ACOUSTIC MEASUREMENTS

Test ordered:	03.05.2021
Test orderer:	**INTO Concept**
	Lemuntie 3-5 C, 00510 Helsinki, Finland
	Business ID number FI26977215
Test conducted:	19.05.2021 at 17:00 – 18:00
Test performer:	**AKUKON Oy**
	Hiomotie 19, 00380 Helsinki, Finland
	Business ID number FI09837720

1 INTRODUCTION

The purpose of the measurements was to determine the speech reduction properties of INTO POD 1.

Measurements and calculations were performed in accordance with ISO 23351-1:2020 standard ”Acoustics – Measurement of speech level reduction of furniture ensembles and enclosures”.

Measurement time	Wednesday, 19.05.2021, 17:00-18:00
Measurer	Johan Hallimäe

1.1 Specimen definition

Furniture ensembles and enclosures are assembled on site using elements, which can be transferred into any room through normal-sized passage doors. They are not treated as a fixes part of the building and are beyond the scope of building regulations. These products are typically assembled in a finished room and not during the construction of the building.

The following method is applicable for entire furniture nsembles or enclosures, which form a unity that serves one or several occupants, and which are also used to provde improved speech privacy. The method is not inteded for single components used in worktations (acoustic screens, etc.).

2 MEASUREMENTS

2.1. Measurement method

The sound power level is measured in two scenarios:

- without the product
  - the test signal is produced in an empty room while the product is absent
- with the product
  - the test signal is produced inside the product in the occupant's position.

Reverberation time is measured in the room with and without the product. Background noise is measured in the same positions as sound power level with the product in the room and without. Level reductions is the difference of the sound power levels measured in the two scenarios in 1/1-octave frequency bands from 125 Hz to 8000 Hz. Speech level reduction si a single-numbered quantity that express the corresponding reduction in A-weighted sound power level of standard speech withing the entire frequency range from 125 Hz to 8000 Hz.

The lowest one-third-octave band frequancy of interest is 125 Hz, meaning the room has to have a minimum volume of 150 m^3.

3 MEASUREMENT EQUIPMENT AND CALIBRATION DATES

Measurements were conducted using „*Brüel & Kjaer 2250 SLM*" sound level meter, which corresponds to class 1 measurement equipment.

Device	Supplier and model	Serial nr	Calibration date
calibrator	Brüel & Kjaer 4231	2253338	27.08.2020 [AKUKON]
microphone	Brüel & Kjaer 4966	3271301	19.05.2021 [AKUKON]
SLM	Brüel & Kjaer 2250	3004362	19.05.2021 [AKUKON]

**The microphone was calibrated before and after the measurements.*

3.1 Environment and conditions

Volume of room	„ 736m^3
Total surface area	„ 529m^2
Microphone positions	6
Testi Specimen	INTO POD 1

4 MEASUREMENTS RESULTS

The level reduction depends strongly on the ratio of covered area to the total area of the external envelope of the test specimen. Enclosures, which have coverage over 99%, typically produce $D_{S,A}$ results between 15dB and 30dB. Funiture ensembles, shich have coverage under 30%, typically produce $D_{S,A}$ results between 0dB and 5dB.

Adequate target values of $D_{S,A}$ cannot be unambiguously given since the perceived acoustic performance in situations depends on various factors: the distance from the product, the speech effort used by the occupant inside the product, the speech level reduction, the acoustic conditions of the surrounding room, and background noise level.

4.1 Speech level reduction index

Speech level reduction index for the furniture model was measured and calculated according to the ISO 23351-1 standard. The measurement results are presented in table 1.

Table 1. Speech level reduction index $D'_{S,A}$

Furniture model	$D'_{S,A}$, dB	Measurement report
1. INTO POD 1	29,2	Akukon 200450 – M09

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Composed by

Mario Narbekov
Consultant

AKUKON

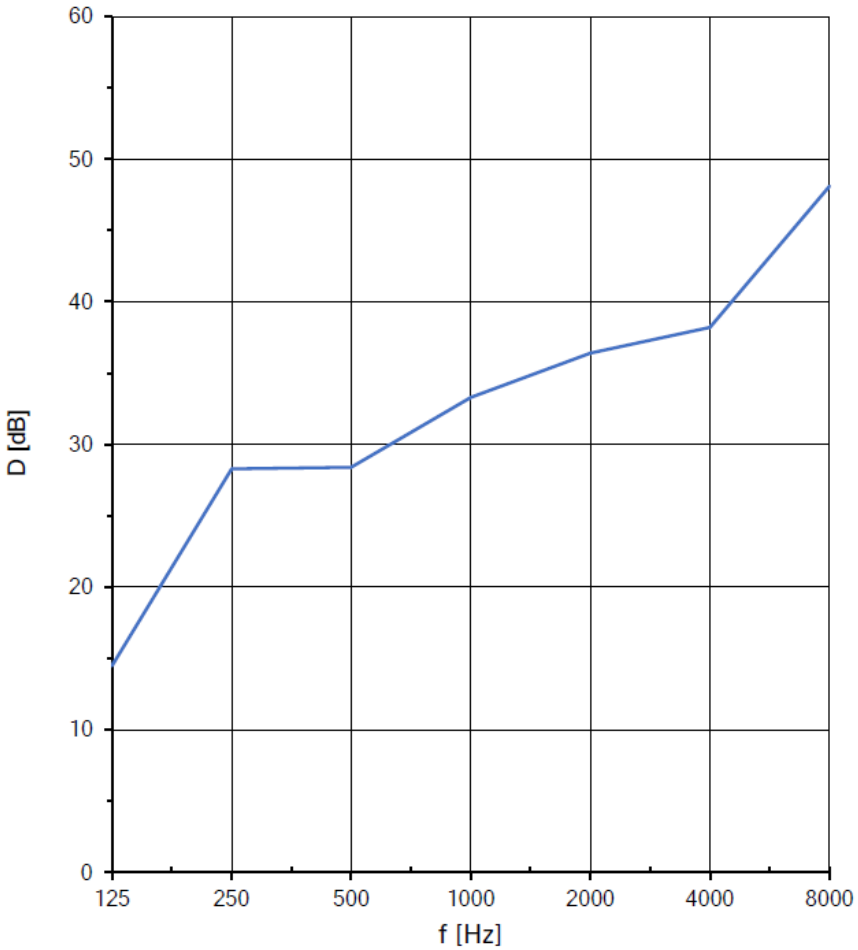
DETERMINATION OF SPEECH LEVEL REDUCTION ACCORDING TO ISO 23351-1

Product: INTO POD 1

Order date: 03.05.2021

Test date: 19.05.2021

Frequency	Speach level reduction
f Hz	*D* dB
125	14.5
250	28.3
500	28.4
1000	33.3
2000	36.4
4000	38.2
8000	48.1
$D'_{S,A}$	**29.2**



Key

f 1/1 -octave frequency band, in Hz

D level reduction, in dB

$D'_{S,A}$ speech level reduction, in dB

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