RESPONSE FORM

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, **before 12 December 2016**

Source of the identified need (identification of TC, WG, etc, incl. title)	☒ CEN/TC 138/WG 11 ☐ CLC/TC 0/WG 0 ☐ ISO/TC 0/SC 0 / WG 0 ☐ IEC/TC 0/SC 0 / WG 0 ☐ Other, namely *Identification, Title*
European entity responsible for submission of the need	*CEN/TC 138* ***Validation of numerical models based on FEM and FDM applied to data of passive and active thermography***
Person that can be contacted for more detail (name, e-mail and telephone number)	*Dr. Christiane Maierhofer* *Christiane.maierhofer@bam.de* *+49 30 8104 1441* *Germany*
Unaddressed need (short description)	***Validation of numerical models based on FEM and FDM applied to data of passive and active thermography*** *Scope:* Computer simulations of the heat transfer are important for the development of testing procedures, for data reconstruction as well as for the prediction and validation of testing results obtained by passive and active thermography. Usually, models are developed based on commercial or self-developed FE (finite element) or FD (finite difference) solvers. Up to now, very often large discrepancies can be observed between numerical simulation and experimental data. This might be explained by badly selected boundary and initial conditions, by an unsuited mesh or mesh size distribution, by unsuited time steps or by inadequate knowledge of thermal material parameters and its dependence on temperature and space. Therefore, for different simplified testing problems using reference test

	specimens with well-known geometries of defects and material parameters FE and FD models need to be developed and to be validated with experimental investigations. Standards need to be developed for the selection of optimum FE and FD modelling parameters. These standards should contain validated test sceneries for quality assurance of numerical models
Type of work (more answers possible)	☒ pre-normative ☐ SI-units ☐ co-normative ☒ interlaboratory study ☒ testing ☐ fundamental research ☐ measurement ☒ market support ☐ energy ☐ environment
Estimated effort (if known)	Person months:
Further explanation of need (TC business plan, road map, formal decision, work item, etc.)	FE- and FD-models will be adapted to different simplified and well defined testing problems (varying material thicknesses, flat bottom holes, delaminations, cracks), different materials (metals with low and high thermal diffusivity, high and low emissivity), partially translucent materials (polymers, ceramics), materials with anisotropic properties (fiber reinforced polymers) and to different optical excitation methods (flash, halogen lamps, infrared radiators, laser). Different commercial FE and FD solvers will be applied as well as commercially available thermal simulation software. Reference test specimens will be developed and the results of the numerical simulations will be compared to experimental data. For the analysis of the uncertainty of measurements, the experimental data will be obtained using calibrated and retraceable equipment. For extreme conditions, the results will also be evaluated by analytical solutions. The standards will contain a distinct description of testing procedures and expected results including measurement uncertainties. Numerical simulations as well as experimental measurements will be performed in close co-operation of research institutes, SMEs and industrial companies. Such investigations and the development of draft standards will need up to three years.
Enclosures	☐ Yes ☒ No

Email address for sending the Response Form:

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