

GRAS RA0045

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



Volume: 1260 mm³ @ 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

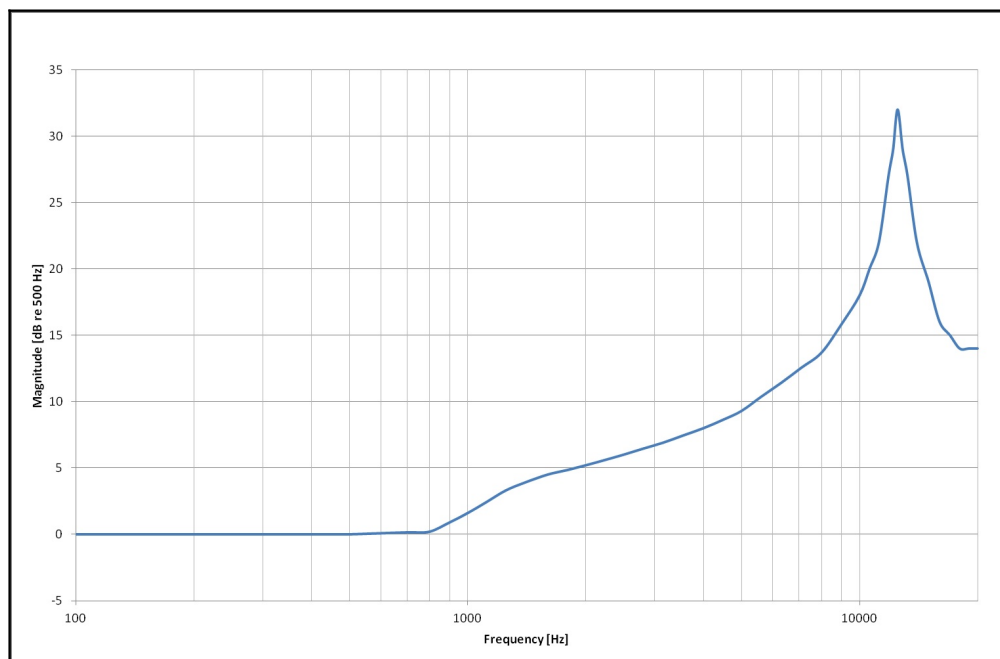
It is also part of the [GRAS 43AC](#) Artificial Ear which is a complete test jig for acoustic testing of earphones coupled to the ear by inserts.

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.

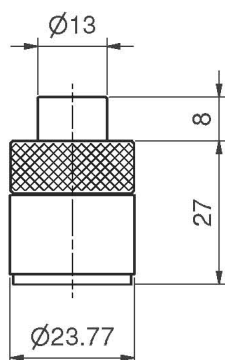
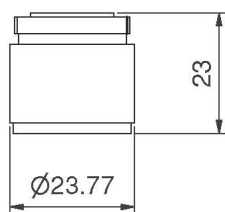
| | | |
|--|-----------------|------------------------|
| Polarization/Connection | | 200 V / Traditional |
| Theoretical dynamic range lower limit with GRAS preamplifier | dB(A) | 25 |
| Theoretical dynamic range upper limit with GRAS preamplifier @ +28 V / ±14 V power supply | dB | 153 |
| Theoretical dynamic range upper limit with GRAS preamplifier @ +120 V / ±60 V power supply | dB | 164 |
| Set sensitivity @ 250 Hz (±3 dB) | mV/Pa | 12.5 |
| Set sensitivity @ 250 Hz (±3 dB) | dB re 1V/Pa | -38 |
| Resonance frequency | kHz | 13.5 |
| Coupler volume | mm ³ | 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

| | |
|-----------------------------|--|
| GRAS RA0088 | 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 |
| GRAS RA0056 | Low-leak Pinna Simulator |
| GRAS RA0057 | High-leak Pinna Simulator |
| GRAS 26AK | 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 |

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
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
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
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
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

grasacoustics.com

GRAS
An Axiometrix Solutions Brand