

# GRAS RA0045

Externally Polarized Ear Simulator According to IEC 60318-4  
(60711)



Volume: 1260 mm<sup>3</sup> @ 500 Hz  
Dyn range: 25 dB(A) to 164 dB  
Sensitivity 12.5 mV/Pa  
IEC: 60318-4

The GRAS RA0045 is an ear simulator with an acoustic input impedance closely resembling that of an average human ear. It includes a 40AG pressure microphone and is individually calibrated with this specific microphone.

## Introduction

The RA0045 Ear Simulator is for making acoustic measurements on earphones coupled to the human ear by ear inserts such as tubes, ear moulds, or ear tips. The acoustic input impedance of RA0045 closely resembles that of the human ear and, as a result, loads a sound source in very much the same way.

The RA0045 complies with the following international requirements:

- IEC 60318-4: Occluded-ear simulator for the measurement of earphones coupled to the ear by ear inserts.
- ITU-T Recommendations P.57 (08/96) Series P: Telephone transmission quality, Objective measuring apparatus: Artificial ears.

It is measured and calibrated according to the ITU-T Recommendation P.57.

## Design

The RA0045 embodies a number of carefully designed volumes connected via well-defined and precisely tuned resistive grooves. In an equivalent electrical circuit, capacitors would represent the volumes, and inductance and resistance would represent respectively air mass and air flow within the resistive grooves.

It is delivered with a built-in [GRAS 40AG 1/2"](#) externally polarized pressure microphone and an individual calibration chart for the ear simulator.

## Typical Applications and Use

The RA0045 is for measurements on earphones and hearing aids coupled to the human ear by ear inserts such as tubes, ear moulds, or ear tips.

In accordance with ITU-T Recommendation P.57, it can be used with the following GRAS pinna

simulators for testing telephones:

- [GRAS RA0056](#) Low-leak Pinna Simulator
- [GRAS RA0057](#) High-leak Pinna Simulator

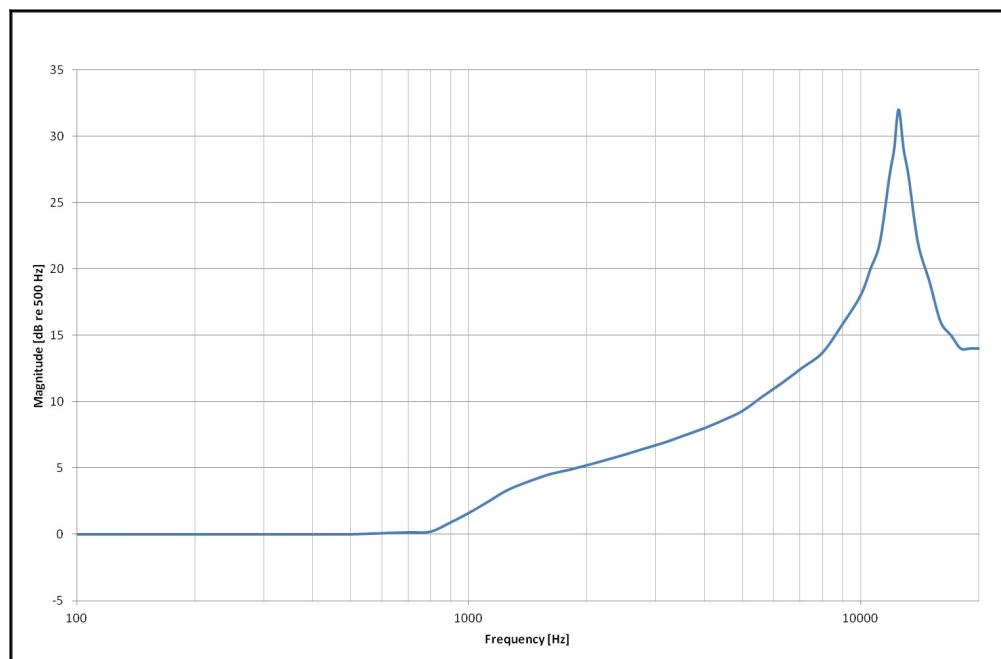
It is also part of the [GRAS 43AC](#) Artificial Ear which is a complete test jig for acoustic testing of earphones coupled to the ear by inserts.

A comprehensive range of accessories for making measurements in accordance with IEC 60318-4 are available. See the tab Ordering info.

## Compatibility

The RA0045 can be used with a standard LEMO preamplifier, e.g. the [GRAS 26AK 1/2"](#) Preamplifier or the GRAS 26AC 1/4" Preamplifier fitted with an adapter. For the 1/4" preamplifier, use either the straight RA0003 Adapter or the right-angled RA0001 Adapter.

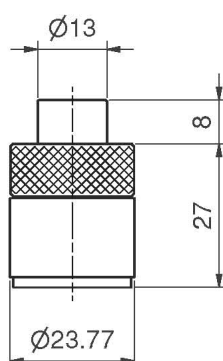
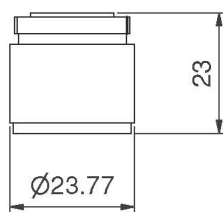
Polarization/Connection		200 V / Traditional
Theoretical dynamic range lower limit with GRAS preamplifier	dB(A)	25
Theoretical dynamic range upper limit with GRAS preamplifier @ +28 V / $\pm 14$ V power supply	dB	153
Theoretical dynamic range upper limit with GRAS preamplifier @ +120 V / $\pm 60$ V power supply	dB	164
Set sensitivity @ 250 Hz ( $\pm 3$ dB)	mV/Pa	12.5
Set sensitivity @ 250 Hz ( $\pm 3$ dB)	dB re 1V/Pa	-38
Resonance frequency	kHz	13.5
Coupler volume	mm <sup>3</sup>	1260 @ 500 Hz
Temperature range, operation	°C / °F	-30 to 60 / -22 to 140
Temperature coefficient @250 Hz	dB/°C / dB/°F	0.05
Humidity range non condensing	% RH	0 to 90
ANSI standard		S3.7
IEC standard		60318-4 (former 60711)
ITU-T recommendations		P.57
CE/RoHS compliant/WEEE registered		Yes/Yes, Yes
Weight	g / oz	52 / 1.8



Typical frequency response

GRAS Sound & Vibration reserves the right to change specifications and accessories without notice.

Dimensions in mm



GS0076  
RA0045

## Optional items

<a href="#">GRAS RA0088</a>	In Ear Adapter
GRAS GR0433	Calibration Adapter
GRAS GR0434	Stop Washer
GRAS GR0436	Tube Adapter
GRAS GR0437	Ear-mould Simulator
GRAS GR0438	Retention Ring
GRAS GR0440	Tube Adapter
<a href="#">GRAS RA0056</a>	Low-leak Pinna Simulator
<a href="#">GRAS RA0057</a>	High-leak Pinna Simulator
<a href="#">GRAS 26AK</a>	26AK 1/2" Standard Preamplifier with Integrated Connector
GRAS 26AC	26AC 1/4" Standard Preamplifier with 3 m Integrated Cable
GRAS RA0001	Right-angled Adapter for 1/2" microphone and 1/4" preamplifier
GRAS RA0525	Foam insert for 60318-4 coupler, 10 pcs
GRAS RA0003	Adapter for 1/2" microphone and 1/4" preamplifier

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## About GRAS Sound & Vibration

GRAS is a worldwide leader in the sound and vibration industry. We develop and manufacture state-of-the-art measurement microphones and related equipment for industries where acoustic measuring accuracy and repeatability are of the utmost importance. This includes applications and solutions for customers within the fields of aerospace, automotive, audiology, consumer electronics and other highly demanding industries. GRAS microphones are designed to live up to the high quality, durability and accuracy that our customers have come to expect, trust and require.

GRAS Sound & Vibration is represented through subsidiaries and distributors in more than 40 countries and is part of Axiometrix Solutions, a leading test solutions provider comprised of globally recognized measurement brands. Read more at [www.grasacoustics.com](http://www.grasacoustics.com)

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