

# RESPONSEFORM

## Standardization needs and suggestions to EURAMET for consideration in their 2017 EMPIR call

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 **Industry**, in **Fundamental** and in **Pre- and co-normative research**.

Relevant technical groups (sector fora, advisory boards, coordination groups, TCs...)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, using the table below.

<p><b>Source of the identified need</b> (identification of TC, WG, etc, incl. title)</p>	<p><input checked="" type="checkbox"/> CEN/TC88/WG11 “Vacuum Insulation Products (VIP)”  <input type="checkbox"/> CLC/TC0/WG0  <input type="checkbox"/> ISO/TC12/Quantities and units  <input type="checkbox"/> IEC/TC0/SC0/WG  <input checked="" type="checkbox"/> and others:          INRiM (Italy);          Politecnico di Torino(Italy);          FIW (Germany)          LNE (France)          NPL (United Kingdom)</p>
<p><b>European entity</b> responsible For submission of the need</p>	<p><i>CENTC88 Thermal insulating materials and products</i></p>
<p><b>Person that can be contacted for more detail</b> (name, e-mail and telephone number)</p>	<p><u>For CEN TC 88 WG11:</u>  <i>Dr. Ulrich Passon          ulrich.passon@saint-gobain.com          +49 621 4701577          Germany</i></p> <p><u>For Research Consortium:</u>  <i>Ing. Alice Lorenzati          iNRiM - Istituto Nazionale di Ricerca Metrologica          alice.lorenzati@polito.it          +39 011 0904550          Italy</i></p>
<p><b>Unaddressed need</b> (short description)</p>	<p><i>Thermal conductivity measurement of Superinsulating Materials (Vacuum Insulation Panels -VIPs and Advanced Porous Materials - APMs) and reduction of the measurement uncertainty</i></p> <p><i>Development and assessment of measurement procedures and boundary conditions for the thermal</i></p>

	<i>characterization of Super Insulating Materials (SIMs) by means of standardized Test Procedures (Guarded Heat-Flux Meter (HFM) and Guarded Hot Plate (GHP) methods).</i>
<b>Type of work</b> (more answers possible)	<input checked="" type="checkbox"/> pre-normative <input type="checkbox"/> SI-units <input checked="" type="checkbox"/> co-normative <input checked="" type="checkbox"/> interlaboratory study <input checked="" type="checkbox"/> testing <input type="checkbox"/> fundamental research <input checked="" type="checkbox"/> measurement <input checked="" type="checkbox"/> market support <input type="checkbox"/> energy <input type="checkbox"/> environment
<b>Estimated effort</b> (if known)	Person months: unknown
<b>Further explanation of need</b> (TC business plan, road map, formal decision, work item, etc.)	<p><i>All measurements are subject to uncertainty, to an indeterminacy degree. In fact the word uncertainty means doubt, thus it expresses a lack of exact information about the measurement that was carried out. For this reason every result should be expressed with a quantitative indication of its reliability and quality. The uncertainty depends on several factors like the type of specimen used, the resolution of the instrumentation, the skill of the operator, the effects of environmental conditions, the simplified assumptions of the method and procedure and other effects. Because of this, the measured value is always an estimate of the measurand, as described in the standard, GUM "Evaluation of measurement data – Guide to the expression of uncertainty in measurement".</i></p> <p><i>The measurement methods GHP and HFM together with the standardized procedures and boundary conditions for the measurement of thermal properties of insulating materials were originally developed for conventional insulation products, such as e.g. polystyrene boards and mineral wool boards. The thermal conductivity for these products ranges from 0.020 W/(m*K) for freshly produced PU foam to 0.070 W/(m*K) for wood wool boards or Calcium silicate boards. CEN standards EN 12667, EN 12664, EN 12939, EN 1946-2 and EN 1946-3 describe apparatuses and procedures leading to a measurement uncertainty of less than 2 % for these materials.</i></p> <p><i>SIMs however are up to a magnitude below that in their thermal conductivity, showing 0.002 W/(m*K) or even less for freshly evacuated VIPs with fiber glass cores. In this context the accurate measurement of heat-flux, temperatures, electrical power and thickness of the specimens is crucial for reducing measurement uncertainty for SIMs.</i></p> <p><i>For the determination of thermal performance of these materials it is strongly recommended to re-define the boundary conditions and measurement procedures in order to reduce the measurement uncertainty and bring it to values close to the ones that the insulating material manufacturers and their customers are used to when testing conventional materials.</i></p> <p><i>The necessary work should be carried out as soon as possible, in order to be able to implement the results in the first revision of the product standard for VIPs that is expected to be ready in the year 2020 (3 years after first issue of standard in 2017).</i></p>

**Enclosures** Yes: short list of relevant scientific articles: No

- Fantucci S. et. al.: "VIPs thermal performance in buildings: research experience and roadmap" in: Proceedings of the 12<sup>th</sup> International Vacuum Insulation Symposium – IVIS 2015, Nanjing, 2015
- Lorenzati, A. et. al.: "VIPs thermal conductivity measurement: test methods, limits and uncertainty" in: Proceedings of the 6<sup>th</sup> International Building Physics Conference IBPC 2015,
- Lorenzati, A. et. al.: "The effect of temperature on thermal performance of fumed silica based Vacuum Insulation Panels for buildings" in: Proceedings of the 8<sup>th</sup> International Conference on Sustainability in Energy and Buildings, SEB-16, Turin, 2016