

# GRAS RA0045-S1

Prepolarized Ear Simulator According to IEC 60318-4 (60711)



Volume: 1260 mm<sup>3</sup> @ 500 Hz  
Dyn range: 25 dB(A) to 150 dB  
Sensitivity 12.5 mV/Pa  
IEC: 60318-4

GRAS RA0045-S1 is an ear simulator with an acoustic input impedance closely resembling that of an average human ear. The RA0045 includes a 40AO 1/2" prepolarized pressure microphone and each RA0045 is individually calibrated with this specific microphone.

## Introduction

The RA0045-S1 Prepolarized 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-S1 closely resembles that of the human ear and, as a result, loads a sound source in very much the same way.

The RA0045-S1 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-S1 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 40AO](#) 1/2" prepolarized pressure microphone and an individual calibration chart for the ear simulator.

## Typical Applications and Use

The RA0045-S1 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-S1](#) Artificial Ear.

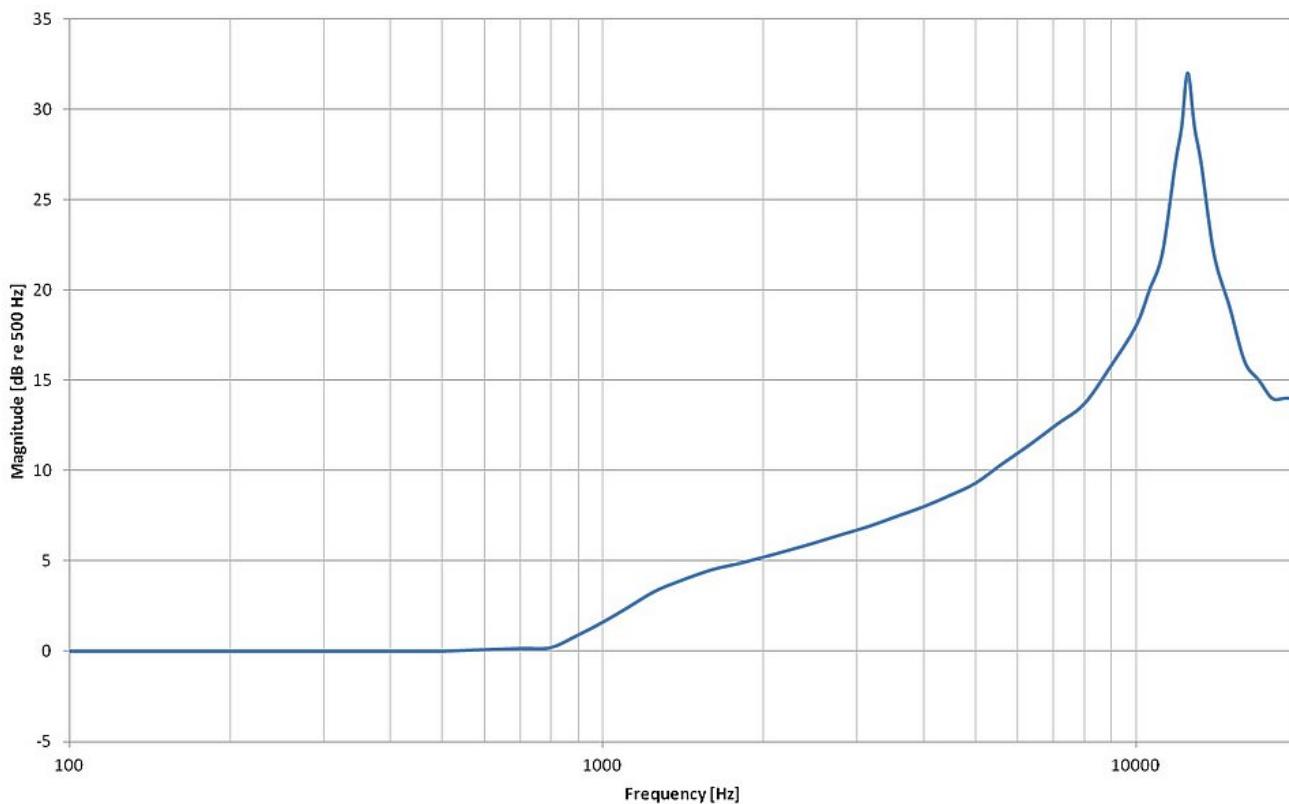
A comprehensive range of accessories for making measurements in accordance with IEC 60318-4 are available. See the tab Ordering info.

## Compatibility

The RA0045-S1 can be used with a standard CCP preamplifier, e.g. the [GRAS 26CA](#) 1/2" Preamplifier or the [GRAS 26CB](#) 1/4" Preamplifier fitted with an adapter. For the 1/4" preamplifier, use either the straight RA0003 Adapter or the right-angled RA0001 Adapter.

# Specifications

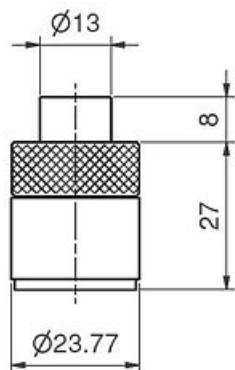
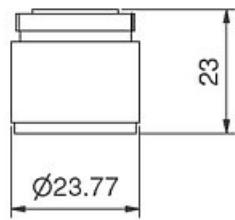
Polarization/Connection		0 V / CCP
Theoretical dynamic range lower limit with GRAS preamplifier	dB(A)	25
Dynamic range upper limit with GRAS CCP preamplifier	dB	150
Set sensitivity @ 250 Hz ( $\pm 3$ dB)	mV/Pa	12.5
Set sensitivity @ 250 Hz ( $\pm 3$ dB)	dB re 1V/Pa	-38
Resonance frequency	kHz	13.5
Coupler 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 26CA</a>	26CA 1/2" CCP Standard Preamplifier with BNC Connector
<a href="#">GRAS 26CB</a>	26CB 1/4" CCP Standard Preamplifier with Microdot Connector
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

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

# GRAS Worldwide

Subsidiaries and distributors in more than 40 countries

## HEAD OFFICE, DENMARK

**GRAS SOUND & VIBRATION**  
Skovlytoften 33  
2840 Holte  
Denmark  
Tel: +45 4566 4046  
[www.GRASacoustics.com](http://www.GRASacoustics.com)  
[gras@grasacoustics.com](mailto:gras@grasacoustics.com)

## USA

**GRAS SOUND & VIBRATION**  
9290 SW Nimbus Avenue  
Beaverton, OR 97008  
Tel: 503-627-0832  
Toll Free: 800-231-7350  
[www.GRASacoustics.com](http://www.GRASacoustics.com)  
[sales-usa@grasacoustics.com](mailto:sales-usa@grasacoustics.com)

## UK

**GRAS SOUND & VIBRATION**  
Unit 115, Gibson House,  
Ermine Business Park, Huntingdon,  
Cambridgeshire, PE29 6XU  
Tel: +44 (0) 7762 584 202  
[www.GRASacoustics.com](http://www.GRASacoustics.com)  
[sales-uk@grasacoustics.com](mailto:sales-uk@grasacoustics.com)

## CHINA

**GRAS SOUND & VIBRATION**  
Room 315, RuiBo Center(T1)  
Lane683, Shenhong Rd,  
Minhang District,  
Shanghai, China, 201107  
Tel: +86 21 64203370  
[www.GRASacoustics.cn](http://www.GRASacoustics.cn)  
[cnsales@grasacoustics.com](mailto:cnsales@grasacoustics.com)



## 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)

[grasacoustics.com](http://grasacoustics.com)

**GRAS**  
An Axiometrix Solutions Brand