



KTH Engineering Sciences

TEST REPORT

“Insertion loss” of earbags

Customer: Ear Bag AB

Customer contacts: Tom Natvig

Issued: 2012-09-18
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1. Method of measurements

The measurements are performed in the laboratories of MWL, KTH.

An opening is made in the wall between the anechoic room and the reverberation room in MWL. When the anechoic room is set to overpressure, airflow is produced in between the two rooms. A *Head and Torso Simulator* is placed in the front of the opening to measure the flow-induced noise with and without the airbag. The difference of the sound pressure levels detected is the insertion of the airbag for the flow-induced noise.

Two measurements are taken for each wind speed. The averages of the two measurements are listed in the table below.

2. Environment

Temperature:	21 °C	Relative humidity:	58%
Ambient pressure:	1019 mbar	Background noise:	28.0 dBA

3. Instrumentation

Computer with software *SpectraPlus* and UA-1G sound card
 Head and Torso Simulator, B&K type 4218, series number 1877681
 Sound Quality Conditioning Amplifier, B&K type 2672, series number 1838629

4. Test samples and test conditions

The mounting conditions of the earbags are controlled by the customer.

5. Results

All results listed below are average insertion loss of flow-induced noise for both ears.

A-weighted insertion loss

Wind speed, km/h	Mean insertion loss, dBA
20	22.7
30	21.8
40	24.8

The results in 1/3 octave band are also listed in the table below for reference. They are also depicted. When the speed is low, the flow-induced noise is only at low frequencies. That explains why the insertion losses for low speed cases are low at high frequencies since the signal at high frequency is at the same level as the background noise.

Frequency, Hz	Air speed, km/h		
	20	30	40
50	21.6	16.5	8.9
63	23.7	20.8	13.2
80	25.3	23.4	16.6
100	25.8	24.6	20.0
125	26.2	25.5	23.8
160	26.7	24.8	25.5
200	24.2	24.5	26.0
250	25.0	25.0	26.4
315	25.3	27.5	28.2
400	22.9	23.9	26.9
500	20.9	21.9	26.1
630	18.9	24.7	25.5
800	17.2	23.3	24.3
1000	14.9	21.2	23.8
1250	12.9	19.8	22.0
1600	10.0	19.0	20.0
2000	6.2	18.5	18.7
2500	2.8	17.0	18.2
3150	0.8	13.1	17.5
4000	0.5	7.3	15.5
5000	0.4	3.4	13.2
A-weighted	22.0	21.8	24.8

