

Simulation Absorption Curve on Acoustics Panels with Front Textiles ISO-354

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Abstract

KVADRAT SOFTCELLS A/S, COMSOL A/S AND RESOLVENT P/S

APPLICATION CREATED BY RESOLVENT FOR SIMULATING ABSORPTION CURVES ON ACOUSTIC PANELS WITH FRONT TEXTILES AND ACOUSTIC INSULATION FOLLOWING THE INTERNATIONAL STANDARD ISO 354 FOR MEASURING SOUND ABSORPTION.

In Kvadrat Soft Cells we have our own reverberation room lab in our production facility in Poland where we empirically can test the acoustic behavior of our Soft Cells panels. For every product configuration to be tested we need to upholster a panel surface of 3900X2800 mm and test it in the reverberation room using a lot of time, resources and materials. As the product configuration and thus acoustics changes with different front textiles and acoustic backings we have 1000+ variations and constant change.

The goal was to predict the panel behavior before building it and determine the band average and frequency dependent values of the Soft Cells panels with insulation and front textiles (depending on different models) following the standard ISO 354 ACOUSTICS - MEASUREMENT OF SOUND ABSORPTION IN A REVERBERATION ROOM.

ERAGE AND FREQUENCY DEPENDENT VALUES.

Ideally simulations would be based on standard textile data for the specific designs

- Yarn properties
- Textile construction
- Poro-Acoustic parameters (5-parameter equivalent to fluid model)

Often the poro-acoustic parameters are not readily available and specific yarn properties and textile construction data might be proprietary supplier information. Therefore, initially, the dependencies and effect of the various parameters related to the sound absorption curve were analysed. Result was that within a standard range, the airflow resistance value could be isolated as far the most determining parameter.

For the insulation material, airflow value of mineral wool would normally be available from manufacturer and is a constant value/component. For the textiles, we already had an in-house setup to measure this. We use a textile piece of 300x300 mm to get the airflow resistance value. Airflow values as well as material thicknesses are now introduced into the simulation tool..

We have thus - for most cases - replaced the physical sound absorption measurements in reverberation room by using an app modeled for the Comsol acoustic module that

simulates 'poroelastic waves with thermal and viscous losses' (Biot-Allard Model) and the Comsol server. The app is specially designed by the Comsol's certified consultants Resolvent

The designed app works as intended for the Soft Cells panels with front textiles within a certain range of (non extreme) airflow resistance values and thus covers most configurations while obtaining the needed absorption curve values on the different Soft Cells models. The app is designed as a browser based solution allowing easy access worldwide to the tool and the results, thus saving time, resources and materials.