

Title: Sound insulation of façades – new standardised measurement procedure for low frequencies

Abstract

Sound insulation of façades is key for the protection of people inside buildings from environmental noise. Europe currently undergoes an energy transition from fossil fuel to alternative sources such as wind turbines and heat pumps. These sources emit low-frequencies, which are not covered by any procedures when measuring the performance of façades. It is therefore necessary to develop a new CEN or ISO standard for the measurement of airborne sound insulation of façades between 10 Hz and 100 Hz.

Keywords

Sound insulation, façade, low-frequency sound, sound pollution, measurement standard, measurand definition

Background to the Metrological Challenges

Environmental noise is described by specific indicators which are sound pressure levels in front of a façade determined for a reference time interval. Centralised large fossil fuel power stations will be replaced by a system of decentralised technical devices for energy conversion such as wind turbines, heat pumps, or combined heat and power plants. These devices emit a large amount of sound below frequencies of 100 Hz and, lately, are placed closer to living areas. This makes sound transmission from the outside into buildings a major issue. This is well understood, measurable and predictable with a sufficiently small uncertainty for one-third octave mid-band frequencies starting from 100 Hz. However, for one-third octave bands between 50 Hz and 80 Hz, the current procedures are not satisfactory with uncertainties reaching values of 6.8 dB at 50 Hz according to ISO 12999-1. In addition, frequencies below 50 Hz are currently not taken into consideration at all.

Objectives

Proposers should address the objectives stated below, which are based on the PRT submissions. Proposers may identify amendments to the objectives or choose to address a subset of them in order to maximise the overall impact, or address budgetary or scientific / technical constraints, but the reasons for this should be clearly stated in the protocol.

The JRP shall focus on metrology research necessary to support standardisation in sound insulation of façades at frequencies between 10 Hz and 100 Hz.

The specific objectives are

1. To theoretically investigate idealised cases of possible measurements of façade sound insulation at frequencies between 10 Hz and 100 Hz, focusing on measurand definition, traceability and uncertainty budgets.
2. To investigate experimentally the above idealised cases and compare the outcome with the theoretical results of objective 1.
3. To develop a measurement method, based on the results of objectives 1 and 2 and then perform test measurements on a range of realistic geometries and representative European buildings.
4. To compare the results of the newly developed measurement method with the results obtained by ISO 16283-3 in the frequency range between 50 Hz and 100 Hz.

5. To draft a CEN or ISO standard based on the results and to initiate the standardisation process via the national member bodies of the relevant technical committees of CEN/TC 126 and/or ISO/TC 43/SC. In addition, to promote the take up of the results by end users such as the building industry and instrument manufacturers.

The proposed research shall be justified by clear reference to the measurement needs within strategic documents published by the relevant Regulatory body or Standards Developing Organisation or by a letter signed by the convenor of the respective TC/WG. EURAMET encourages proposals that include representatives from industry, regulators and standardisation bodies actively participating in the projects. The proposal must name a “Chief Stakeholder”, not a member of the consortium, but a representative of the user community that will benefit from the proposed work. The “Chief Stakeholder” should write a letter of support explaining how their organisation will make use of the outcomes from the research, be consulted regularly by the consortium during the project to ensure that the planned outcomes are still relevant, and be prepared to report to EURAMET on the benefits they have gained from the project.

Proposers should establish the current state of the art, and explain how their proposed research goes beyond this.

EURAMET expects the average EU Contribution for the selected JRPs in this TP to be 0.8 M€, and has defined an upper limit of 1.0 M€ for this project.

EURAMET also expects the EU Contribution to the external funded partners to not exceed 30 % of the total EU Contribution across all selected projects in this TP.

Any industrial partners that will receive significant benefit from the results of the proposed project are expected to be unfunded partners.

Potential Impact

Proposals must demonstrate adequate and appropriate participation/links to the “end user” community, describing how the project partners will engage with relevant communities during the project to facilitate knowledge transfer and accelerate the uptake of project outputs. Evidence of support from the “end user” community (e.g. letters of support) is also encouraged.

You should detail how your JRP results are going to:

- Address the SRT objectives and deliver solutions to the documented needs,
- Feed into the development of urgent documentary standards through appropriate standards bodies,
- Transfer knowledge to the construction sector.

You should detail other impacts of your proposed JRP as specified in the document “Guide 4: Writing Joint Research Projects (JRPs)”

You should also detail how your approach to realising the objectives will further the aim of EMPIR to develop a coherent approach at the European level in the field of metrology and include the best available contributions from across the metrology community. Specifically, the opportunities for:

- improvement of the efficiency of use of available resources to better meet metrological needs and to assure the traceability of national standards
- the metrology capacity of EURAMET Member States whose metrology programmes are at an early stage of development to be increased
- organisations other than NMIs and DIs to be involved in the work.

Time-scale

The project should be of up to 3 years duration.

Additional information

CEN/CENELEC identified this topic as one of their priorities. Details are available at:

http://ec.europa.eu/growth/tools-databases/mandates/index.cfm?fuseaction=select_attachments.download&doc_id=1671