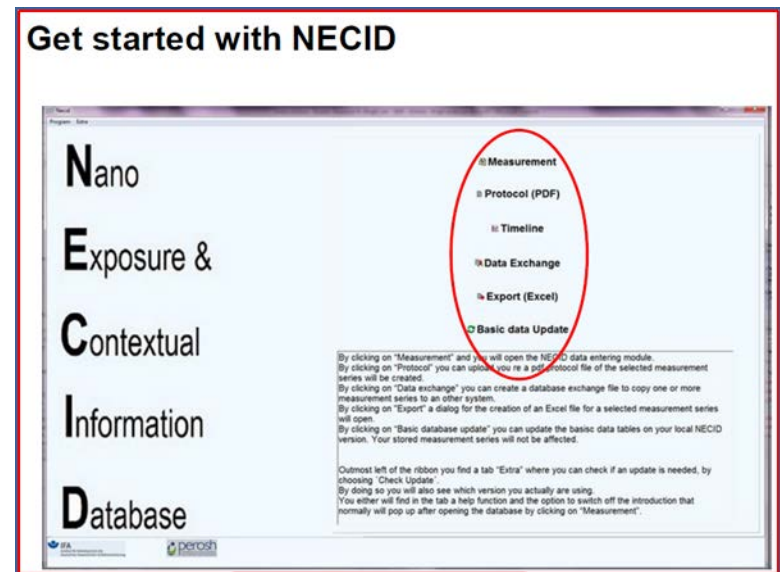
- Inter-comparison of dustiness of dustiness methods
- Dustiness of nanomaterial in powder form: proposal of a new surface-based dustiness index. C. Dazon, O.Witschger and al. Congrès CFA 2018
- Dustiness of nanomaterial in powder form: intercomparison of four methods. C. Dazon, O.Witschger and al. Congrès CFA 2018

▶ **Standards:**


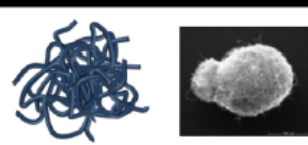
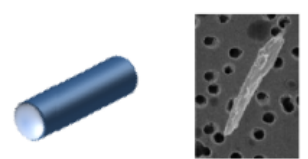
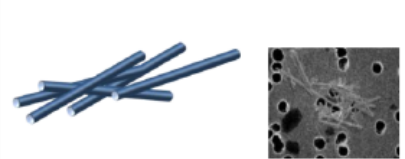
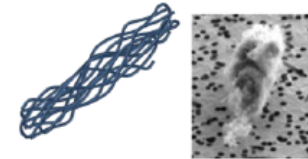
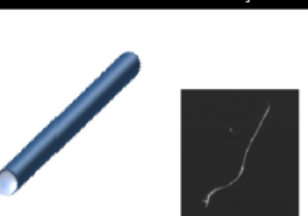

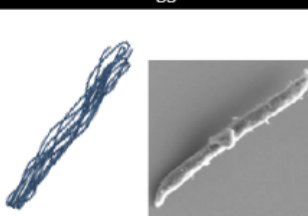
- prEN 17199 Workplace exposure - Measurement of dustiness of bulk nanomaterials that contain or release nano-objects or submicrometer particles - Part 1: General requirements; Part 2: Rotating drum method; Part 3: Continuous drop test; Part 4: Small rotating drum; Part 5: Vortex shaker

Nano Exposure and Contextual Information Database (NECID)

- ▶ Initiative under the umbrella of PEROSH (Partnership for European Research in Occupational Safety and Health) lead by IFA/TNO
- ▶ Institutes involved: IFA, TNO, HSL, INRS, CIOP, NRCWE, FIOH, INSHT
- ▶ **Objectives:**
- ▶ Systematic and uniform documentation of workplace exposure and contextual data
- ▶ Harmonisation of measurement and assessment of exposure to nanomaterials
- ▶ Possibility to load and exchange data to a central server
- ▶ Option for free access to the database



BAuA research on fibres

	Individual Object	Cluster	Agglomerate	
Low-Aspect Ratio		LARFC (GBS-Cluster) Agglomerated and Countable 	LARFA (GBS-Agglomerate) Agglomerated and Un-countable 	Low-Aspect Ratio
High-Aspect Ratio	HARFO Individual Fibre Object 	HARFC HAR-Cluster 	HARFA HAR-Agglomerate 	High-Aspect Ratio
Satisfies WHO-Definition	WHOFO Individual WHO-Fibre Object 	WHOFC WHO-Cluster 	WHOFA WHO-Agglomerate 	Satisfies WHO-Definition

LAR = low aspect ratio < 3
 HAR = high aspect ratio > 3
 WHO = HAR, L > 5 µm, W < 3 µm

O = object
 C = cluster (low number of objects distinguishable individually)
 A = agglomerate (objects in higher concentration with overlap and predominantly not distinguishable individually)

[BAuA]

Future metrology needs

- ▶ CEN TC 137 WG3 thinking to carry out additional pre-normative research and developing standards for the following topics
 - Measurement methods to assess and characterise aerosols
 - Methods to characterise sampled aerosols on filters (including nanoaerosols)
 - Dustiness / aerosolisation methods for nanofibres

- ▶ WG3 will need
 - Metrology support for the determination of particle dimensions and properties using microscopy techniques (e.g. SEM, TEM, AFM, ...)
 - Particles are nanoplatelets and nanofibres. Dimensions include: length, thickness, aspect ratio and elongation. Properties include rigidity.
 - Reference materials for
 - generation of nanoaerosols
 - comparison in analysis

Conclusion

- ▶ List of interested organisations to collaborate with NMIs: HSL, IFA, University Stockholm, TNO, INRS, Nanoinspect, BAuA
 - ▶ WG3 is interested in NMIs expertise on metrology including those for measurement of nanoparticles and nanofibres.
 - ▶ WG3 would like to discuss with NMIs how we could potentially establish a partnership to work together.
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