



KTH Engineering Sciences

**Determination of
Object Sound Absorption according to ISO 20189**

**Object:
- Abstracta ZENPOD**

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Signature:	
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1) Measurement date

2020-12-21

2) Measurement method,

The measurements of the **Equivalent Sound Area A_{Obj}** , have been carried out according to ISO354:2003.

The test object was positioned inside the reverberation room according to picture 1 under 5.
Test object, below.

Reverberation times T_0 and T_1 were measured using 4 different microphones and one omni directional loudspeaker in 3 different positions according to Picture 2 below.

The measurement results are only valid for the measured samples.

This report can only be reproduced in its entirety.

3) Test room and environment

The test room meets the requirements on diffusion of sound field according to ISO354:2003 6.1.3 and Annex A. Controlled December 2020.

For the measurements performed here, set 9 was used, see Appendix 2.

The Sound Absorption Area for the empty test room meets the requirements according to ISO354:2003 6.1.4. Controlled December 2020, see Appendix 2.

Test room nr	81
Room dimensions	L:7,82 x B:6,00 x H:5,20
Room Volume	244 m ³
Room surface area	235 m ²

4) Instrumentation

Dynamic signal analyser Data Translation DT9837A Serial No: 1F1FB33

Software Spectra Plus DT

Microphone 1 B&K Type 4942-A-021 Serial No: 2360828

Microphone 2 BSWA MP201 Serial No: 560130

Microphone 3 B&K Type 4942-A-021 Serial No: 2360830

Microphone 4 B&K Type 4942-A-021 Serial No: 2360845

Calibrator Bedrock 86065 Serial No: 86065

Power Amplifier B&K Type 2706 Serial No:

Climate sensor "Klima Series"; Temperature, Relative humidity, and pressure

Omni directional loudspeaker

5) Test object

The test object was positioned in the test room according to IS20189 Annex E, E.1.7. Type VII.1.

Abstracta ZENPOD

Units: 2

Test Object surface is m2 according to ISO20189

Annex B, B4:

1200x2320x2310 mm



Picture 1 Test Object positioned in the test room.

Positions of microphones, Loudspeaker and Test object in the test room.

Loudspeaker direct on floor.

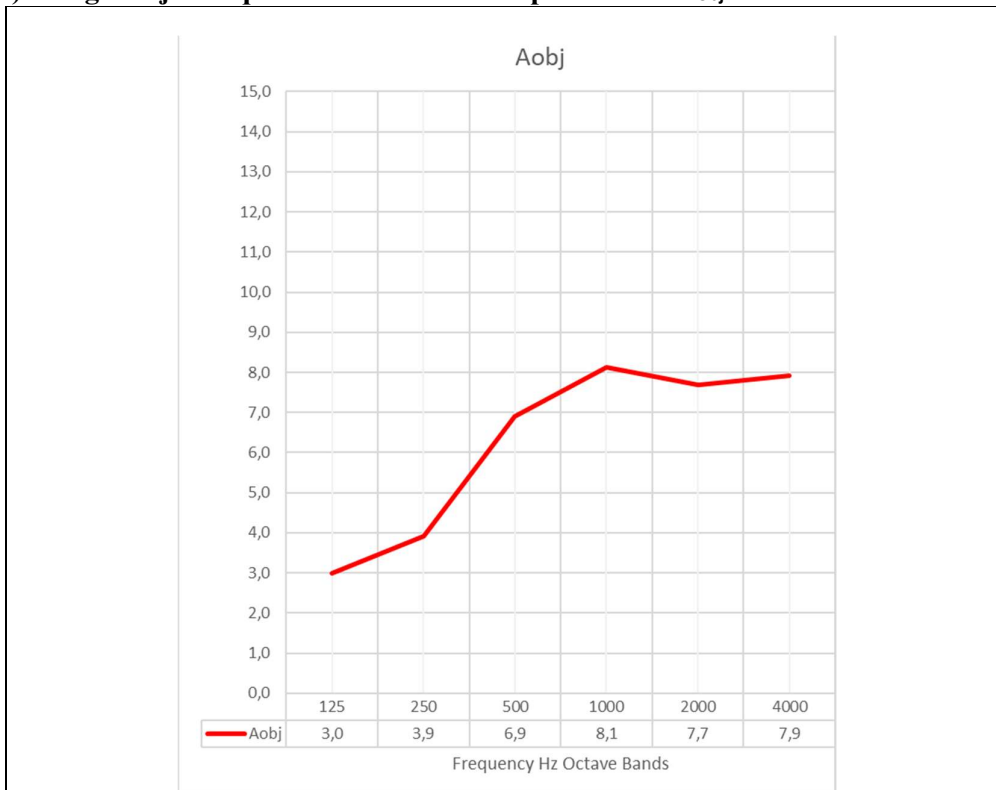
Mic	X	Y	Z
1	4,2	6,0	4,0
2	4,8	3,8	3,4
3	4,5	2,2	4,0
4	4,1	1,4	3,7



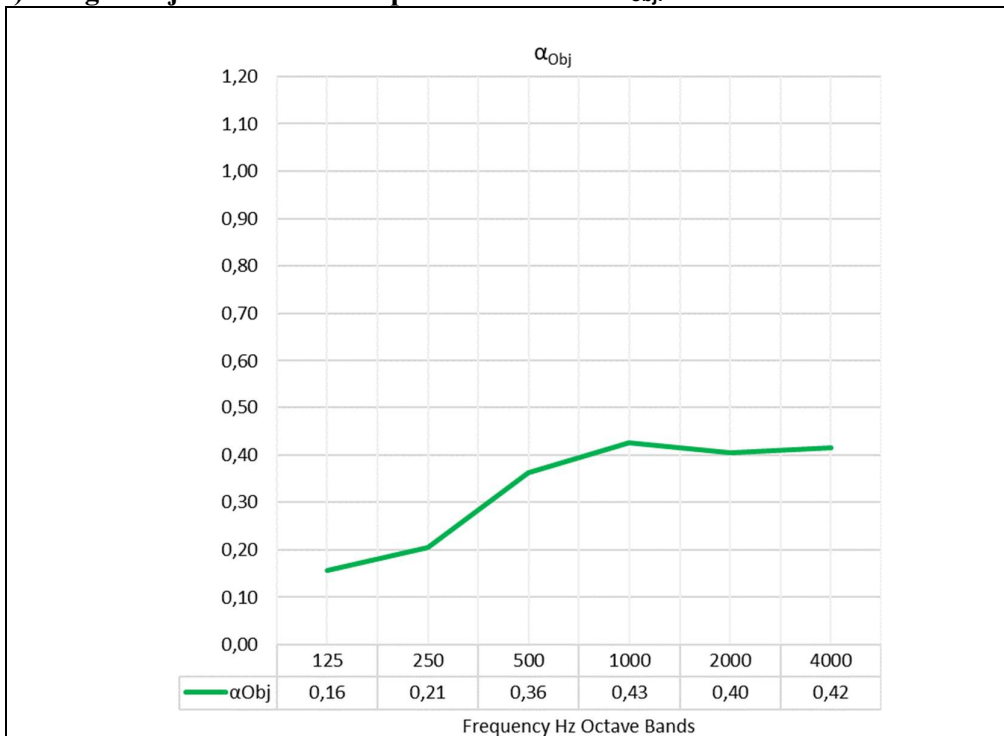
Picture 2

6) Measurement Results

a) Single object Equivalent Sound Absorption Area A_{obj} .



b) Single Object Sound Absorption Coefficient α_{obj} .



c) Reverberation times

Arithmetic averaged Reverberation Times T_0 and T_1 and Object Sound Absorption Coefficient α_{obj}	Frequency, Hz Third Octave Bands	Reverberation times Empty room T_0 (s)	Standard deviation T_0	Reverberation times Test Object T_1 (s)	Standard deviation T_1
	100	4,47	0,52	3,31	0,50
Temperature T_0 19,2°C	125	3,86	0,33	3,05	0,28
	160	4,08	0,37	3,08	0,22
Temperature T_1 19,0°C	200	5,49	0,72	3,82	0,22
	250	5,99	0,41	3,77	0,31
Relative humidity T_0 21,9%	315	5,85	0,26	3,43	0,15
	400	5,33	0,11	3,00	0,12
Relative humidity T_1 22,9%	500	5,07	0,09	2,68	0,08
	630	4,60	0,08	2,39	0,10
Air pressure T_0 1018 hPa	800	4,48	0,08	2,35	0,08
	1000	4,34	0,11	2,29	0,10
Air pressure T_1 1021 hPa	1250	3,71	0,05	2,09	0,06
	1600	3,39	0,04	1,99	0,08
	2000	2,93	0,06	1,83	0,04
	2500	2,51	0,07	1,72	0,04
	3150	2,01	0,05	1,47	0,03
	4000	1,63	0,05	1,23	0,06
	5000	1,21	0,21	0,92	0,09

Tabel 1