Fit Testing for Hearing Protection: A Practical Introduction for Your Workplace

May 2025

ACKNOWLEDGEMENT

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NORA Hearing Loss Prevention Cross-sector Council

https://www.cdc.gov/nora/councils/hlp/default.html

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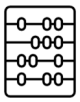
An Introduction to Hearing Protector Fit Testing

Does this sound like your workplace?

It's noisy.

Despite all efforts to reduce noise, it is still loud enough to potentially cause hearing loss.

You follow applicable regulations and best practice recommendations to set up a hearing conservation program (also called a hearing loss prevention program).



You provide a selection of hearing protectors you believe are suitable for noise-exposed workers based on the Noise Reduction Rating (NRR).

You feel confident because you have met the regulatory requirements… yet…

You still wonder… Do the hearing protectors properly fit each person? How can I be certain that the hearing protectors are blocking enough noise?

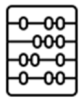
Hearing protector fit testing can make a difference!

Keep reading to learn how hearing protector fit testing can help ensure workers are protected adequately… *before it is too late*.

What is hearing protector fit testing?

Hearing protector fit testing is a procedure used to measure the amount of noise reduction provided by a specific hearing protector during a given fitting on an individual worker. Fit testing is a quantitative way to make sure the individual fit will protect the wearer. It is also a powerful tool for training.

But we use the Noise Reduction Rating (NRR)… isn't that enough?



Selecting and wearing hearing protectors is not as simple as checking the NRR. The NRR is a laboratory measure based on the amount of noise reduction obtained by a group of individuals under ideal conditions. The NRR cannot tell you how much noise reduction an individual worker is getting.

Hearing conservation regulations typically use the NRR as a preferred method for determining if hearing protectors are "suitable" to offer to workers. But using the NRR is just one step in choosing hearing protectors. Federal regulations also require employers to ensure the selected hearing protectors have proper initial fit and workers are trained. *Hearing protector fit testing is the answer.*

How do employers and workers know if hearing protectors are blocking enough noise?

The best way to know if a hearing protector is effective is to measure its sound reduction on **individual workers**. Advancements in science and technology developed after the NRR regulations were established now make it possible to obtain a Personal Attenuation Rating (PAR) for each person by using **hearing protector fit testing**.

To find out more about the research and technology behind these advances, see the Technical References in the Resources section.

What is a Personal Attenuation Rating (PAR)?

A PAR is a single number (in decibels) generated by a hearing protector fit-test system. It indicates how much a hearing protector reduces, or attenuates, the sound that reaches the ear.

The PAR is used to determine "individual fit" which is different from determining the "suitability" of a hearing protector's attenuation based on the NRR. Even if a hearing protection device is determined to be "suitable" based on the NRR, it may not be a good fit for a particular individual.

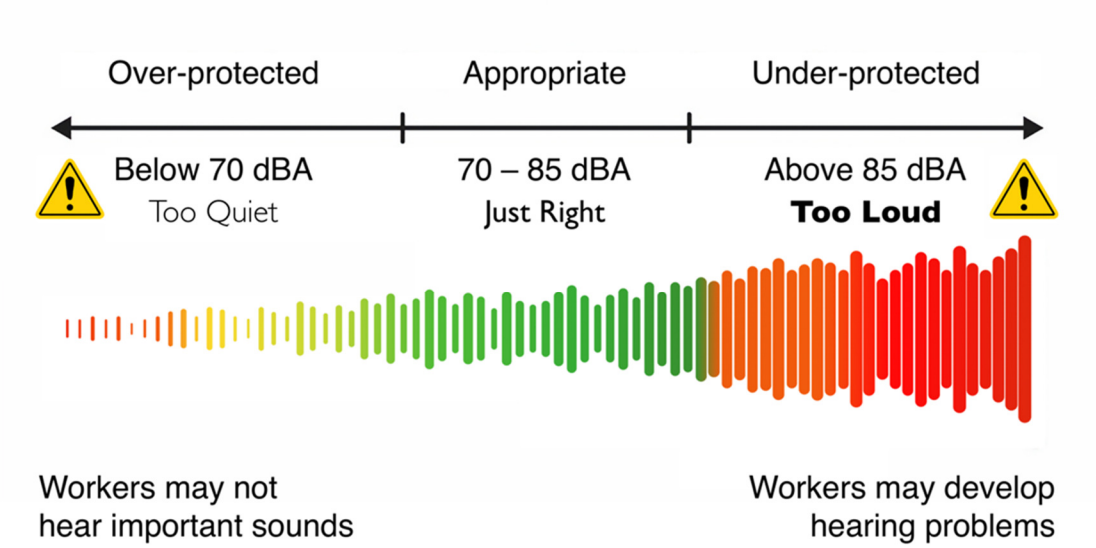
How is PAR used?

The PAR can be used to judge whether a worker is adequately protected by comparing the PAR to the worker's noise exposure. The PAR is either subtracted from an A-weighted exposure or compared to a target attenuation value.

Why is PAR important?

PAR provides the ability to fine-tune hearing protection levels to ensure all safety considerations in the workplace are addressed. When the fit of the hearing protector doesn't provide enough noise reduction, workers may be at risk because they are "under-protected." Also, when workers are unable to hear critical sounds or feel isolated from their environment, they may be "over-protected."

A general guide is to aim for protected exposures (i.e., Exposure level - PAR) that are between about 70 – 85 dBA, avoiding protected exposures that are lower than 70 dBA. This may be especially important for workers with hearing loss.



What is the role of hearing protector fit testing fit in the hearing protector selection process?

Selecting appropriate hearing protection involves these considerations:

POTENTIAL NOISE REDUCTION

The potential attenuation of a hearing protector can be evaluated using methods allowed by the appropriate regulatory jurisdiction. In many cases, this involves assessing the NRR in view of a worker's noise exposure. Occupational Safety and Health Administration (OSHA) provides requirements for evaluating the suitability of a hearing protector based on worker noise exposure levels (https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.95AppB).

FEATURES AND PREFERENCES

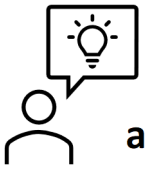
Once the attenuation of a hearing protector is determined to be adequate for the noise environment, other selection criteria are relevant to the process, such as:

- Comfort
- Work environment (temperature, cleanliness)
- Ease of use
- Ability to hear important sounds (alarms, speech)
- Special requirements (metal detectable, corded)

Offering workers several suitable hearing protector options may enhance their likelihood of proper usage.

INDIVIDUAL WORKER FIT

The effectiveness of the hearing protector the worker selects can be confirmed by doing a hearing protector fit test. The worker's PAR can be subtracted from the noise exposure level to make sure this protector provides adequate sound reduction for this worker. If the fit test results indicate insufficient noise reduction, adjustments can help such as coaching on proper use or selecting a different hearing protector.



What do regulatory and professional organizations say about fit testing?

Growing Acceptance

Hearing protector fit testing has gained attention in the occupational safety and health community, professional organizations, and regulatory agencies. Along with

NIOSH[1], OSHA,[2] and professional organizations[2] recognize hearing protector fit testing as a best practice.

NIOSH specifically "recommends employers use individual, quantitative fit testing to evaluate the attenuation received by workers from their hearing protection devices."[1]

OSHA formally expressed support for hearing protector fit testing in an alliance document, signed jointly with the National Hearing Conservation Association in 2008. The signed agreement endorsed fit testing as a valuable tool to ensure the proper fit of hearing protection devices, demonstrate effective worker training, and document worker protection.

OSHA issued an interpretation in 2017 confirming that fit testing can be used to ensure proper initial fitting and to provide training in the proper wear and use of hearing protectors.

Click here to read more:

OSHA/NHCA Alliance Letter:
https://www.hearingconservation.org/assets/docs/AllianceRecommendationForFitTesting_Final.pdf

OSHA's Interpretation: https://www.osha.gov/laws-regs/standardinterpretations/2017-10-20

What are key benefits of hearing protector fit testing?

Each ear is different. The good news is hearing protectors come in many sizes and types. Hearing protectors sold in the US are required to be tested and labeled with a Noise Reduction Rating (NRR). For employers, the NRR is the starting point for narrowing down the available hearing protection products, to determine if they are "suitable" for the noise exposures. But that is not the end of the story. Regulatory requirements include follow-on steps to "ensure proper initial fitting…" and "provide training in the use…" of hearing protectors (https://www.ecfr.gov/current/title-29/subtitle-B/chapter-XVII/part-1910/subpart-G/section-1910.95#p-1910.95).

[1] NIOSH (2025). NIOSH science policy update: individual fit-testing recommendation for hearing protection devices. Cincinnati, OH: U.S. Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, DHHS (NIOSH), Publication No. 2025-104, DOI: https://doi. org/10.26616/NIOSHPUB2025104: https://www.cdc.gov/niosh/docs/2025-104/.

[2] National Hearing Conservation Association (2008).
https://www.hearingconservation.org/assets/docs/AllianceRecommendationForFitTesting_Final.pdf

Council for Accreditation in Occupational Hearing Conservation (2014). Hearing Conservation Manual, 5th Ed (2014, 2nd printing 2017).

Hearing protector fit testing empowers employers and safety professionals to:

- ✓ Identify at-risk workers (over- and under-protected).
- ✓ Select hearing protectors that meet individual needs.
- ✓ Improve training outcomes by providing real-time feedback.
- ✓ Meet federal and policy requirements for fitting hearing protectors and providing training.
- ✓ Document that workers are adequately protected from noise.
- ✓ Enhance hearing conservation programs.

There's nothing like seeing the attenuation improve as the fit gets better!

Fit-test systems benefit employers and workers

Employers can use hearing protector fit testing to help identify when a given fit of a hearing protector is not achieving the desired attenuation. This can happen if the hearing protector doesn't fit the ear OR if a worker needs additional instruction on proper fitting technique. The fit-testing experience provides clear real-time guidance to workers and employers when selecting from a variety of products that are labeled with the suitable NRR.

Every day after initial fit testing is potentially one less day a worker will experience hearing damage.

How is hearing protector fit testing done?

Available methods

Available Fit-Testing Methods

- Threshold-based
- Supra-threshold-based
- F-MIRE

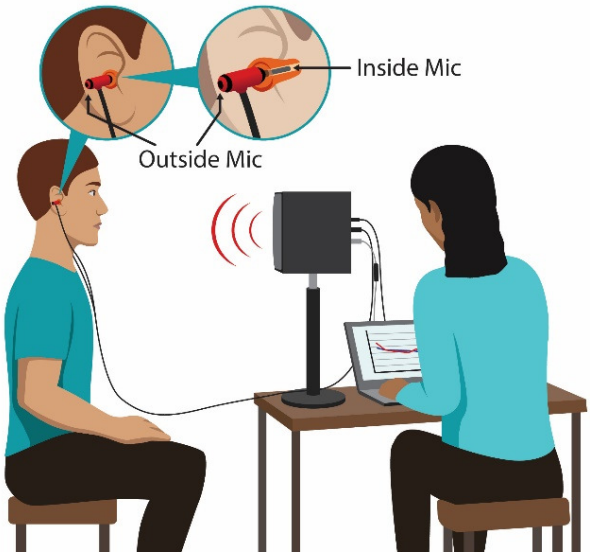
Several different measurement methods are available to conduct fit testing. These are incorporated into different fit-test systems. A few common methods are described below.

Psychophysical (also called subjective) real-ear attenuation at threshold (REAT) measurements. This method uses the results of a traditional-type hearing test where the differences between thresholds obtained with and without the hearing protector determine attenuation. This hearing protector fit-test method can generically be called "threshold-based."

Psychophysical loudness balance-based measurements. This approach compares loudness differences between ears with and without earplugs to determine attenuation. This earplug fit-test method can generically be called "supra-threshold-based."

Physical (also called objective) field microphone-in-real-ear (F-MIRE) measurements. This method uses specialized microphones to measure the difference in the sound pressure level of a test signal inside the ear canal (protected level) and outside a hearing protector (unprotected

level). Some systems use a modified hearing protector (earplug or earmuff) during the measurement.



Considerations in selecting a fit-test system

Different fit-test systems offer various features that may be more or less suitable for your specific workplace. Factors such as the kinds of hearing protectors you will be testing and the place fit testing will be conducted can impact system selection. The table below provides information on what to think about when choosing a fit-test system. Manufacturer's specifications and instructions are another good source of information about the capabilities and use of each fit-test system.

Ask yourself:	Key points:
What types of hearing protectors do the workers you will be testing use?	All fit-test systems can test earplugs. Not many systems can test earmuffs. Fit-test systems that use a subjective measurement method can test any type of earplug. Fit-test systems that use an objective method typically use specially modified hearing protectors that connect to the measurement microphones during the fit test. These systems can test earplugs or earmuffs that are supported by the manufacturer of the system.

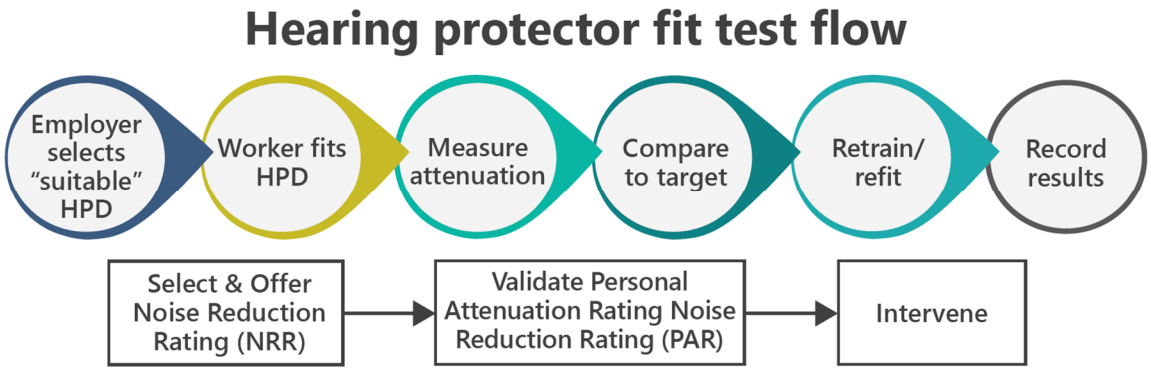
Ask yourself:	Key points:
How much background noise is in the testing area(s)?	Supra-threshold-based systems and field microphone-in-real-ear (F-MIRE) systems can be done in areas with a moderate level of background noise. Threshold-based systems require a quiet test area. The manufacturer of the system typically specifies the maximum background noise levels in which the system can be used to obtain accurate measurements.
How much time is needed to conduct the fit test?	In general, fit-test systems that use an objective method are faster than systems which use a subjective method. Objective systems measure PAR in seconds once the hearing protectors and microphones are in place. Subjective systems take several minutes depending on the number of frequencies tested and whether the test is done monaurally or binaurally. However, when a worker doesn't achieve the necessary attenuation, time is needed to coach fitting techniques or to try different styles of hearing protectors. Consult manufacturers' user instructions for more details.
Can people with hearing loss be tested?	Subjective fit-test systems may have output limits that prevent them from accurately measuring PARs in workers with hearing loss. The manufacturer's guidance can be a resource for how to test workers who have conditions such as asymmetric hearing loss or tinnitus. Objective systems do not rely on responses from the person being tested, so hearing loss and tinnitus do not affect measurement.
How will results be used?	Some fit-test systems report only a pass/fail result based on a set criterion. Other fit-test systems report the specific PAR the worker achieved. Some systems may also report the measured attenuation at each frequency used in the PAR calculation. A fit-test system that reports basic pass/fail results may be sufficient when the main purpose of the test is to document that a worker is receiving enough attenuation to reduce exposure to a safe level. Fit-test systems that provide the actual PAR and/or details about the attenuation by frequency are helpful when fit-testing is used in conjunction with worker training and in the process of hearing protector selection and fitting.
How is the system calibrated?	Make sure the fit-test system has some method of performing a periodic check to make sure it is functioning appropriately. Manufacturers typically provide directions for conducting performance checks and the recommended interval for an overall calibration check.

For more information about the performance characteristics of hearing protector fit-test systems and for guidance to manufacturers about developing fit test systems, refer to ASA/ANSI S12.71-2018 (R2022) at https://webstore.ansi.org/standards/asa/ASAANSIS12712018R2022.

What is the procedure for conducting a hearing protector fit test?

The fit-test session is an opportunity to enhance the worker's experience with fitting and using hearing protectors. Each worker receives individual attention and can be coached to improve fit skills and knowledge of hearing protectors.

A typical flow for a fit-test session is illustrated and explained below.



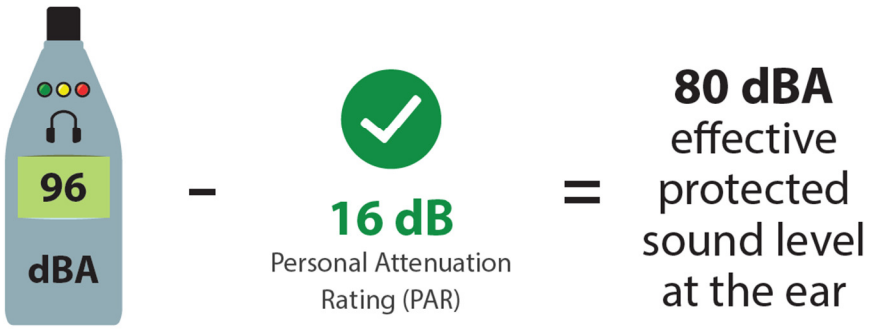
Select suitable HPD: Select hearing protector options that are suitable (i.e., an NRR that will bring the noise exposure below the noise limit, characteristics that meet workplace requirements and worker preferences).

Worker fits HPD: Ask the worker to fit the hearing protector as he or she typically wears it while working.

Measure attenuation: Conduct the fit-test measurement according to the manufacturer's instructions.

Compare to target: Determine if the hearing protector provides the desired amount of protection (e.g., compare the PAR to the noise exposure and decide if the attenuation achieved is appropriate).

PAR may be subtracted from an A-weighted noise exposure.



Record results: Determine if any follow-up actions are needed to maximize the worker's hearing protector use and experience.

This example procedure is flexible. It can be adjusted to allow employers to meet the specific needs of their workers (e.g., starting with training before testing the fit).

How do I get started with hearing protector fit testing?

Who to fit test?

Everyone who wears hearing protectors can benefit from fit testing. However, if fit testing everyone is not an option, fit-test programs are still effective when prioritizing subsets of workers most at risk.

These may include workers who are:

- Newly hired or newly exposed to noise
- Showing a hearing change/shift
- Exposed to extreme noise levels
- Exposed to impulsive noise (brief bursts of noise, such as from a nail gun or punch press)
- Using hearing protectors intermittently but not in a formal hearing conservation program
- Switching to a different type of hearing protector
- Exposed to ototoxic chemicals (which can damage hearing) as well as to noise

When and how often to fit test?

Fit testing is a tool that may be used at different times and for different purposes. Fit-test programs may evolve over time to address changing needs. Here are some considerations when designing a fit-test program.

Fit testing may be conducted:

- Before workers begin a noise-hazardous job or as soon as possible afterward
- When a worker starts to show a change in hearing
- To verify attenuation is appropriate and meets regulatory requirements
- To identify an inadequate fit or inappropriate hearing protector choice
- To periodically confirm the attenuation achieved is appropriate
- Upon worker request

- If a worker experiences discomfort with the current hearing protector

Who conducts fit testing?

Currently, no credentials are necessary to conduct hearing protector fit testing. Fit-test operators may include medical personnel or non-medical personnel (e.g., safety professionals, industrial hygienists, etc.) trained in hearing protector fitting.

Basic knowledge in areas such as noise and hearing protection, hearing protector fitting, coaching workers, and follow-up actions based on fit-test results is beneficial for fit-test operators. Familiarity with the operation and maintenance of the fit-test system equipment and environment is also important. Training materials provided by fit-test system manufacturers or vendors can support operator training and education.

What fit-test records to keep?

A record for each time an individual is fit tested can be integrated into a hearing conservation program or other hearing loss prevention efforts. Records may include:

- Worker name and job/position, and tester's name
- Hearing protector fit-test method and instrumentation used
- Test date
- Reason for fit testing
- Hearing protector tested including manufacturer, make, model, size, and NRR
- The employer's selected protected exposure target value
- The worker's assigned noise exposure
- PAR achieved during the test
- Determination if the PAR is enough to reduce the exposure below the target value
- Comments about the test session (e.g., environmental conditions)
- Recommendations for follow-up

Definitions

Attenuation – the amount of sound level reduction provided by a hearing protector.

Fit-test system – equipment designed to measure attenuation for the individual user of a hearing protection device. Referred to as a field attenuation estimation system (FAES) by the Acoustical Society of America/American National Standards Institute standard S12.71-2018 (R2022).

Hearing threshold – sound level at which stimuli are barely perceptible (able to be heard about half the time).

Impulsive noise – very short bursts of sound created by the rapid release of pressure (for example, a nail gun) or objects colliding together (for example, a punch press). Impulsive noise is more hazardous to hearing than continuous (steady-state) noise.

Loudness balance – a subjective method of measuring hearing protector attenuation by balancing the volume of sounds between ears with and without the hearing protector in place.

Noise Reduction Rating (NRR) – a labeled value (in decibels) of a hearing protector intended to represent the reduction (attenuation) of sound. NRR is calculated based on attenuation values measured on a group of individuals using a standardized Real Ear Attenuation at Threshold (REAT) method in a laboratory.

Ototoxic chemicals – substances that affect how the ear functions and may cause hearing loss or balance problems, regardless of noise exposure. Examples include certain pesticides, solvents, metals, and pharmaceuticals that contain ototoxicants.

Personal Attenuation Rating (PAR) – a single number rating in decibels that represents the attenuation at that point for the fit of the hearing protector that was tested. PAR may be subtracted from the A-weighted sound level or A-weighted sound exposure to estimate the effective level or exposure when the hearing protector is worn.

Physical (also called objective) measurements – measure of physical stimuli (such as sound).

Psychophysical (also called subjective) measurements – measure of sensation and perceptions based on physical stimuli (such as the ability to hear sound).

- Threshold-based fit testing is based on stimuli that are barely perceptible.
- Supra-threshold fit testing is based on stimuli that are above the barely perceptible level.

Real Ear Attenuation at Threshold (REAT) – a standardized procedure used to determine hearing protector attenuation by evaluating hearing thresholds with (occluded) and without (unoccluded) hearing protectors.

Resources

Additional guidance

Three Tips for Choosing the Right Hearing Protector. (2018). NIOSH Science Blog: https://blogs.cdc.gov/niosh-science-blog/2018/10/24/hearing-protection/

The Defense Health Agency's Hearing Center of Excellence (multiple resources on site): https://health.mil/Military-Health-Topics/Centers-of-Excellence/HCE

Standards and recommendations

ASA/ANSI S12.71-2018 (R2022). "Performance criteria for systems that estimate the attenuation of passive hearing protectors for individual users," Accredited Standards Committee S12, Noise. (American National Standards Institute / Acoustical Society of America, Melville NY), 2018.

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OSHA/NHCA Alliance Letter. (2008). BEST PRACTICE BULLETIN: Hearing Protection-Emerging Trends: Individual Fit Testing: https://www.hearingconservation.org/assets/docs/AllianceRecommendationForFitTesting_Final.pdf

OSHA's Interpretation. (2017). Ear plug personal fit-testing systems that measure real-time noise reduction: https://www.osha.gov/laws-regs/standardinterpretations/2017-10-20

Technical references

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