

HEARING PROTECTION

Environmental Health and Safety



HEARING LOSS

People living near airports or freeways are exposed to levels of noise typically in the 65 to 75 dB(A) range. If lifestyles include significant outdoor or open window conditions, these exposures over time can degrade hearing. The U.S. EPA and various states have set noise standards to protect people from these adverse health risks. The EPA has identified the level of 70 dB(A) for 24 hour exposure as the level necessary to protect the public from hearing loss and other disruptive effects from noise, such as sleep disturbance, stress-related problems, learning detriment, etc. (EPA, 1974).

Noise-induced hearing loss (NIHL) typically is centered at 3000, 4000, or 6000Hz. As noise damage progresses, damage starts affecting lower and higher frequencies. On an audiogram, the resulting configuration has a distinctive notch, sometimes referred to as a “noise notch.” As aging and other effects contribute to higher frequency loss (6–8 kHz on an audiogram), this notch may be obscured and entirely disappear.

Many people are unaware of the presence of environmental sound at damaging levels, or of the level at which sound becomes harmful. Common sources of damaging noise levels include car stereos, children’s toys, transportation, crowds, lawn and maintenance equipment, power tools, gun use, and even hair dryers. Noise damage is cumulative; all sources of damage must be considered to assess risk. If one is exposed to loud sound (including music) at high levels or for extended durations (85 dB A or greater), then hearing impairment will occur. Sound levels increase with proximity; as the source is brought closer to the ear, the sound level increases.

Hearing Protection Devices (HPDs) are one component of an effective hearing conservation program. HPDs can protect the delicate hearing system from the effects of noise on the job and off.

HPDs come in various shapes, sizes, and protection levels. While there is an HPD to suit nearly every person and situation, no single HPD is right for every job, every person, or every noise environment.

Although some expandable foam earplugs come close, there is really no such thing as a one-size-fits-all HPD. Each person must be individually evaluated to determine the best match of HPD for their environment, noise exposure, anatomy, and hearing ability.



There is no such thing as the “best” hearing protector. Needs vary by individuals, noise environment, on-the-job communication needs, interaction with other types of safety equipment and other variables. The “best” HPD is the one that will be consistently and properly used, all day, every day.

Keep in mind that the object is to obtain a good and comfortable seal against noise and that any leak seriously compromises the protection offered by HPDs. Most environments require 15 dB or less of real protection.

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FORMABLE INSERT PLUGS



Most popular varieties are made from expandable, slow-recovery foam.

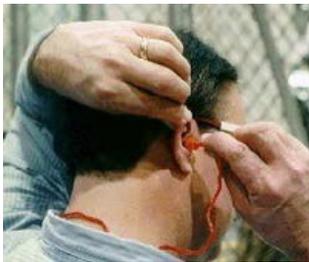


Before fitting earplugs or semi-insert HPDs, examine the ear canals to determine whether any

obvious indication of possible medical problems are present. Also check for excess cerumen (ear wax) that might be pushed further into the canal by the insertion of an earplug (in a few instances—complete blockage of the ear canal may have occurred) If these conditions exist, then earmuffs should be worn until the problem is corrected.

To use, slowly roll and compress plugs into a very thin cylinder and insert well in the ear canal.

Fitting is easier if you reach around the head to pull the ear outward and upward during insertion.



» **The Good:** Properly inserted, foam plugs offer among the best protection available and yet are found to be very comfortable for most wearers.

» **The Bad:** Some manual dexterity is required to roll and insert the plugs, they are subject to contamination in dirty environments and they are generally treated as limited-use or “throw away” products.

PRE-MOLDED PLUGS

These are typically molded from soft plastic which is preformed to fit the ear. Reach around the back of the head and pull outward and upward on the ear while inserting these plugs until they feel like they are sealing the ear.

» **The Good:** Pre-molded plugs are relatively easy to insert and are reusable.

» **The Bad:** Although some of the newer versions are one-size products, many are sold in two or more sizes and must be individually sized for each ear. They can work loose while wearing and require resealing.

CUSTOM MOLDED PLUGS

Individual impressions are made of each ear canal using a quick-curing material. For some products, the impressions themselves are coated and sealed to become reusable earplugs; for others, the impressions are sent to a lab to make a subsequent custom ear mold.

» **The Good:** some employees like the individual attention of having their own earplugs molded and fit, and for some ears custom ear molds are especially comfortable.

» **The Bad:** Custom plugs are expensive, especially when the employee/technician time is considered as a cost. Slight and normal changes in ear canal size may require taking new impressions.



SEMI-INSERT/ CANAL CAPS

These consist of a lightweight band with soft rounded or conical pods or flexible tips that seal at or near the entrance of the ear canal.

» **The Good:** they can be useful for intermittent exposures, since they are quick to put on and take off and easy to hang around the neck when not in use.

» **The Bad:** They generally provide less protection than either plugs or muffs and aren't usually recommended for continuous long-term use because of discomfort.

EARMUFFS

Consist of rigid cups with soft plastic cushions that fit around the pinna (outer ear) and against the head. The muffs must fully enclose and seal around the ears to properly block noise.

» **The Good:** Earmuffs are easy to use and fit, and to put on and take off, and therefore generally require less training in use. They provide consistent protection in most cases.

» **The Bad:** Safety glasses, long hair, and beards may interfere with a good seal, or the muffs themselves may interfere with other safety equipment like helmets and hoods. In addition, they may feel hot or heavy with long periods of use. If gaps are present, earmuffs can actually increase the level of noise reaching the eardrum.

USE THESE FIELD TESTS TO CHECK FIT

THE TUG TEST

The fitter can very gently tug back and forth on the handle of the plug. If there is resistance and if the employee feels a sensation of gentle suction of the eardrum, then the earplug has probably achieved a seal. In contrast, if the plug pulls out easily, an adequate seal was not achieved.

THE HUM TEST

After the fitter has inserted just one earplug, ask the employee to hum or “say ahhh.” If one ear is properly sealed (creating the occlusion effect), then the sound of the user’s voice will seem louder in the sealed ear. If the employee does not get this sensation, then the ear canal is probably not adequately sealed. Sealing both canals at the same time will cause the voice to be perceived equally in both ears, or in the center of the head.

THE LOUDNESS TEST

While in a noisy environment with plugs inserted in both ears, cup both hands over the ears. If there is a perceptible difference in the noise level, the HPDs are probably not properly fitted; the HPDs should be blocking enough noise so that putting hands over the ears should not result in a significant difference. Conversely, the perceived noise level should increase markedly as the user breaks the seal of each earplug or raises each cup of an earmuff when in noise.

THREE STEPS TO EFFECTIVE HEARING PROTECTION

- 1. Selection:** Offer a variety of hearing protectors, including a minimum of two types of pre-molded earplugs; two types of formable earplugs; semi-insert devices and earmuffs. Consider the noise level, work environment, and wearer’s convenience, communication needs and preexisting hearing loss.
- 2. Fit the Individual:** Check the fit in each ear to see if the device is a good match of the individual’s anatomy. Comfort is the key to user acceptance.
- 3. Train, Train, Train:** Don’t just tell the individual how to wear the HPDs—have the wearer demonstrate correct placement of the device. Stress the importance of a good seal for adequate noise reduction, show what a good fit feels and sounds like, and reinforce the need to use HPDs at all times in noisy environments. Teach the wearer how to care for HPDs and recognize when they need to be replaced.

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