AUDIOLOGY

Defining Safe Noise Exposure Levels for Hearing Aid Users Using GRAS 45CB Acoustic Test Fixture

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University of Southampton
Institute of Sound and Vibration Research (ISVR)

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GRAS 45CB

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Project

“What are safe noise exposures for hearing aid users?”

The project is funded by the EPSRC Noise Network Plus and conducted in collaboration with researchers at the Institute of Sound and Vibration Research. The project is led by Professor Steve Bell with early-career researcher Richard Johns contributing to the research.

The research aims to determine safe workplace noise exposure levels for people using hearing aids. As populations age and working lives extend, more individuals with hearing loss continue to work in industries with potentially hazardous noise environments.

While workplace noise regulations exist, there is currently limited scientific evidence on safe exposure limits for hearing aid users.

The results will help inform guidance from the Health and Safety Executive and support safer working conditions for people with hearing loss.



GRAS 45CB Acoustic Test Fixture

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The Challenge

Millions of workers rely on hearing aids to remain active in the workforce. However, hearing aids amplify sound, which raises important questions:

- How does amplification affect exposure to workplace noise?
- Are current occupational exposure limits safe for hearing aid users?
- How can hearing aid users work safely in high-noise industries such as construction, manufacturing, and shipbuilding?

Reliable answers require accurate simulation of the human ear and hearing aid interaction with sound.

The Solution

Researchers use a GRAS 45CB Acoustic Test Fixture equipped with a hearing aid to accurately replicate how sound reaches the human ear.

The GRAS 45CB provides:

- A realistic acoustic representation of the human head and ear
- Accurate measurement of sound pressure at the ear canal
- Repeatable and standardized testing conditions

By placing a hearing aid on the GRAS 45CB ear and exposing the system to controlled noise environments, researchers can measure how amplified sound reaches the ear and evaluates potential risks.

This approach allows the team to quantify true acoustic exposure levels experienced by hearing aid users.

Why GRAS 45CB Acoustic Test Fixture

The 45CB is widely used in hearing research because it enables:

- Realistic simulation of human hearing conditions
- Highly repeatable acoustic measurements
- Accurate evaluation of hearing devices and sound exposure
- High self-insertion loss
- Heated ear canal to body temperature
- Available in different configuration with different ear simulator types

These capabilities are essential when studying how hearing aids interact with complex workplace noise environments.



GRAS 45CB
Acoustic Test Fixture.
The GRAS 45CB Acoustic Test Fixture is specified and designed for measuring sound isolation of hearing-protectors and ear- and headphones according to the ANSI/ASA S12.42 standard. For testing in accordance with the ISO 4869-3 standard, choose GRAS 45CA.

GRAS 45CB >

Impact

The research will contribute to:

- Improved workplace safety guidance
- Evidence-based noise exposure limits for hearing aid users
- Better opportunities for people with hearing loss to remain in employment longer

Ultimately, the findings will help ensure that individuals who rely on hearing aids can continue to work safely in a wide range of industries.

GRAS Commitment to Hearing Health Research

For more than three decades, GRAS Sound & Vibration has supported the global hearing research community by providing precision acoustic measurement solutions used to understand, protect, and improve human hearing.

Research institutions, hearing aid manufacturers, and regulatory bodies rely on GRAS measurement technologies to study how sound interacts with the human ear and hearing devices. Solutions such as the GRAS KEMAR Manikin Type 45BB enable realistic simulation of human hearing conditions, allowing researchers to evaluate hearing aids, communication devices, and noise exposure in a controlled and repeatable way.

By supporting studies like this project at the University of Southampton, GRAS contributes to advancing knowledge about safe listening levels, hearing protection, and hearing aid performance. These insights are essential for developing evidence-based guidelines that protect hearing health while enabling people with hearing loss to remain active in the workforce and society.

Through close collaboration with universities, industry partners, and standards organizations, GRAS remains committed to advancing the science of sound and supporting the technologies that safeguard hearing health worldwide.

For more information,
please contact marketing@grasacoustics.com.

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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 the 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.

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