

GRAS 45CA

耳机/听力保护器测试夹具



ISO: 4869-3
IEC: 60318-1 and 60318-4
depending on configuration

GRAS 45CA是一种通用测试夹具，用于根据ISO 4869-3测量听力保护器的隔声，以及根据IEC60318-1或60318-4进行耳朵和耳机的隔声测量。根据ANSI/ASA S12.42 标准测试听力保护器时，选择 [GRAS 45CB](#)。

引言

GRAS 45CA 为可靠、精确的测量提供了基础，其设计符合以下要求

- 安装在弹性底座上的测试夹具，可将典型测试情况下的本底噪声降至最低。提供泡沫塞和润滑脂，以避免沿电缆漏音
- 测试夹具头，用于优化隔音效果
- 用于测试隔音效果的隔音杯和隔音塞
- 可安装一系列模制橡胶 KEMAR 耳廓，例如用于测试耳塞的耳廓

45CA 的设计坚固耐用，非常适合对主动和被动耳塞以及环耳听力保护器进行双耳测试。

它主要用于测试耳塞和耳罩（耳上和耳周）等听力保护装置的性能，也可用于测试耳机和耳机等声源。它配有传声器或耳模拟器，具体取决于要测试的设备和要遵守的标准。

符合 ISO 4869-3 IEC 60318-1 和 IEC 60318-4 标准可确保技术人员、决策者和权威机构在开发和验证听力保护器时获得可重复性和透明数据。

45CA 的耳廓与标准的 KEMAR 耳廓相同，但经过圆角处理，以适合 45CA 的大底板。这种大底板可降低或消除泄漏风险。

45CA 包括两个塞子，用于测量闭合耳朵的隔声量。

我们建议在每次使用前进行校准，以确保测量的准确性。[GRAS 42AP](#) 智能活塞发声器和 [GRAS 42AA](#) 活塞发声器非常适合这项任务。

TEDS 兼容性

所有基于 CCP 的配置（-2、-4、-6、-8、-10 和 -12）均符合 IEEE 1451.4 TEDS v. 1.0 标准。如果您的测量平台支持传感器电子数据表 (TEDS) 您就可以读写属性和校准数据等数据。

典型应用和使用的配置

45CA 耳机/听力保护器测试夹具（非配置）是一个多功能测试平台，您可以根据具体需要进行配置。最常见的配置可向 GRAS 订购，这些配置已组装、校准和测试完

毕：

45CA-1 耳机/听力保护器测试夹具 ISO 4869-3 1" 传声器. LEMO

45CA-1 是一种用于测试耳外设备的配置，即用于测量耳罩的插入损耗和耳机的音质。在这种配置中 45CA 配置了两个 GRAS 40EN 1" 压力传声器。该配置符合 ISO 4869-3

45CA-2 耳机/听力保护器测试夹具 ISO 4869-3 1/2" 传声器. CCP

45CA-2 是一种用于测试耳外设备的配置，即用于测量耳罩的插入损耗和耳机的音质。在这种配置中 45CA 配置了两个 GRAS 40AD 1/2" 压力传声器。该配置符合 ISO 4869-3 标准。

45CA-3 耳机/听力保护器测试夹具 IEC 60318-1 LEMO

45CA-3 配有两个带 40AG 1/2" 外部极化传声器的 RA0039 耳模拟器，用于测量环耳听力保护器的插入损耗和耳机的音质。该配置符合 IEC 60318-1 标准 RA0039 不能与耳廓模拟器一起使用，因此不能用于测量入耳式耳机。

45CA-4 耳机/听力保护器测试夹具 IEC 60318-1 CCP

45CA-4 配有两个有 40AO 1/2" 预极化传声器的 RA0039 耳模拟器。该配置符合 IEC 60318-1 标准，用于测量环耳听力保护器的插入损失和耳机的音质 RA0039 不能与耳廓模拟器一起使用，因此不能用于测量入耳式耳机。

45CA-5 耳机/听力保护器测试夹具 IEC 60318-4 LEMO

45CA-5 配有 RA0045 外部极化耳模拟器，可与耳廓模拟器一起使用。它可用于测量耳罩和耳塞的插入损耗，以及耳机和头戴式耳机的音质。其配置符合 IEC 60318-4 标准。

45CA-6 耳机/听力保护器测试夹具 IEC 60318-4 CCP

45CA-6 配有 RA0045-S1 预极化耳模拟器，可与耳廓

模拟器一起使用。该配置可用于测量耳罩的插入损耗、耳机和助听器的音质。该配置符合 IEC 60318-4 标准。

45CA-7 耳机/听力保护器测试夹具 IEC 60318-4 LEMO 带人体测量耳廓

45CA-7 配有 RA0045 外部极化耳模拟器和人体测量耳廓。它可用于测量耳罩和耳塞的插入损耗，以及耳机和头戴式耳机的音质。其配置符合 IEC 60318-4 标准。

45CA-8 头戴式耳机/听力保护器测试夹具 IEC 60318-4 CCP 带人体测量耳廓

45CA-8 配有 RA0045-S1 预极化耳模拟器和人体测量耳廓。该配置可用于测量耳罩的插入损耗、耳机和助听器的音质。该配置符合 IEC 60318-4 标准。

45CA-9 头戴式耳机/听力保护器测试夹具、高频耳模拟器和人体测量耳针 LEMO

45CA-9 配有 RA0401 外部极化高频耳模拟器和人体测量耳廓。它可用于测量助听器、耳机和头戴式耳机，最高频率可达 20 kHz 该配置符合 IEC 60318-4 标准。

45CA-10 头戴式耳机/听力保护器测试夹具、高频耳模拟器和人体测量耳廓 CCP

45CA-10 配有 RA0402 预极化耳模拟器和人体测量耳廓。它可用于测量助听器、耳机和头戴式耳机，最高频率可达 20 kHz 配置符合 IEC 60318-4

45CA-11 头戴式耳机/听力保护器测试夹具，高保真耳模拟器和人体测量耳针 LEMO

45CA-11 配有 RA0403 外部极化高保真耳模拟器和人体测量耳廓。它可用于测量助听器、耳机和头戴式耳机，最高频率可达 50 kHz 该配置与 IEC 60318-4 兼容。

45CA-12 头戴式耳机/听力保护器测试夹具，高保真耳模拟器和人体测量耳廓 CCP

45CA-12 配有 RA0404 预极化高保真耳模拟器和人体

测量耳廓。它可用于测量助听器、耳机和头戴式耳机，最高频率可达 50 kHz 配置与 IEC 60318-4 兼容。

45CA-13 头戴式耳机/听力保护器测试夹具，低噪音耳模拟器系统

45CA-13 配有 43BB 低噪音耳模拟器系统和人体测量耳廓。它可用于测量助听器、耳机和头戴式耳机。配置与 IEC 60318-4 兼容。

每种配置的特定应用项目都列在 "订购信息" 选项卡下。

系统验证

要对测量设置进行日常验证和检查，建议使用 [GRAS 42AG](#) 多功能声音校准器等校准器。要进行适当的灵敏度校准，建议使用 [GRAS 42AP](#) 智能活塞发声器。

服务

如果您不小心损坏了耳模拟器，我们在大多数情况下都能以非常合理的价格更换和维修，而且周转时间很短。这不仅能保护您的投资，还能让您的质量保证部门满意，因为您不必担心新的序列号等问题。

校准

所有产品在出厂前都要在受控实验室环境中使用可追溯校准设备进行校准。根据使用情况、测量环境和内部质量控制程序，我们建议至少每年对系统进行一次重新校准。

性能和质保

GRAS 45CA 由我们标准产品组合中的部件组成，所有部件均由优质材料和品牌部件制成，这些材料和部件均经过精挑细选和加工，以确保其终生稳定性和坚固性。因此，我们对材料和工艺缺陷提供 5 年质保。例外情况：电缆保修期为 6 个月。

IEC standard		Dep. on conf.
ITU-T recommendations		P.380
CE/RoHS compliant/WEEE registered		Yes/Yes/Yes
Weight	g / oz	11.6 k / 409.18
45CA-1 and 45CA-2		
Self Insertion Loss, measured with closed ear simulators	> 50 dB	80 - 250 Hz
Self Insertion Loss, measured with closed ear simulators	> 65 dB	350 - 4000 Hz
Self Insertion Loss, measured with closed ear simulators	> 55 dB	5000 - 20000 Hz
Specs for the GRAS 40EN 1" Externally Polarized Pressure Microphone can be found here .		
Specs for the GRAS 40AD 1/2" Prepolarized Pressure Microphone can be found here .		
45CA-3 and 45CA-4		
GRAS RA0039 Ear Simulator	Specs can be found here :	www.gras.dk/RA0039
GRAS 40AG 1/2" Externally Polarized Pressure Microphone	Specs can be found here :	www.gras.dk/40AG
GRAS 40A0 1/2" Prepolarized Pressure Microphone	Specs can be found here :	www.gras.dk/40A0
45CA-3 and 45CA-4		
GRAS RA0039 Ear Simulator	Specs can be found here :	www.gras.dk/RA0039
GRAS 40AG 1/2" Externally Polarized Pressure Microphone	Specs can be found here :	www.gras.dk/40AG
GRAS 40A0 1/2" Prepolarized Pressure Microphone	Specs can be found here :	www.gras.dk/40A0
45CA-5 to 45CA-8		
GRAS RA0045 Ear Simulator	Specs can be found here :	www.gras.dk/RA0045
GRAS RA0045-S1 Ear Simulator	Specs can be found here :	www.gras.dk/RA0045-s1
45CA-9 to 45CA-10		
GRAS RA0401 High-Frequency Ear Simulator Externally Polarized	Specs can be found here :	www.gras.dk/RA0401

GRAS RA0402 High-Frequency Ear Simulator Prepolarized	Specs can be found here :	www.gras.dk/RA0402
45CA-11 to 45CA-12		
GRAS RA0403 Hi-Res Ear Simulator Externally Polarized	Specs can be found here :	www.grasacoustics.com/ra0403
GRAS RA0404 Hi-Res Ear Simulator Prepolarized	Specs can be found here :	www.grasacoustics.com/ra0404
45CA-13		
GRAS 43BB Ear Simulator	Specs can be found here :	www.grasacoustics.com/43bb

GRAS Sound & Vibration 保留更改规格和配件的权利，恕不另行通知。

包含 **GRAS 45CA** 的项目

通用于所有配置、非配置订购时交付

GRAS GR1085	Cover Plate, 2 pcs
GRAS GR0970	Insert
GRAS GR0974	Acoustic Cup (for acoustic isolation testing)
GRAS RA0178	1" Acoustic Plug
GRAS GR1281	Foam plug for leakage sealing (2 pcs)
GRAS MI0016	7 ml Silicon grease for leakage sealing
GRAS YY0019	Allen Key, 6 mm
GRAS YY0016	Allen Key, 2.5 mm
GRAS YY0018	Allen Key, 2 mm
GRAS YY0012	Allen Key, 1.5

配置

有 12 种不同的 45CA 预配置可供选择。每种预配置都已组装完毕并经过测试，随时可供使用。

45CA-1 1 英寸头戴式耳机/听力保护器测试夹具 □ **ISO 4869-3** 1 英寸传声器.**LEMO**——用于测试耳罩

GRAS 40EN	1" Ext. Polarized Pressure Microphone (2 pcs)
GRAS RA0017	Adapter for 1" microphone and 1/2" preamplifier (2 pcs)
GRAS RA0003	Adapter for 1/2" microphone and 1/4" preamplifier (2 pcs)
GRAS 26AS	1/4" Standard Preamplifier with 3 m integrated cable, very short (2 pcs)

45CA-2 1/2" 头戴式耳机/听力保护器测试夹具 □ **ISO 4869-3** 1/2" 传声器.**CCP**——用于测试耳罩

GRAS 40AD	1/2" Prepolarized Pressure Microphone, High Sensitivity (2 pcs)
GRAS RA0177	1" Microphone protection grid (2 pcs)
GRAS RA0058	1/2" to 1" Microphone Adapter (2 pcs)
GRAS GR0010	1/2" to 1/4" Adapter (2 pcs)
GRAS 26CB	1/4" CCP Preamplifier with Microdot connector, very short (2 pcs)

[GRAS AA0070](#) 3 m Microdot - BNC Cable, High Temp

45CA-3 头戴式耳机/听力保护器测试夹具 IEC 60318-1 LEMO——用于测试耳罩和耳机

GRAS RA0039	Ear Simulator according to IEC 60318-1 (2 pcs)
GRAS 40AG	1/2" Ext. Polarized Pressure Microphone (2 pcs)
GRAS RA0176	1/2" to 1" Adapter for RA0039 (2 pcs)
GRAS GR0010	1/2" to 1/4" Adapter (2 pcs)
GRAS 26AS	1/4" Standard Preamp with 3 m integrated cable, very short (2 pcs)

45CA-4 头戴式耳机/听力保护器测试夹具 IEC 60318-1 CCP——用于测试耳罩和耳机

GRAS RA0039	Ear Simulator according to IEC 60318-1 (2 pcs)
GRAS 40AO	1/2" Prepolarized Pressure Microphone (2 pcs)
GRAS RA0176	1/2"-1" Adapter for RA0039 (2 pcs)
GRAS GR0010	1/2" to 1/4" Adapter (2 pcs)
GRAS 26CB	1/4" CCP Preamp with Microdot connector, very short (2 pcs)
GRAS AA0070	3 m Microdot - BNC Cable, High Temp

45CA-5 头戴式耳机/听力保护器测试夹具 IEC 60318-4 LEMO——用于测试耳罩、耳塞、头戴式耳机和耳机

GRAS KB0070	Large Right KEMAR Pinna, 55 Shore 00
GRAS KB0071	Large Left KEMAR Pinna, 55 Shore 00
GRAS GR1075	Pinna Holder Plate
GRAS GR1069	Ear Canal Extension
GRAS RA0045	Externally Polarized Ear Simulator according to IEC 60318-4 (60711) (2 pcs)
GRAS GR0010	1/2" to 1/4" Adapter (2 pcs)
GRAS 26AS	1/4" Standard Preamp with 3 m integrated cable, very short (2 pcs)

45CA-6 头戴式耳机/听力保护器测试夹具 IEC 60318-4 CCP——用于测试耳罩、耳塞、头戴式耳机和耳

机

GRAS KB0070	Large Right KEMAR Pinna, 55 Shore 00
GRAS KB0071	Large Left KEMAR Pinna, 55 Shore 00
GRAS GR1075	Pinna Holder Plate
GRAS GR1069	Ear Canal Extension
GRAS RA0045-S1	Prepolarized Ear Simulator according to IEC 60318-4 (60711) (2 pcs)
GRAS GR0010	1/2" to 1/4" Adapter (2 pcs)
GRAS 26CB	1/4" CCP Preamplicifier with Microdot connector, very short (2 pcs)
GRAS AA0070	3 m Microdot - BNC Cable, High Temp (2 pcs)

45CA-7 头戴式耳机/听力保护器测试夹具 IEC 60318-4 LEMO 带人体测量耳廓——用于测试耳罩、耳塞、头戴式耳机和耳机

GRAS KB5010	Large Right Anthropometric KEMAR Pinna 35 Shore 00
GRAS KB5011	Large Left Anthropometric KEMAR Pinna 35 Shore 00
GRAS GR1075	Pinna Holder Plate
GRAS RA0045	Externally Polarized Ear Simulator according to IEC 60318-4 (60711) (2 pcs)
GRAS GR0010	1/2" to 1/4" Adapter
GRAS 26AS	1/4" Standard Preamplicifier with 3 m integrated cable, very short (2 pcs)
GRAS GR0408	Exterior Ear Canal (for calibration)
GRAS GR0409	Union Nut (for calibration)

45CA-8 头戴式耳机/听力保护器测试夹具 IEC 60318-4 CCP 带人体测量耳廓——用于测试耳罩、耳塞、头戴式耳机和耳机

GRAS KB5010	Large Right Anthropometric KEMAR Pinna 35 Shore 00
GRAS KB5011	Large Left Anthropometric KEMAR Pinna 35 Shore 00
GRAS GR1075	Pinna Holder Plate
GRAS RA0045-S1	Prepolarized Ear Simulator according to IEC 60318-4 (60711) (2 pcs)

GRAS GR0010	1/2" to 1/4" Adapter
GRAS 26CB	1/4" CCP Preamplifier with Microdot connector, very short (2 pcs)
GRAS AA0070	3 m Microdot - BNC Cable, High Temp (2 pcs)
GRAS GR0408	Exterior Ear Canal (for calibration)
GRAS GR0409	Union Nut (for calibration)

45CA-9 头戴式耳机/听力保护器测试夹具，带人体测量耳廓的高频耳模拟器□LEMO——用于测试高达 20 kHz 的头戴式耳机和耳机

GRAS KB5010	Large Right Anthropometric KEMAR Pinna 35 Shore 00
GRAS KB5011	Large Left Anthropometric KEMAR Pinna 35 Shore 00
GRAS GR1075	Pinna Holder Plate
GRAS RA0401	Externally Polarized High-Frequency Ear Simulator (2 pcs)
GRAS GR0010	1/2" to 1/4" Adapter
GRAS 26AS	1/4" Standard Preamplifier with 3 m integrated cable, very short (2 pcs)
GRAS GR0408	Exterior Ear Canal (for calibration)
GRAS GR0409	Union Nut (for calibration)

45CA-10 头戴式耳机/听力保护器测试夹具，带人体测量耳廓的高频耳模拟器□CCP——用于测试高达 20 kHz 的头戴式耳机和耳机

GRAS KB5010	Large Right Anthropometric KEMAR Pinna 35 Shore 00
GRAS KB5011	Large Left Anthropometric KEMAR Pinna 35 Shore 00
GRAS GR1075	Pinna Holder Plate
GRAS RA0402	Prepolarized High-Frequency Ear Simulator (2 pcs)
GRAS GR0010	1/2" to 1/4" Adapter
GRAS 26CB	1/4" CCP Preamplifier with Microdot connector, very short (2 pcs)
GRAS AA0070	3 m Microdot - BNC Cable, High Temp (2 pcs)
GRAS GR0408	Exterior Ear Canal (for calibration)
GRAS GR0409	Union Nut (for calibration)

45CA-11 头戴式耳机/听力保护器测试夹具，带人体测量耳廓的高保真耳模拟器□LEMO——用于测试高达 50 kHz 的头戴式耳机和耳机

GRAS KB5010	Large Right Anthropometric KEMAR Pinna 35 Shore 00
GRAS KB5011	Large Left Anthropometric KEMAR Pinna 35 Shore 00
GRAS GR1075	Pinna Holder Plate
GRAS RA0403	Externally Polarized Hi-Res Ear Simulator (2 pcs)
GRAS 26AS	1/4" Standard Preamp with 3 m integrated cable, very short (2 pcs)
GRAS GR0408	Exterior Ear Canal (for calibration)
GRAS GR0409	Union Nut (for calibration)

45CA-12 头戴式耳机/听力保护器测试夹具，带人体测量耳廓的高保真耳模拟器□CCP——用于测试高达 50 kHz 的头戴式耳机和耳机

GRAS KB5010	Large Right Anthropometric KEMAR Pinna 35 Shore 00
GRAS KB5011	Large Left Anthropometric KEMAR Pinna 35 Shore 00
GRAS GR1075	Pinna Holder Plate
GRAS RA0404	Prepolarized Hi-Res Ear Simulator (2 pcs)
GRAS 26CS	1/4" CCP Preamp with Microdot connector, very short (2 pcs)
GRAS AA0070	3 m Microdot - BNC Cable, High Temp (2 pcs)
GRAS GR0408	Exterior Ear Canal (for calibration)
GRAS GR0409	Union Nut (for calibration)

可选配件

使用 IEC 60318-4 耳模拟器配置的 KEMAR 耳廓

GRAS RA0172	Pinna & Ear Simulator Mounting Kit (required to hold a pinna) Included with 45CA-5 and -6. Note: Contains a cover plate, ear canal extension, screws and Allen key
GRAS KB0070	KEMAR Large Right Pinna Shore 55 Hearing Protector. Included with 45CA-5 and 6.
GRAS KB0071	KEMAR Large Left Pinna Shore 55 Hearing Protector. Included with 45CA-5 and 6.

GRAS KB1070	KEMAR Large Right Pinna Shore 35 Hearing Protector
GRAS KB1071	KEMAR Large Left Pinna Shore 35 Hearing Protector
GRAS KB0072	KEMAR Small Right Pinna Shore 55 Hearing Protector
GRAS KB0073	KEMAR Small Left Pinna Shore 55 Hearing Protector
GRAS KB5010	KEMAR Large Right Anthropometric Pinna for 45CA, Shore 35. Included with 45CA-7 and 8
GRAS KB5011	KEMAR Large Left Anthropometric Pinna for 45CA, Shore 35. Included with 45CA-7 and 8

用于 LEMO 配置的电缆

GRAS AA0008	3 m LEMO 7-pin - LEMO 7-pin Cable
GRAS AA0009	10 m LEMO 7-pin - LEMO 7-pin Cable

用于 CCP 配置的电缆

GRAS AA0035	3 m BNC - BNC Cable
GRAS AA0037	10 m BNC - BNC Cable
GRAS AE0074	BNC - BNC adapter

电源模块

GRAS 12AQ	For all configurations (dual channel LEMO/CCP)
GRAS 12AA	For externally polarized configurations only (dual channel)

电源 +15 VDC (为电源模块提供 +15 VDC 电源)

GRAS AB0002	Mains/line power supply, 230 VAC (EU mains connector)
GRAS AB0006	Mains/line power supply, 230 VAC (UK mains connector)
GRAS AB0003	Mains/line power supply, 120 VAC (US mains connector)

校准设备

GRAS 42AP	Intelligent Pistonphone, Class 0
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GRAS 42AA	Pistonphone, Class 1
GRAS RA0023	Coupler for 1" microphones (Note: RA0023 is included with 42AP but optional for 42AA)
GRAS RA0287	Calibration Adapter (for in-situ verification of RA0039)
GRAS RA0157	1/2" Calibration Adapter for KEMAR Pinna (For the IEC60318-4 configuration only)
GRAS 42AG	Multifunction Sound Calibrator, Class 1

GRAS Sound & Vibration 保留更改规格和配件的权利，恕不另行通知。

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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 to industries where acoustic measuring accuracy and repeatability is of utmost importance in R&D, QA and production. This includes applications and solutions for customers within the fields of aerospace, automotive, audiology, and consumer electronics. GRAS microphones are designed to live up to the high quality, durability and accuracy that our customers have come to expect and trust.

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

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