# Acoustic test report no 19012

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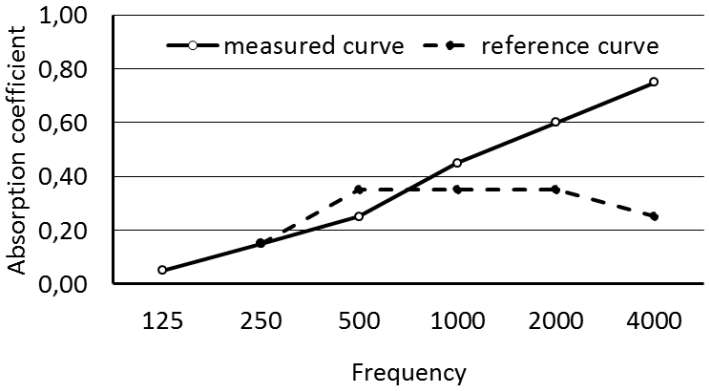
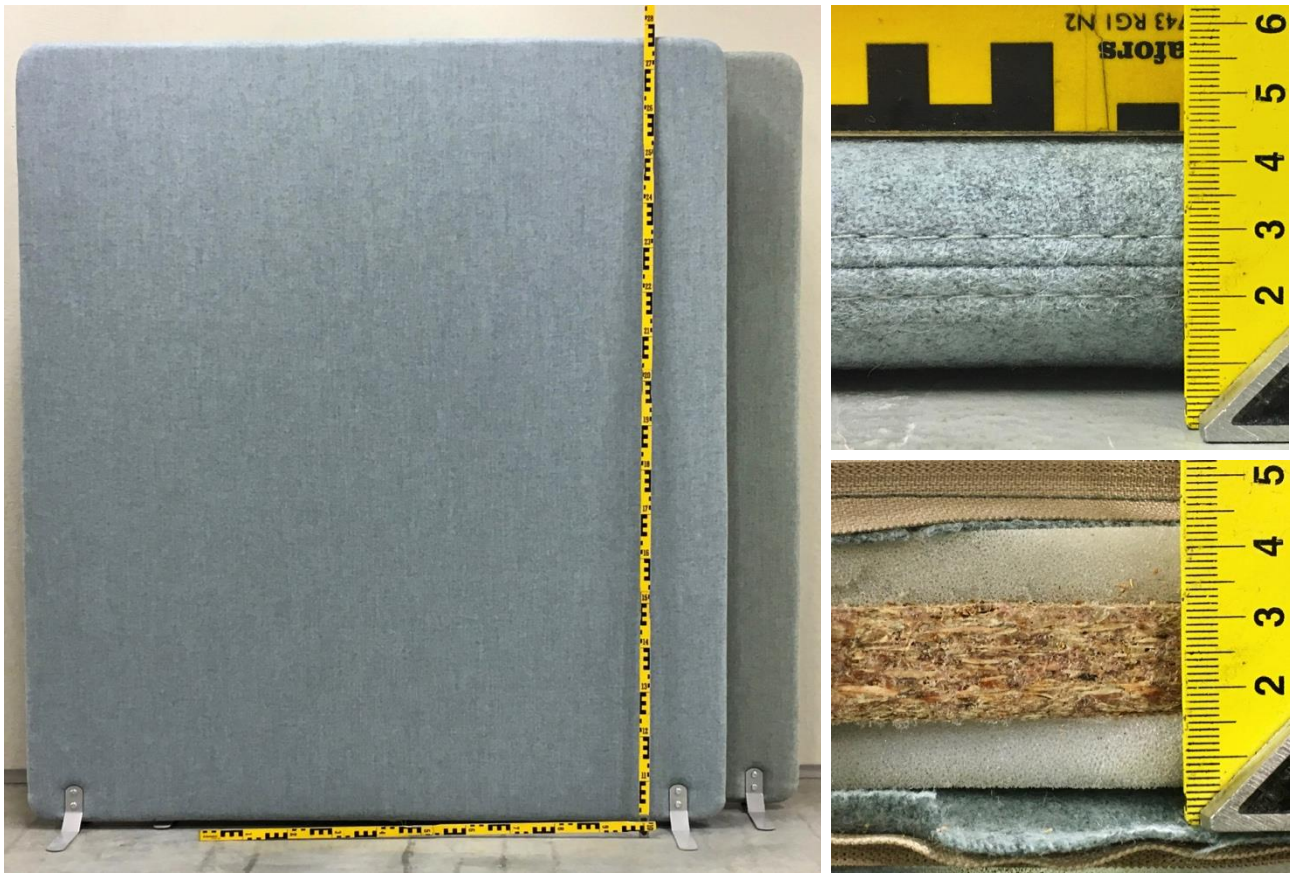
|---|---|
| **Laboratory** | Laboratory of Acoustics<br>Tallinn University of Technology, Dept. of Mechanical and Industrial Eng.<br>Ehitajate tee 5, 19086, Tallinn, Estonia |
| **Date of measurements** | 08.04.2019 |
| **Customer** | Standard AS, represented by Martin Kull (martin.kull@standard.ee) |
| **Task** | Determination of sound absorption coefficient, weighted sound absorption coefficient and noise absorption class for acoustic office panels |
| **Test object** | Acoustic office screens (see Appendix A1) |
| **Method** | Reverberation room method assuming EN ISO 354:2003 and EVS-EN ISO 11654:1999, see Appendix A2 |
| **Equipment** | • noise level meter Brüel & Kjær 2270;<br>• measurement microphones Brüel & Kjær 4189;<br>• omnidirectional loudspeaker Brüel & Kjær 4292-L;<br>• sound amplifier Brüel & Kjær 2734;<br>• acoustic calibrator Brüel & Kjær 4231;<br>• temp. and humidity metering device (Termometerfabriken Viking AB). |
| **Results** | Sound absorption coefficient of test samples provided:<br>  <br><br>The weighted sound absorption coefficient of the object is **0.35(H)**<br>The noise absorption class of the object is **class D**<br>The sound absorption curve in third-octave frequency domain is presented in Appendix A3 |
| **Test conditions** | Temperature: 20,0°C, humidity: 52%, barometric pressure: 100,5kPa [ilmateenistus.ee]. |
| **Tests performed by** | Prof. Jüri Lavrentjev (juri.lavrentjev@ttu.ee)<br>Government Certified Expert in Tech. Acoustics, PhD in Tech. Acoustics;<br><br>Dr. Hans Rämmal (hans.rammal@ttu.ee)<br>Government Certified Expert in Machinery and Transportation,<br>Cert. Mechanical Engineer (level 8), PhD in Tech. Acoustics. |

| Freq., Hz | Absorber | Ref. curve |
|---|---|---|
| 125 | 0,05 | |
| 250 | 0,15 | 0,15 |
| 500 | 0,25 | 0,35 |
| 1000 | 0,45 | 0,35 |
| 2000 | 0,60 | 0,35 |
| 4000 | 0,75 | 0,25 |

**Appendixes:**
**A1**: **OBJECTS TESTED**



Photos 1-3. The acoustic screens tested. Dimensions of the screens: 1,6 x 1,8m with the thickness of 43mm. Total absorbing surface area: 5,8 $m^2$. The screen consists of a wood-based OSB panel (thickness: 16mm), symmetrically covered by porous foam and a layer of textile (right).

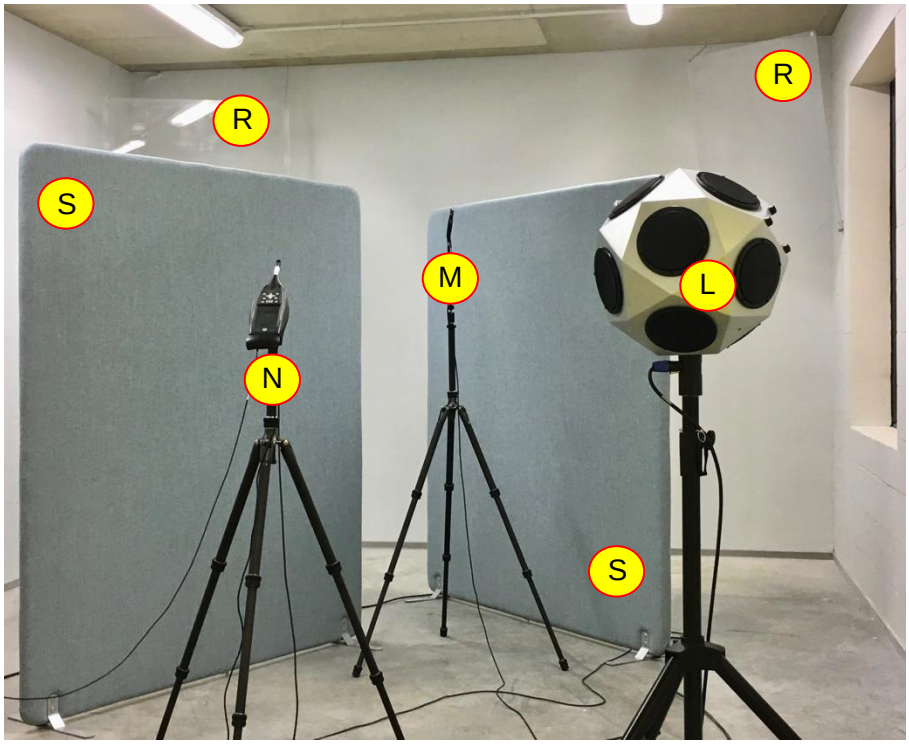



Photo 4. The acoustic screens (S) located vertically in the central area of the reverberation room during the measurements. An omnidirectional acoustic source (loudspeaker, L), tripod mounted noise level meter (N) and condenser microphone in pos. 1 (M) and diffuser screens (R) are shown hereby.

## A2. MEASUREMENTS

### Laboratory room:

Rectangular reverberation room with mansonry concrete block walls (see photos 4-6), with the wall mass greater than 400 kg/m$^2$ (class: heavy). Dimensions of the room: 2.8 x 4.0 x 5.9 m. Total area of the walls: 55.4 m$^2$, the floor area: 23.6 m$^2$ and the cealing area: 23.6 m$^2$.

### Equipment:

- noise level meter Brüel & Kjær 2270
- measurement microphones Brüel & Kjær 4189
- omnidirectional loudspeaker Brüel & Kjær 4292-L
- sound amplifier Brüel & Kjær 2734
- acoustic calibrator Brüel & Kjær 4231.

All equipment follows class 1 rating and is calibrated.

### Method:

The measurements were carried out assuming the standard EN ISO 354:2003. The reverberation time was measured with and then without the tested object. The interrupted noise method was applied. The frequency range was set to 100 – 5000 Hz. For both measurement cases 2 different loudspeaker positions and 6 microphone positions were used. For each measurement case the average value of 3 reverberation times was calculated. The weighted absorption coefficient and the absorption class were determined according to standard EVS-EN ISO 11654:1999. Respectively the standard curve shifting method was used.

## A3. RESULTS:

The measured reverberation times are presented in Table 1. The calculated absorption coefficients in third-octave scale are presented in Figure 2.

Table 1. Measured reverberation times T1 and T2 according to third-octave freqencies.

| Freq, Hz | 100 | 125 | 160 | 200 | 250 | 315 | 400 | 500 | 630 | 800 | 1 k | 1.25k | 1.6 k | 2 k | 2.5 k | 3.15 k | 4 k | 5 k |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T2, s | 2,36 | 2,52 | 2,63 | 2,26 | 2,11 | 1,73 | 1,91 | 1,81 | 1,52 | 1,34 | 1,18 | 1,10 | 1,08 | 0,99 | 0,95 | 0,87 | 0,76 | 0,69 |
| T1, s | 2,90 | 2,79 | 3,30 | 3,03 | 2,97 | 2,58 | 3,35 | 3,31 | 2,89 | 2,86 | 2,76 | 2,76 | 2,82 | 2,74 | 2,71 | 2,47 | 2,06 | 1,69 |

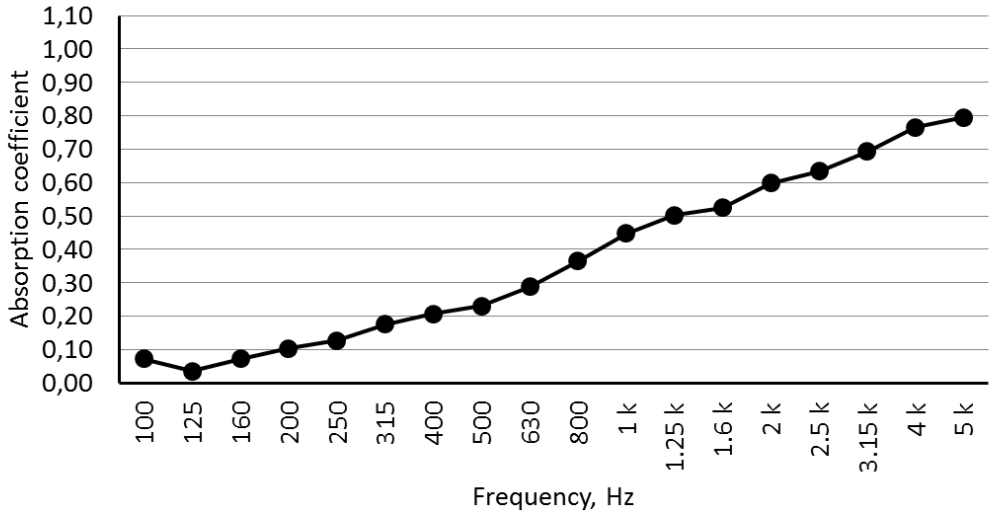



Figure 2. Calculated absorption coefficient in third-octave frequencies.