

Turun ammattikorkeakoulu Kira Circularis -projekti

AKUSTISEN ABSORPTIOSUHTEEN MÄÄRITYS

1 TILAAJA

Turku AMK, Kira Circularis -projekti

2 TARKOITUS

Tarkoitus oli määrittää akustinen absorptiosuhde ISO 10534-2 mukaan kolmella eri materiaalipaksuudella 50, 100 ja 200 mm. Joka tuotteesta toimitettiin kaksi vesileikattua näytettä, joista raportoidaan mittausten keskiarvo. Näytteiden absorptiosuhde mitattiin taustassa kiinni (ISO 354 Type A).

3 TULOKSET

Tulokset ovat liitteessä 1. Tuotekuvaukset on liitteessä 2.

4 ALLEKIRJOITUKSET



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Tutkimusryhmän vetäjä



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Erikoistutkija

Turun ammattikorkeakoulu
Akustiikkalaboratorio

LIITTEET

1. Mittaustulokset (3 sivua)
2. Tuotekuvaukset (2 sivua)
3. Mittausmenetelmä (2 sivua)



LIITE 2 – TUOTEKUVAUKSET

Taulukko 2.1. Näytteiden mitat.

<u>Näyte</u>	<u>Massa (g)</u>	<u>Paksuus (mm)</u>	<u>Halkaisija (mm)</u>	<u>Tiheys kg/m³</u>
9_50	7,92	50	63,5	50
9_100	15,83	100	63,5	50
9_200	31,67	200	63,5	50

METHODS

The normal incidence sound absorption coefficient is determined with an impedance tube using the transfer function method according to the standard ISO 10534-2. In this method, a chirp excitation signal is played through a loudspeaker attached at one end of the tube (Fig. 1). The test specimen is attached to the other end of the tube. Sound propagates as a plane wave in the tube below a certain frequency, which depends on the diameter of the tube. The sound wave reflects from the specimen (material sample + possible air gap), and the superposition of the incoming and reflected sound waves is measured with two microphones near the test specimen. The complex acoustic transfer function between the microphones is determined, from which the normal incidence sound absorption coefficients are calculated.

The internal diameter of the impedance tube (Brüel & Kjær 4206A) was 63.5 mm, see Fig. 2. Sound pressure in the tube was measured using two pressure microphones (1/4" Brüel & Kjaer 4187 equipped with preamplifier Brüel & Kjaer 2670 and a GRAS-12AA microphone amplifier) mounted to the sidewall of the tube. Spacing of the microphones was either 31.8 mm (160–3150 Hz) or 63.5 mm (80–2440 Hz). The measurement was performed using both the microphone spacings so that the results were reported within 80–3150 Hz. Chirp excitation signal generated by the measurement computer was used as the measurement signal. The signal was amplified with a power amplifier (Brüel & Kjaer 2716C). The transfer function was calculated from the microphone signals. AD and DA conversions were made using Esi Maya USB audio interface. The calibration of the microphones and the cables was checked before the measurements with a sound level calibrator (Brüel & Kjaer 4231).

Analyses were conducted using a MATLAB code and frequency resolution 1.46 Hz. The results were averaged into one-third octave bands and octave bands.

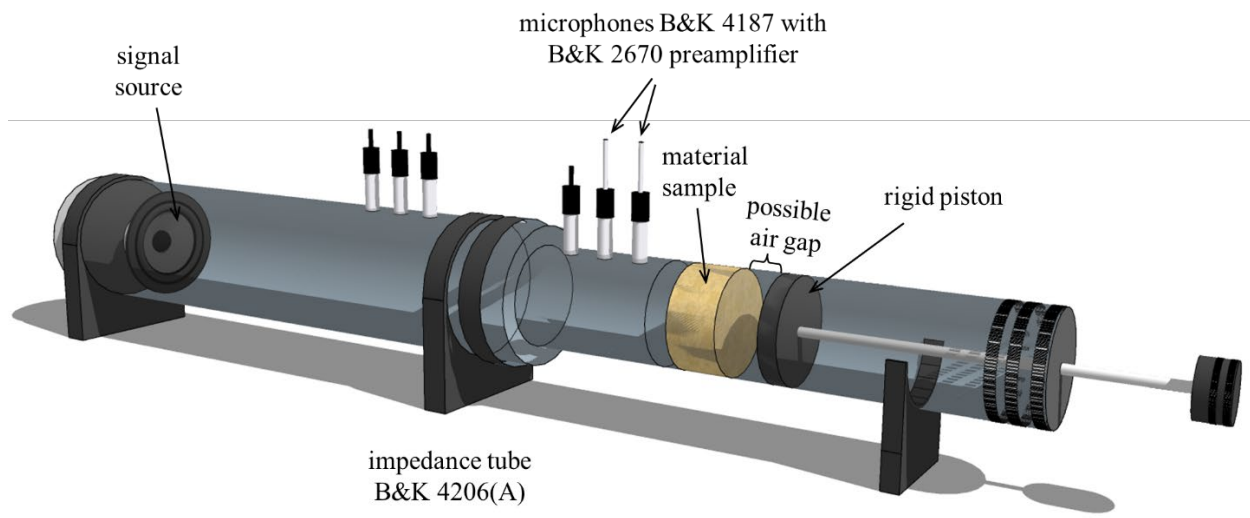


Fig. 1. The impedance tube.



Fig. 2. An example of test piece installation in the sample tube.

REFERENCES

ISO 10534-2: 1998(E) Acoustics Determination of sound absorption coefficient and impedance in impedance tubes, International Organization for Standardization, 1998, Genève, Switzerland

SFS-EN ISO 11654:1997 (E) Acoustics - Sound absorbers for use in buildings - Rating of sound absorption, International Organization for Standardization, 1997, Genève, Switzerland.