

# NEWS

## Couplers for Audiometer Calibration



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

# Audiometers

## - An introduction to audiometer calibration

Audiometers are used for checking people's hearing. If a hearing loss is discovered the specific hearing loss data is e.g. used to set up a possible hearing aid. Many decisions – both human and legal – are based on this data and it is therefore very important that the audiometers are calibrated regularly.

Basically the audiometer consists of a tone generator with an output attenuator and some kind of output transducer transmitting the test tones to the person being tested.

### **Audiometric Headsets**

Depending on the type of audiometer, local preferences and diagnostic purpose the audiometer is used with audiometric headphones or earphones (ear-inserts) – and in some cases bone-conductors and free-field speakers as transducers.

The output characteristics of these transducers are highly dependent on the acoustic load (impedance) of the human ear. It is therefore essential that the transducers are calibrated with a well-defined, acoustic load resembling that of the average human ear.

### **Artificial Ears**

Such a load is also known as an ear simulator or coupler. It consists of a measurement microphone and one or more enclosed volumes to achieve the correct acoustic load or simulation of a real ear.

Artificial ears are available with several acoustic properties depending on the application. They are all standardized according to international standards and recognized as calibration references within not only audiometric headset calibration but also hearing aid and telephone testing.

### **Audiometer Calibration**

Besides one or more artificial ears you typically need a sound level meter to document the various sound pressure levels, frequencies and distortion. Any sound level meter with these features, a standard 7-pin or 10-pin LEMO connector or CCP-input (constant current power) and adjustable microphone sensitivity option can be connected to G.R.A.S.' artificial ears.

To calibrate such a system a sound level calibrator like Type 42AB is recommended.



# Artificial Ear Systems

## - IEC standards and configurations

All G.R.A.S. artificial ear systems are made in accordance with standards and based on a modular and upgradable platform. These systems have been developed in close corporation with the industry resulting in a complete stainless steel design, easy adjustment

of pressure force and compatibility with all commercially available audiometric headsets and earphones. For non-standard, custom made configurations please contact G.R.A.S.



Type 43AA  
– IEC 60318-1 & 2  
Ear Simulator & Coupler  
(318) shown as IEC  
60318-2 with circum-  
aural audiometric head-  
set HDA-200

### IEC 60318-1 & 2 Artificial Ears – Type 43AA

For calibration of supra- and circum-aural headsets using ear simulators according to IEC 60318-1 and IEC 60318-2 (extended high frequency range 8 kHz – 16 kHz). This setup is according to IEC 60318-1 (former 60318) Ear Simulator with an additional headset plate, a ½" pressure-field microphone and a ¼" preamplifier. The spring loaded holder on the base can easily be adjusted from 1 to 8 Newton to fulfill standard requirements for mounting pressure.

This configuration is typically used for headsets like HDA-200, TDH-39 & 49, and DT 48.



Type 43AF  
– IEC 60318-3  
Reference Coupler (6cc)  
shown with supra-aural  
audiometric headset  
TDH 39

### IEC 60318-3 Artificial Ear – Type 43AF

For calibration of supra-aural headsets using the 6cc Coupler according to IEC 60318-3 (former 60303). This setup is based on the NBS-9A Coupler with a 1" pressure-field microphone and a ¼" preamplifier.

This configuration is typically used for headsets like TDH-39 & 49.



Type 43AC  
– IEC 60318-4  
Occluded-ear Simulator  
for calibrating earphones  
coupled to the ear by  
ear-inserts (711). Here  
shown with earphone 3A

### IEC 60318-4 Artificial Ear – Type 43AC

For calibration of earphones coupled to the ear by ear-inserts. This setup is based on the IEC 60318-4 (former 60711) Occluded-ear Simulator with integrated ½" pressure-field microphone and ¼" preamplifier. A standardized ear-mould is included to accommodate for the tube of the earphones.

This configuration is typically used for earphones like model 3A and 5A.



Type 43AB  
– IEC 60318-5  
Reference Coupler (2cc)  
shown with insert  
earphone 3A

### IEC 60318-5 Artificial Ear – Type 43AB

For calibration of earphones coupled to the ear by ear-inserts using the 2cc Coupler based on IEC 60318-5 (former 60126). This setup is based on a ½" pressure-field microphone and a ¼" preamplifier. The advantage of this design is the microphone grid being mounted all the time, thus avoiding the diaphragm to be exposed while calibrating the microphone. If required, a 1" microphone version is also available.

# One Common Platform

## - The advantages of modularity

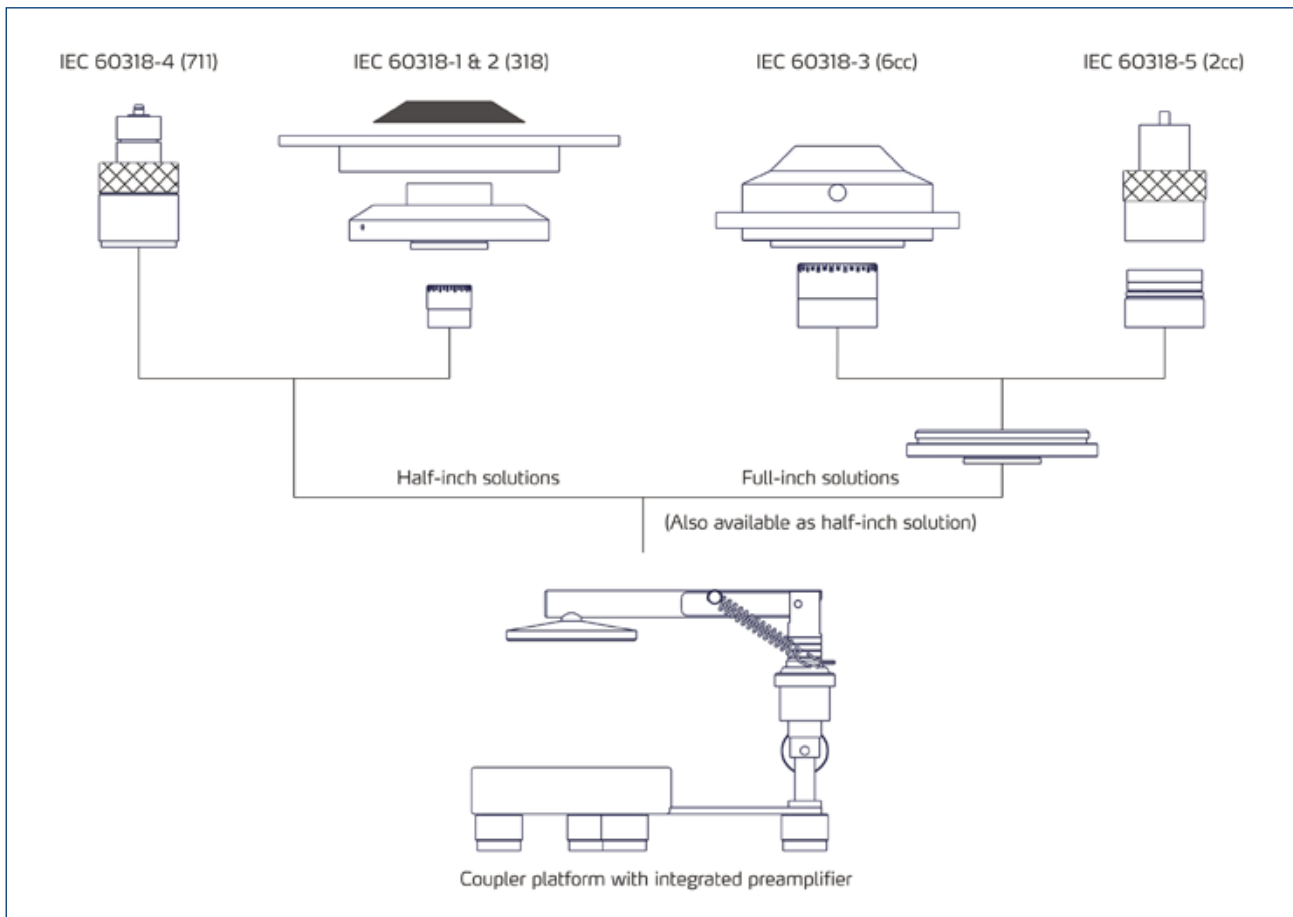
Did you know that G.R.A.S. offers you unsurpassed modularity in the coupler program?

Researchers in the audiological industry have already seen the benefits of being able to switch back and forth between standardised test setups, and have chosen G.R.A.S. as their preferred partner.

As illustrated below, by using G.R.A.S.' unique coupler platform, you can easily switch between half- and

full-inch coupler measurements. There is no need to change preamplifiers or un-cabling your equipment – simply switch couplers and microphones, and you are ready to measure.

In many industries, like audiometers and hearing aids, multiple tests are needed in order to meet different countries' certification requirements, and for these situations – the G.R.A.S. artificial ear and coupler program is a perfect match.



The G.R.A.S. coupler platform is based on one, common hardware platform. It accommodates for both half- and full-inch solutions (in traditional 200 VDC or CCP types) for audiometer calibration and hearing aid testing.

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