

GRAS 43AA

Ear Simulator Kit According to IEC 60318-1



43AA is a complete test jig for acoustical measurements on telephone handsets and earphones in accordance with:

- IEC 60318-1 (60318) Electroacoustics – Simulators of human head and ear - Part 1: Ear simulator for the calibration of supra-aural and circumaural earphones, (2010).
- ITU-T Recommendation P.57 (08/96) Series P: Telephone transmission quality, Objective measuring apparatus: Artificial ears.

43AA also complies with IEC 60318-2 (1999) (withdrawn and now incorporated into 60318-1).

Included:

- RA0039 IEC 60318-1 (60318) Ear Simulator
- 40AG 1/2" Pressure Microphone
- 26AC 1/4" Preamplifier
- Mounting plate for circum-aural headphones
- The RA0052 Test Jig has an adjustable spring-loaded arm to exert a variable force on the test object.

GRAS 43AB

1/2" 2cc Coupler Kit According to IEC 60318-5



43AB is a complete test jig for acoustical measurements on hearing aids in accordance with IEC 60318-5 (60126) and ANSI S3.7-1995 on insert type hearing aids in accordance with:

- IEC 60318-5 (60126) IEC reference coupler for the measurement of hearing aids using earphones coupled to the ear by means of ear inserts.
- ANSI S3.7-1995 American National Standard for Coupler Calibration of Earphones.

Included:

- RA0038 IEC 60318-5 (60126) 2cc Coupler
- 40AG 1/2" Pressure Microphone
- 26AC 1/4" Preamplifier
- The RA0052 Test Jig has an adjustable spring-loaded arm to exert a variable force on the test object
- Studs and moulds for BTE and ITE instruments.

43AA Variants

43AA-S2 Ear Simulator Kit According to IEC 60318-1, CCP. 40AO Prepolarized Pressure Microphone included.

43AA-S3 Ear Simulator Kit According to IEC 60318-1, LEMO. As 43AA, but with 26AB Preamplifier.

Specifications	43AA	43AB
Standards	IEC 60318-1 ITU-T Rec. P.57	IEC 60318-5 ANSI S3.7
Dynamic Range	(ext. pol. mic.) 25 dB(A) - 164 dB (prepol. mic.) 25 dB(A) - 153 dB	25 dB(A) - 164 dB
Effective Volume	-	2 cc
Weight	1650 g	1550 g

GRAS 43AC

Ear Simulator Kit According to IEC 60318-4



43AC is a complete test jig for acoustical measurements on earphones coupled to the ear by inserts such as tubes and ear moulds in accordance with:

- IEC 60318-4 (former 60711) 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.

Included:

- RA0045 IEC 60318-4 (former 60711) Ear Simulator
- 40AG 1/2" Pressure Microphone
- 26AC 1/4" Preamp
- The RA0052 Test Jig has an adjustable spring-loaded arm to exert a variable force on the test object.

GRAS 43AF

1" 6cc Coupler Kit According to IEC 60318-3



43AF is a complete test jig for acoustically testing telephone handsets and earphones in accordance with ANSI S3.7 – 1995 and IEC 60318-3.

Included:

- RA0075 NBS 9-A 6cc Coupler
- RA0076 Thread Adapter
- 40EN 1" Pressure Microphone (in WE 640AA configuration)
- 26AC 1/4" Preamp
- The RA0052 Test Jig has an adjustable spring-loaded arm to exert a variable force on the test object.

43AC Variants

43AC-S1 Ear Simulator Kit According to IEC 60318-4, CCP. For more info about the included RA0045-S1, see page 67.

43AC-S4 High Resolution Ear Simulator Kit LEMO. For more info about the included RA0401, see page 67.

43AC-S5 High Resolution Ear Simulator Kit CCP. For more info about the included RA0402, see page 67.

Specifications	43AC	43AF
Standards	IEC 60318-4 ITU-T Rec. P.57	IEC 60318-3 ANSI S3.7
Performance data	RA0045, RA0045-S1 RA0401, RA0402 } specs on page 67	25 dB(A) - 160 dB
Effective Volume	1260 mm ³	6 cc
Weight	1650 g	1550 g

GRAS 43AD

Ear Simulator Kit according to ITU-T Rec. Type 1



43AD is a complete assembly for acoustical measurements on acoustical transmitters and loudspeakers in accordance with:

- IEC 60318-1 (60318) Electroacoustics – Simulators of human head and ear – Part 1: Ear simulator for the calibration of supra-aural earphones. 43AA also complies with IEC 60318-2 (1999) (withdrawn and now incorporated into 60318-1).
- ITU-T Recommendation P.57 (08/96) Series P: Telephone transmission quality, Objective measuring apparatus: Artificial ears.

It can be integrated with a telephone test head or permanently installed on a production test line.

Included:

- RA0039 IEC 60318-1 (60318) Ear Simulator
- 40AG 1/2" Pressure Microphone
- 26AK 1/2" Preamplifier
- GR0332 and GR0336 Snap Coupling
- Mounting plate for circum-aural headphones.

GRAS 43AE

Ear Simulator Kit according to ITU-T Rec. P57 Type 3.2



43AE is an IEC 60318-4 (former 60711) Ear Simulator for acoustically testing supra-aural earphones, telephone handsets and loudspeakers in accordance with:

- IEC 60318-4 (former 60711) Occluded-ear simulator for the measurement of earphones coupled to the ear by ear inserts (1/2" Pressure Microphone 40AG included)
- ITU-T Recommendations P.57 (08/96) Series P: Telephone transmission quality, Objective measuring apparatus: Artificial ears.

Included:

- RA0045 IEC 60318-4 (former 60711) Ear Simulator (40AG 1/2" Microphone built-in)
- 26AC 1/4" Preamplifier
- RA0056 Low-leak simplified Pinna Simulator
- RA0057 High-leak simplified Pinna Simulator.

43AD Variant

43AD-S1 CCP Ear Simulator Kit According to ITU-T Rec. P57 Type 1.

43AE Variants

43AE-S1 CCP Ear Simulator Kit According to ITU-T Rec. P57 Type 3.2.

43AE-S2 LEMO Ear Simulator Kit According to ITU-T Rec. P57 Type 3.2. As 43AE, but with 26AB Preamplifier.

Specifications	43AD	43AE
Standards	IEC 60318-1 ITU-T Rec. P.57	IEC 60318-4 ITU-T Rec. P.57
Dynamic Range	25 dB(A) - 164 dB	25 dB(A) - 164 dB
Effective Volume	-	1260 mm ³
Weight	1650 g	1550 g

GRAS 43AG

Ear & Cheek Simulator Kit IEC 60318-4 & 7



43AG is a device for measurements on earphones of various types. It simulates the ear and cheek of a human head as well as approximates the acoustic impedance of an average human ear.

It is a multi-purpose tool and can for example be used to verify frequency response, distortion, isolation and leakage. Its versatility means that it can be used for testing of both concha and insert types earphones.

It can also be used for headphone and headset testing, both circum-aural and supra-aural types. Also, all common types of hearing-aids, and telephone handset can be tested with 43AG.

The following configurations are available:

43AG Configurations

- 43AG-1** Ear and Cheek Simulator LEMO is configured with an RA0045 Externally Polarized Ear Simulator According to IEC 60318-4 and a large KEMAR Right Pinna 55 Shore 00.
- 43AG-2** Ear and Cheek Simulator CCP is configured with a RA0045-S1 Prepolarized Ear Simulator According to IEC 60318-4 and a large KEMAR Right Pinna 55 Shore 00.
- 43AG-3** Ear and Cheek Simulator w Anthropometric Pinna LEMO is configured with an RA0045 Externally Polarized Ear Simulator According to IEC 60318-4 and a KB5000 Large KEMAR Right Anthropometric Pinna 35 Shore 00.
- 43AG-4** Ear and Cheek Simulator w Anthropometric Pinna CCP is configured with a RA0045-S1 Prepolarized Ear Simulator According to IEC 60318-4 and a KB5000 Large KEMAR Right Anthropometric Pinna 35 Shore 00.
- 43AG-5** Ear and Cheek Simulator, Low-noise is configured with a 43BB low-noise ear simulator system and a large KEMAR Right Anthropometric Pinna 35 Shore 00.
- 43AG-6** Ear and Cheek Simulator, High Resolution, LEMO is configured with an RA0401 Externally Polarized High Resolution Ear Simulator and a KB5000 Large KEMAR Right Anthropometric Pinna 35 Shore 00.
- 43AG-7** Ear and Cheek Simulator, High Resolution CCP is configured with a RA0402 Prepolarized High Resolution Ear Simulator and a KB5000 Large KEMAR Right Anthropometric Pinna 35 Shore 00.

Specifications

For specifications for the RA0045 and RA045 S1 Ear Simulators, see page 67.

For specifications for the RA001 and RA0402 Ear Simulators, see page 67.

For specifications for 43BB, see page 64.

For more information about the Pinnae, see page 96.

GRAS 43BA

1/4" 0.4cc High-frequency Coupler Kit



43BA is a high frequency 1/4" 0.4cc coupler for test of hearing aids at frequencies up to 16 kHz. It is a complete kit with a 1/4" pressure microphone, a 1/4" preamplifier and the same adapters known from the reference 2cc coupler. It is designed for repetitive use and is equally suited for research, quality assurance and production test applications.

The 43BA coupler kit is designed to facilitate the measurement needs described in the IEC TS 62886:2016 "Method for measuring electroacoustic performance up to 16 kHz" and meets the need for an accurate and repeatable measurement method that can be used by designers of hearing aids and hearing aids receivers, and by fitters of hearing aids.

Three variants of the 0.4cc coupler kit are available:



43BA Coupler Kits

- 43BA-1** 1/4" 0.4cc High Frequency Coupler Kit Includes 40BP 1/4" Ext. Polarized Pressure Microphone, 26AS 1/4" Standard Preamplifier with 3 m Integrated Cable, Very Short and RA0252 1/4" 0.4cc High frequency Coupler as well as cable and adapters.
- 43BA-2** 1/4" 0.4cc CCP High Frequency Coupler Kit Includes 40BD 1/4" prepolarized Pressure Microphone, 26CS 1/4" CCP Standard Preamplifier with Microdot Connector, Very Short and RA0252 1/4" 0.4cc High frequency Coupler as well as cable and adapters.
- 43BA-3** 1/4" 0.4cc CCP High Frequency Coupler Kit, High Sensitivity Includes a special 1/4" prepolarized high sensitivity microphone, 26CS 1/4" CCP Standard Preamplifier with Microdot Connector, Very Short and RA0252 1/4" 0.4cc High frequency Coupler as well as cable and adapters.

GRAS 43BB



Low-noise Ear Simulator System



43BB is a low-noise, high-sensitive ear simulator system for measurements of sound pressure levels close to or below the threshold of human hearing.

It has a very low noise floor – below 10.5 dB(A) – and can measure sound levels below or close to the threshold of human hearing. For comparison, a standard IEC 60318-4 (711) ear simulator with a 40AG 1/2" microphone has its noise floor at 24.2 dB(A).

It consists of the well known standardized IEC 60318-4 ear simulator and the 40HT Low-noise Microphone System.

43BB-1 is a variant designed for mounting in KEMAR. It is also part of the KEMAR configurations for low-noise testing, 45BB-11 and -12 and 45BC-11 and -12, see page 70.

Specifications	43BB
Connector	7-pin LEMO with 3-m cable
Dynamic range	10.5 dB(A) - 113 dB
Coupler volume	1260 mm ³

GRAS 43AH

CCP Ear Simulator for Production Testing ITU-T P57 3.2 LL



This ear simulator consists of the ITU-T Rec. P.57 Type 2 Ear Simulator and Type 3.2 Simplified Low-leak Pinna Simulator and is designed for making ITU-T standardized tests of telephone handsets, receivers and receiver/loudspeaker-modules on the production line. Besides the RA0045-S1 Pre-polarized Ear Simulator, the 26CB 1/4" Pre-amplifier and the RA0056 Low-leak Pinna Simulator 43AH includes a detachable front-plate that can be machined to make well-defined testing on various receiver related items. A calibration adapter to be used with 42AA/42AP Pistonphone is included.



43AH can also be delivered with customized front plates that will enable leakage-controlled testing according to your specific needs.

GRAS 43AI

CCP Ear Simulator for Production Testing ITU-T P57 3.2 HL



This ear simulator is similar to 43AH but comprises a Type 3.2 Simplified High-leak Pinna Simulator for testing leak tolerant receivers.

GRAS RA0038

1/2" 2cc Coupler IEC 60318-5



An IEC 60318-5 (60126) 2cc coupler which complies with the requirements of:

- IEC 60318-5 (60126) IEC reference coupler for the measurement of hearing aids using earphones coupled to the ear by means of ear inserts.
- ANSI S3.7-1995 American National Standard for Coupler Calibration of Earphones.

It uses a 1/2" microphone with protection grid, e.g. 40AG and a suitable pre-amplifier, like 26AS, which is a 1/4" very short standard pre-amplifier with 3 m integrated cable supplied with an adapter for 1/2" microphones. RA0038 is also part of the 43AB 2cc Coupler Kit.

GRAS RA0075

NBS 9-A 6cc Coupler



RA0075 is for testing earphones according to ANSI 3.7 - 1995 and IEC 60318-3. It can be used with a 1" pressure microphone like 40EN, a 1/2" pre-amplifier like 26AK and various adapters, e.g. RA0073.

GRAS RA0252

1/4" 0.4cc High-frequency Coupler



The coupler used in the 43BA kits is available separately i.e. without microphone, ear mould and tube adapters.

Specifications	RA0038	RA0075
Standards	IEC 60318-5 (60126) ANSI S3.7-1995	ANSI S3.7-1995, Coupler calibration of earphones

GRAS RA0113

1" 2cc Coupler IEC 60318-5



RA0113 is a 2cc IEC 60318-5 (60126) coupler which uses a 1" microphone, like 40EN and a 1/2" preamplifier like 26AK supplied with e.g. RA0073 Adapter.

The microphone, without its grid, screws into the base of RA0113. In all other respects, this coupler is equivalent to RA0038.

It complies with the following international and national requirements for testing insert type hearing aids:

- IEC 60318-5 (60126) IEC reference Coupler for the measurement of hearing aids using earphones coupled to the ear by means of ear inserts.
- ANSI S3.7-1995 American National Standard for Coupler Calibration of Earphones.

GRAS RA0039

Ear Simulator IEC 60318-1



RA0039 is an IEC 60318-1 (60318) Ear Simulator with an input impedance closely resembling that of an average human ear. When coupled to a sound source, its impedance will load the sound source similar to the loading caused by the human ear. It complies with the requirements of:

- IEC 60318-1 (60318) Electroacoustics – Simulators of human head and ear – Part 1: Ear simulator for the calibration of supra-aural earphones, 1998-07.
- ITU-T Recommendation P.57 (08/96) Series P: Telephone transmission quality, Objective measuring apparatus: Artificial ears.

RA0039 is also part of the 43AA and 43AD Ear Simulator kits.

Specifications	RA0113	RA0039
Standards	IEC 60318-5 ANSI S3.7 (1995)	IEC 60318-1 (60318) / ITU-T Rec. P.57 (08/96)
Frequency Range	-	100 Hz - 8 kHz
Effective Volume	2 cc	-
Height	35 mm	19.8 mm
Diameter	22.4 mm	60 mm
Weight	50 g	137 g

IEC 60318-4 Ear Simulators

RA0045 Externally Polarized Ear Simulator IEC 60318-4

RA0045-S1 Prepolarized Ear Simulator IEC 60318-4



RA0045 is an IEC 60318-4 (former 60711) Ear Simulator for making acoustic measurements on earphones coupled to the human ear by ear inserts such as tubes, ear moulds or ear tips in accordance with:

- IEC 60318-4 (former 60711) 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 delivered with a built-in 40AG 1/2" microphone and an individual calibration chart for the coupler-microphone combination. Can be used with either of the RA0056 and RA0057 Pinna Simulators to simulate a complete ear for testing telephones and loudspeakers.



RA0045-S1 is similar to RA0045 but is delivered with a built-in prepolarized microphone GRAS 40A0 for use with CCP preamplifiers.

More RA0045 Variants

RA0045-S4 High Sensitivity, 40AP Ext. Pol. Microphone

RA0045-S5 High Pressure, 40BP Ext. Pol. Microphone

RA0045-S6 High Sensitivity, 40AD Prepol. Microphone

Specifications for RA0045 variants can be found at www.gras.dk

IEC 60318-4 Ear Simulators, High Resolution

RA0401 Externally Polarized High Resolution Ear Simulator IEC 60318-4

RA0402 Prepolarized High Resolution Ear Simulator IEC 60318-4



RA0401 is a high resolution version of the well-known standardized 60318-4 ear simulator (RA0045), which has gained wide acceptance as the preferred tool for measurements with simulation of the acoustic load presented by the human ear. Below 10 kHz, the standardized ear simulator does a good job. However, above 10 kHz its performance starts rapidly to deteriorate. The GRAS High Resolution Ear Simulator mitigates this limitation. The steep resonance at 13.5 kHz has been replaced by a dampened resonance and the useful frequency range is extended to 20 kHz within a narrow tolerance band. RA0401 complies with IEC60318-4 and is fully backwards compatible as its acoustic transfer impedance is within the tolerance band specified by IEC60318-4. From 10 to 20 kHz the transfer impedance is within ± 2.2 dB, resulting in



improved repeatability. Also, realistic THD measurements are now possible.

It is measured and calibrated according to the ITU-T Recommendation P.57 and delivered with a calibration chart specifying its sensitivity and frequency response.



RA0402 is similar to RA0401 but is delivered with a built-in prepolarized microphone GRAS 40A0 for use with CCP preamplifiers.

Specifications	RA0045/RA0045-S1	RA0401/RA0402
Standards	IEC 60318-4 (former 60711) ITU-T Rec. P.57 (08/96)	IEC 60318-4 (former 60711) ITU-T Rec. P.57 (08/96)
Dynamic Range	25 dB(A) - 164 dB/25 dB(A) - 150 dB	25 dB(A) - 164 dB/25 dB(A) - 150 dB
Effective Volume	1260 @ 500 Hz	1260 @ 500 Hz
Resonant Frequency	13.5 kHz \pm 1 kHz	13.5 kHz \pm 1 kHz
Height	36.5 mm	36.5 mm
Diameter	23.8 mm	23.8 mm
Weight	71 g	74 g

GRAS RA0056

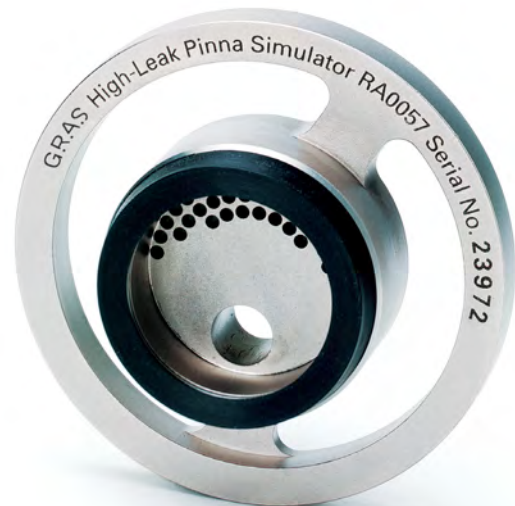
Low-leak Pinna Simulator



▼
A low-leak, pinna (outer ear) simulator for use with the RA0045 Ear Simulator to simulate a complete ear for testing telephones and loudspeakers. The RA0056 meets the specifications in the ITU-T Recommendation P.57 (08/96) "Series P: Telephone transmission quality, Objective measuring apparatus: Artificial ears".

GRAS RA0057

High-leak Pinna Simulator



▼
A high-leak, pinna (outer ear) simulator for use with the RA0045 Ear Simulator to simulate a complete ear for testing telephones and loudspeakers. The RA0057 meets the specifications in the ITU-T Recommendation P.57 (08/96) "Series P: Telephone transmission quality, Objective measuring apparatus: Artificial ears".

GRAS 44AA & 44AB

Mouth Simulators



GRAS 44AA



RA0104 / RA0105



GRAS 44AB



A sound source, which simulates the acoustic field close to the human mouth and complies with the standards IEEE 269, 661 and ITU-T Rec. P51.

For testing telephone mouthpieces as well as other microphones. At the mouth reference point (MRP), which is 25 mm from the detachable lip ring, the minimum-continuous signal it can produce in 1/3-octave bands is 100 dB re. 20 μ Pa in the frequency range 100 Hz to 10 kHz.

44AA's loudspeaker accepts an external signal either directly or via its own built-in power amplifier.

44AB's loudspeaker accepts a signal from an external power amplifier directly via the BNC input.

The jigs RA0104 and RA0105 are included for calibration according to ITU-T Rec. P51 and IEEE 269. These are for use with 1/4" or 1/2" microphones on 1/4" preamplifiers.

RA0104 holds the microphone at 0° incidence (1/4" only) to the sound source, RA0105 at 90° incidence (1/4" or 1/2").

Specifications	44AA	44AB
Min. continuous output level at MRP	110 dB re. 20 μ Pa (200 Hz – 6 kHz) 100 dB re. 20 μ Pa (100 Hz – 16 kHz)	110 dB re. 20 μ Pa (200 Hz – 6 kHz) 100 dB re. 20 μ Pa (100 Hz – 16 kHz)
Loudspeaker	8 Ω / 10 W (max. continuous)	8 Ω / 10 W (max. continuous)
Amplifier	Gain: 10 dB / Input impedance: 20 k Ω	- / -
Mouth opening	20 mm diameter	20 mm diameter
Lip ring: External diameter / Distance from mouth	48 mm / 10 mm	48 mm / 10 mm
Dimensions: Diameter / Height (with lip ring)	104 mm / 104 mm	104 mm / 104 mm