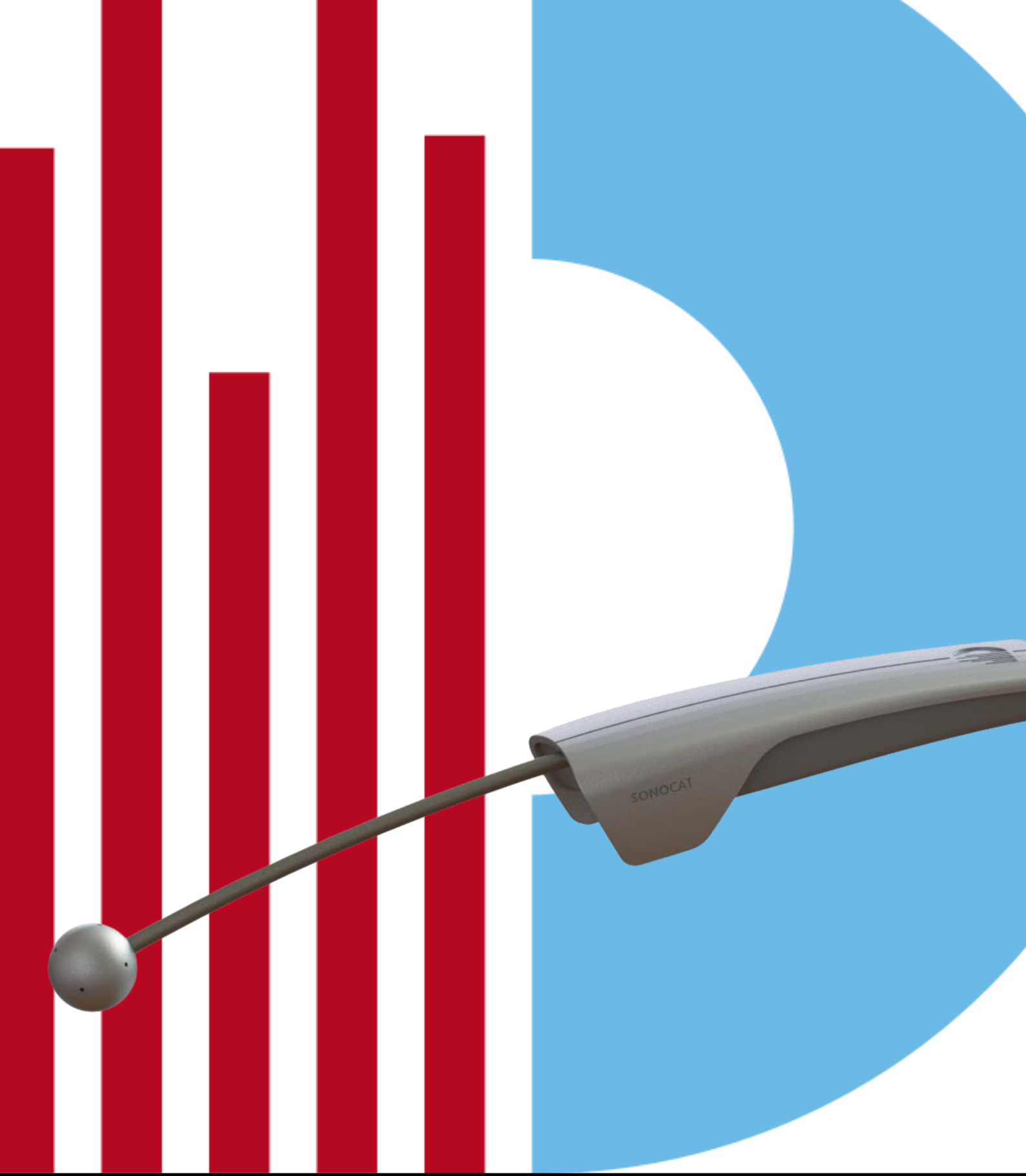

Sonocat

Finding the acoustic transfer-paths between 2 rooms in a concert hall

Introduction

For the purpose of determining sound transmission from concert room 2 to room 1. Sonocat measurements were taken close to various sound-radiating surfaces in room 1. In these measurements, the sound intensity of that sound-radiating surface was determined. A constant loud sound source was used in room 2 for this purpose.
An example of such a measurement is shown below. The Sonocat is held in front of the sound-radiating surface. Due to time constraints, "point" measurements were made and an occasional "scan" measurement. A total of 62 measurements were taken.
In this measurement session, the radiated sound intensities were determined. The normal "active" intensities were also determined. The active intensity is the net intensity; i.e., the radiated intensity minus the intensity reflected back by the room. For a radiating surface, this means that if the value is positive, there is net sound being radiated; if the value is negative, then net energy is flowing into the surface (and thus there is absorption) and more sound is flowing out of the room through that surface than is flowing in. The same surface can radiate sound for one frequency (band) while absorbing sound for another frequency (band).
An example is shown in Figure 1. Here the wooden "sliding doors" in front of the windows are measured in room 1.

Figure 1: measurement m2.

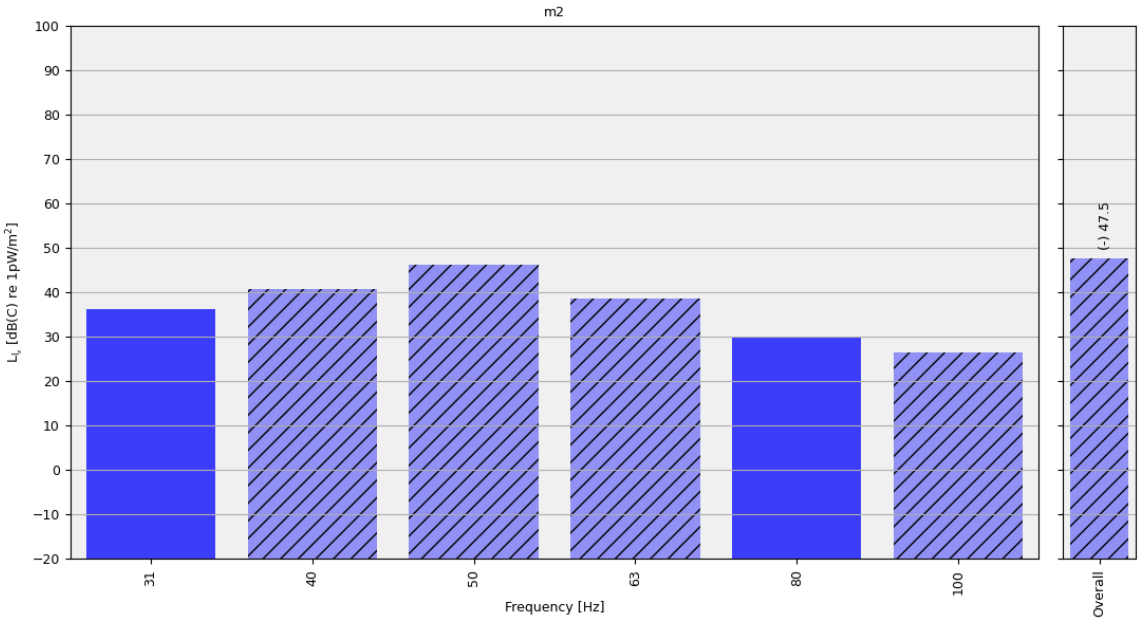

Figure 2. The active noise intensity (C-weighted) at measurement m2.

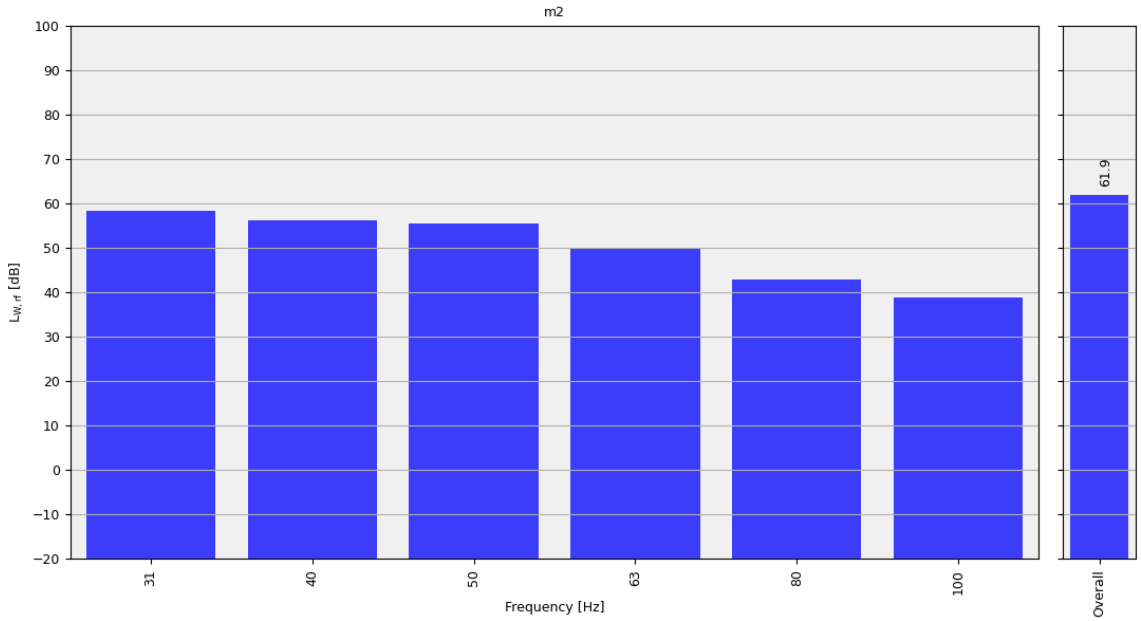

Figure 3. The "emmitted" noise intensity (C-weighted) at measurement m2.

This measurement shows that in the 31 Hz and 80 Hz 1/3-octave bands, there is a net sound transmission to the room flowing through these wooden slotted doors. In the other 1/3-octave bands, there is a net sound penetration. The radiating intensities are clearly higher than the net results and are low frequency higher than high frequency.

Measurements

N°	Location	Position name	Description
1	Podium	M1	Max Left side of the podium
2		M2	---
3		M3	
4		M4	
5		M5	
6		M6	Max Right side of the podium
7		M7	Window podium left
8		M8	Window podium right
9	1st floor	N1	Directivity measure - Center 1st floor
10		N2	Left side
11		N3	
12		N4	Left opening
13		N5	Right side
14		N6	
15		N7	
16	2nd floor	O1	Right side
17		O2	
18		O3	
19		O4	Center
20		O5	Directivity measure - Center 2nd floor
21		O6	Left side
22		O7	
23		O8	

Figure 3: 23 of 62 taken measurements in room 1 grouped by letters

In the following figures, all measurements are grouped by letter as in figure 3

m-measurements: Podium

n- measurements: 1st floor

o- measurements: 2nd floor

Figure 4. Cross-section of the concert hall

m- measurements.

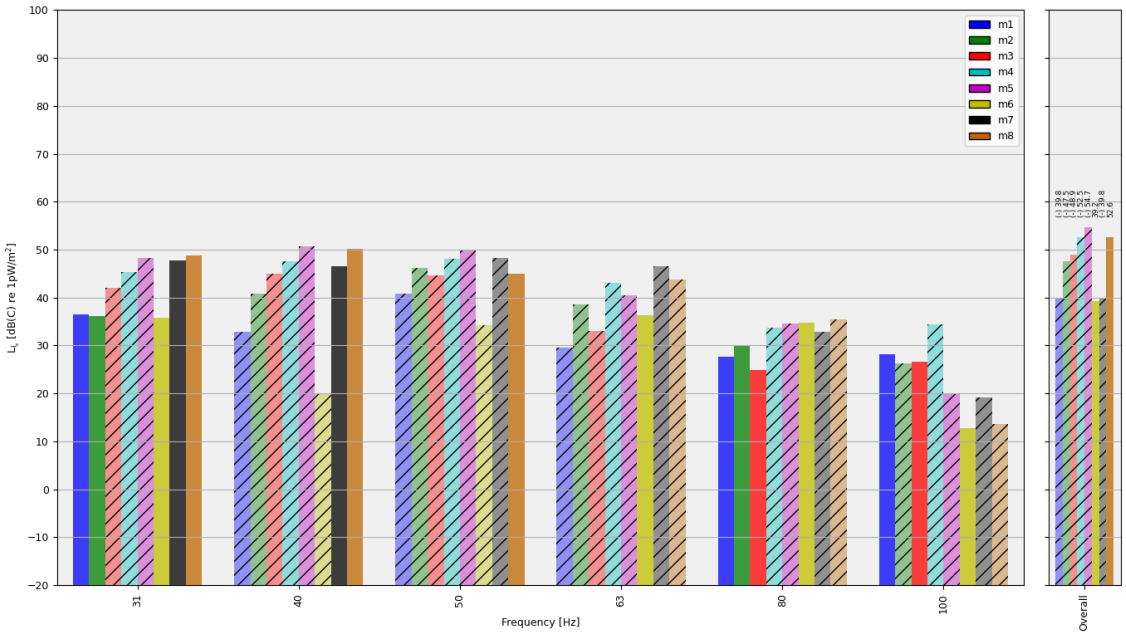

Figure 5. The active sound intensity (C-weighted) for the m-measurements.

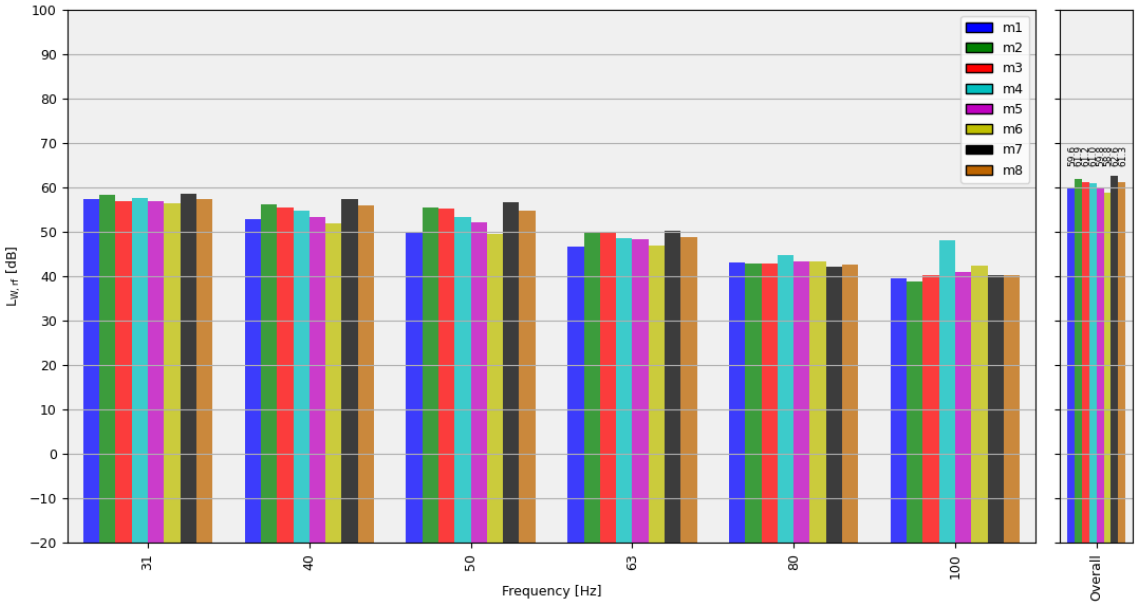

Figure 6. The "emitted" sound intensity (C-weighted) for the m-measurements.

From the figure, it can be concluded that, low frequency, most of the noise enters at measurements 7 and 8 the room; when the wooden sliding doors are opened.

n-measurements

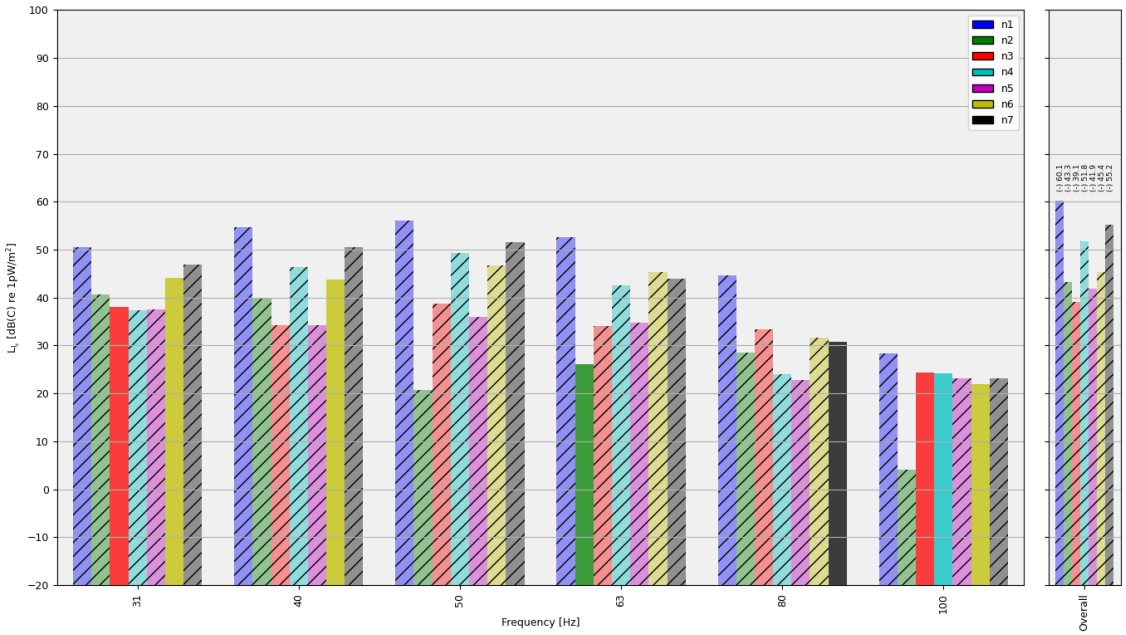

Figure 7. The active sound intensity (C-weighted) for the n-measurements.

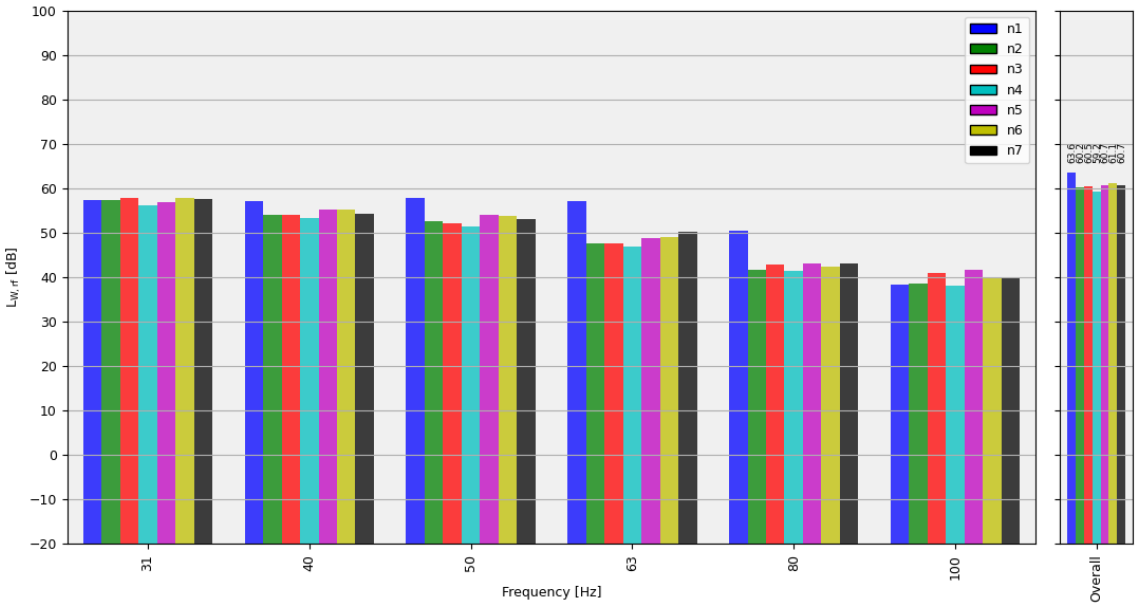

Figure 8. The "emitted" sound intensity (C-weighted) for the n-measurements.

From both figures it can be concluded that the vast majority of the sound intensity is negative so the sound is being absorbed here.

o-measurements.

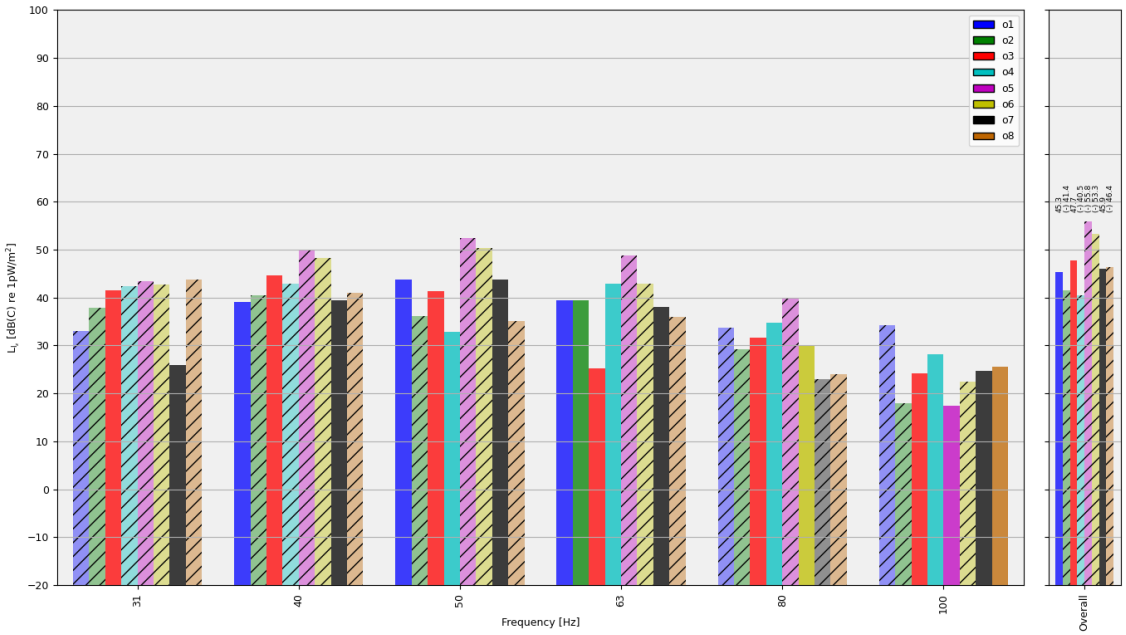

Figure 9. The active sound intensity (C-weighted) for the o-measurements.

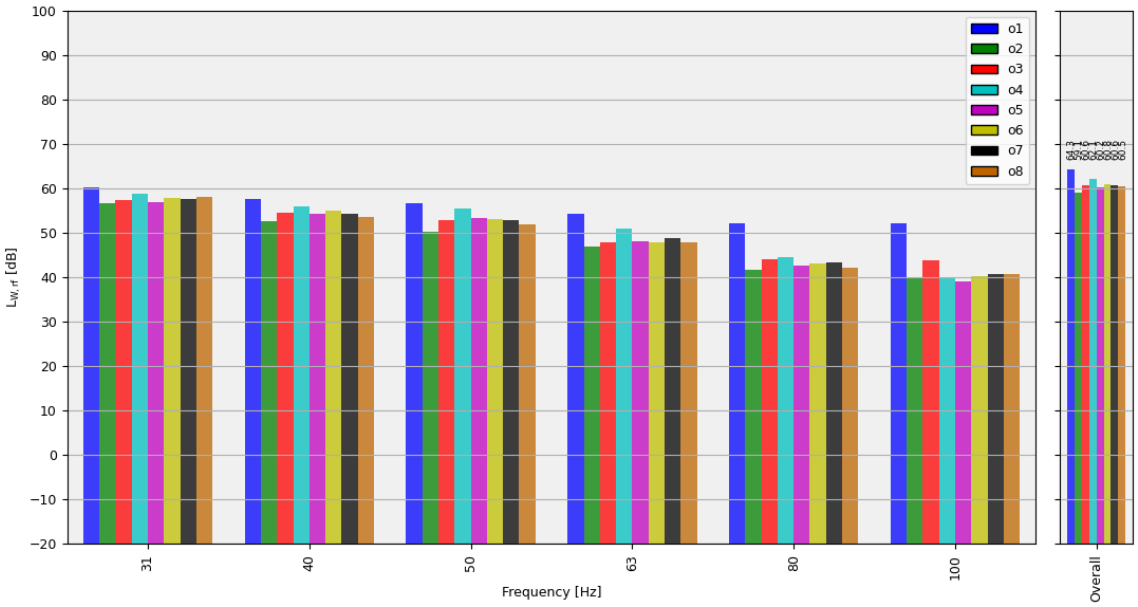

Figure 10. The "emitted" sound intensity (C-weighted) for the o-measurements.

In these measurements, o1, o3, o4 and o7 are possible locations where sound enters the room. At the other surfaces, sound is being absorbed.