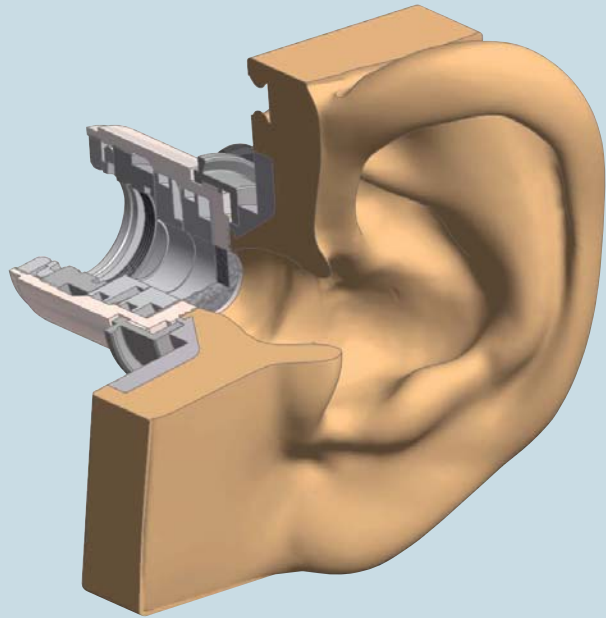


# ***Next Generation Headphone Testing***

For better test results



**G.R.A.S.**  
SOUND & VIBRATION



## Introduction

### Better testing means better products

The headphone market is expanding rapidly these years. Advances in technology have allowed for not only production of headphones in a wide range of types and forms, but also improved performance and connectivity.

As a result, consumers are demanding a higher definition sound experience.

For manufacturers, this has given rise to a number of challenges when it comes to testing their products - including the need to test at low and high frequencies (up to 20 kHz), improve repeatability, maintain accurate and reliable data, and shorten product development time.

At G.R.A.S. we have risen to the challenge and are proud to introduce the **next generation of headphone testing technology**.

After all, the better your testing, the better your products.

### New improved pinna

Obtaining accurate measurements from in-ear headphones and earbuds can be hampered by leakage and inaccurate seals. To solve this we have made subtle but important changes to the pinna, concha and ear canal, providing significant improvements in the **fit, placement and seal** of the pinna\*.

This means **fewer but more precise** measurements – and just as importantly, absolute confidence in the data you capture. It also means a significant reduction in the time needed to test in-ear products.

\*The pinna is based on 300+ 3D scans of human ear canals: R. R. Paulsen: 2004 :<http://www.imm.dtu.dk/~rapa/research.html>].

### Better low frequency testing

For many music lovers using headphones, bass response is important and the new pinna allows for **better measuring of low frequencies** - including Active Noise Cancelation (ANC) below 1 kHz.

And because the low frequency response is **accurate every time**, you can reduce the test time of these parameters without losing confidence in your measurements.

This confirms that the new pinna provides improved repeatability

### Better low noise testing

Testing equipment has not been able to accurately measure the low levels heard by the human ear, and subsequently, conclusions are often based on subjective testing - until now.

We use the most **advanced lownoise transducer** to lower the noise floor below the threshold of human hearing to truly capture all the sounds.

In other words, you will be able to **measure everything the human ear can hear**.

### Better high frequency testing

It can be difficult to obtain accurate data for measurements above 10 kHz but our new ear simulator provides **better correlation from 10-20 kHz**.

Our transducer also allows us to lessen the inherent resonance of the ear simulator so that volatile and high frequency responses are now **smooth and manageable**.

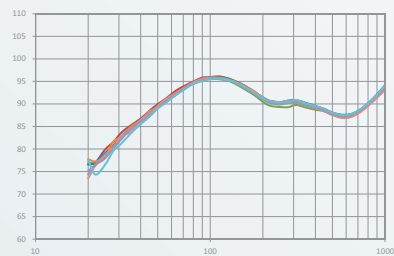
This gives much more clarity and repeatability and provides added SNR at the higher frequency response.



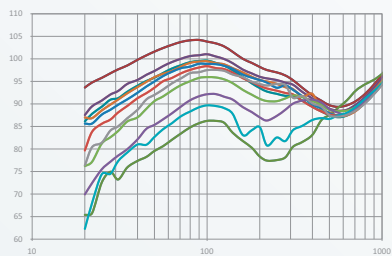
Improved pinna for better seal



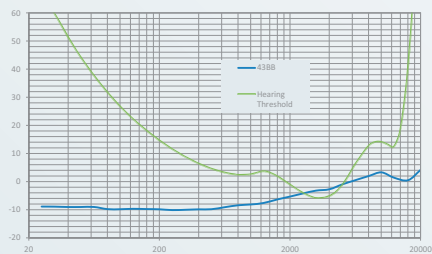
Insert earphone in new pinna



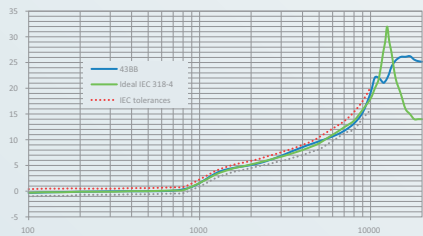
Showing test results with new improved pinna



Showing test results with ITU-T3.3 compliant pinna



Linear self-noise below the threshold of human hearing



Comparison between the transfer impedance avoids splitting of resonance with new 43BB coupler



# G.R.A.S. Headphone testing solutions with the 43BB ear simulator

With the next generation headphone testing solution consisting of the new 43BB lownoise ear simulator and the new KB5000 pinna, you can test either on an advanced KEMAR platform or on the versatile and portable 43AG ear & cheek simulator.



## KEMAR solution

- 1 or 2 channels for binaural testing
- Anthropometric – Torso and ear
- Most advanced and capable test setup available
- Mouth simulator option for two-way communication headset testing



## 43AG ear & cheek simulator

- 1 channel for quick tests & measurements
- Cost-effective
- Portable desktop/tabletop solution
- High-value R&D and QA tool

## Key advantages - Next generation headphone testing

*For other coupler options please go to [www.gras.dk](http://www.gras.dk)*

### 43BB lownoise ear simulator

- Based on the IEC 603318-4 occluded ear simulator
- Dynamic range - Test down to threshold of hearing
- Extends the frequency range up to 20 kHz
- Repeatability at high frequencies
- Added SNR at high frequencies
- Calibrated and traceable

### KB5000/KB5001 – Anthropometric Pinnae (L/R)

- Better repeatability
- Better fit and seal
- More precise measurements
- Anthropometric ear canal and pinna
- Based on the IEC Standard

At G.R.A.S. we are confident that our next generation of headphone testing will make your life easier.

[www.gras.dk/next-generation-headphone-testing](http://www.gras.dk/next-generation-headphone-testing)