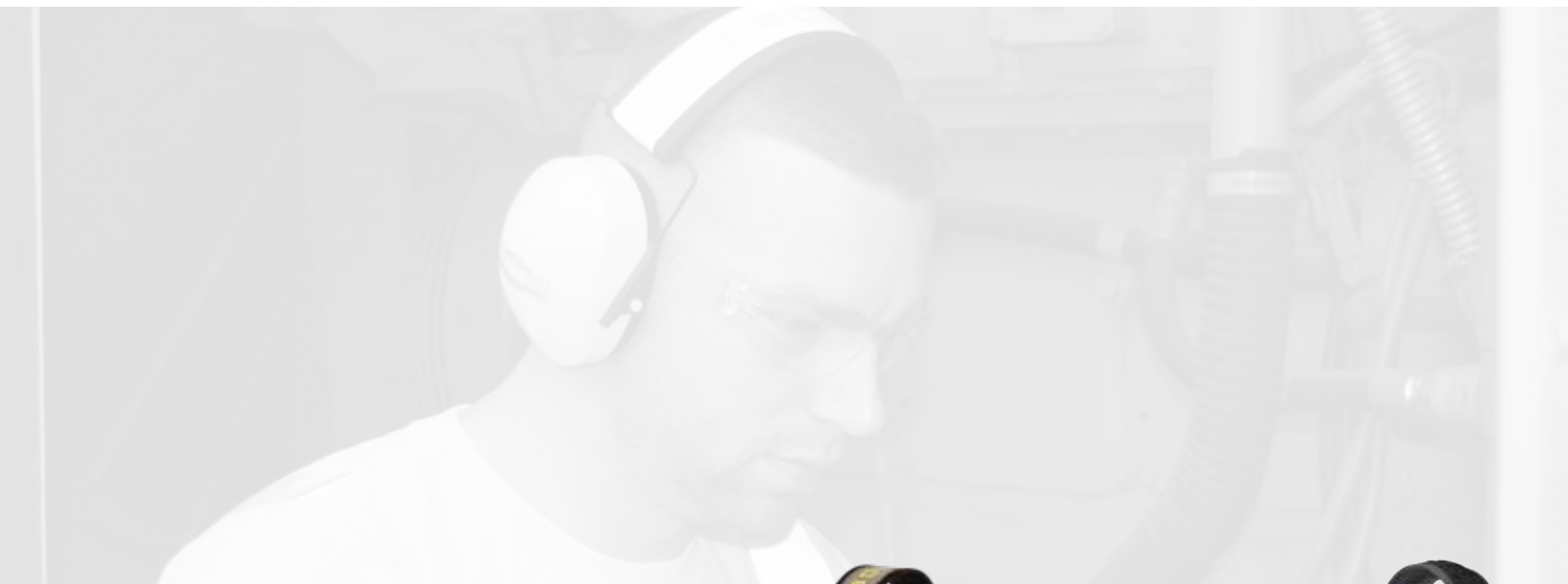




HEARING PROTECTION

FAST FACTS



HEARING INJURY OVERVIEW

Approximately 30 million workers in the United States are occupationally exposed to hazardous noises each year, and the National Institute for Occupational Safety and Health (NIOSH) reports 10 million of those workers suffer from noise-induced hearing loss (NIHL). According to the World Health Organization, NIHL is the most common, permanent, and preventable occupational injury in the world. Industries with the highest numbers of workers exposed to dangerous noise levels include agriculture, mining, construction, manufacturing and utilities, transportation, and military facilities, says the CDC.

NIHL is different from most other occupational injuries. It causes no pain or visible trauma, the ears do not bleed when hearing is being damaged, it leaves no visible scars, it is unnoticeable in its earliest stages, it accumulates with each over-exposure, and it generally takes years to diagnose. Most importantly, it is PERMANENT!

However, with radically smart products, the right education, and a structured hearing conservation program NIHL is 100% preventable.

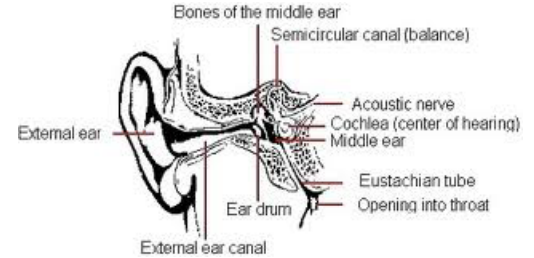
100% Preventable.

NIHL EXPLAINED

Permanent hearing loss can occur when exposed to high levels of noise. This is possible with just ONE instance of over-exposure. Exposure to high levels of noise can also cause tinnitus (ringing in the ears). Other issues related to loud noise at work are physical and psychological stress, reduction in concentration and communication, loss of productivity, and increased probability of work-related accidents.

Damage occurs when sound energy from high noise levels enters your ear. Damage does not affect the eardrum or bones, but instead the receptor cells deep in your ear. Unlike other cells in your body that can regenerate, these receptor cells, once damaged, are gone forever. Noise-induced hearing loss can most easily be diagnosed through an audiogram. Unlike age-related hearing loss which affects mainly high frequencies, NIHL causes a visible “notch” affecting certain frequencies. It is usually bilateral (affects both ears equally) and progresses gradually. Ear pain or drainage is probably not due to noise exposure.

Basically, if you experience a ringing or humming in the ears after work, inability to communicate with a co-worker when only an arm’s length away, and/or temporary hearing loss at any time, then the noise level is most likely hazardous.



PROTECTION REQUIREMENTS

OSHA’s noise standards require that a personal hearing protection device (HPD) be worn to attenuate the occupational high noise exposure of employees, and NIOSH recommends that all workers exposures to noise should be controlled below a level equivalent to 85dBA for eight hours to minimize occupational NIHL.

A dB (Decibel) is the unit used to express the intensity of sound. The threshold of discomfort is between 85 and 95dB, while the threshold for pain is between 120 and 140dB. The level of sound energy doubles for every 3 decibels, so small dB increases represent enormous changes in sound energy.

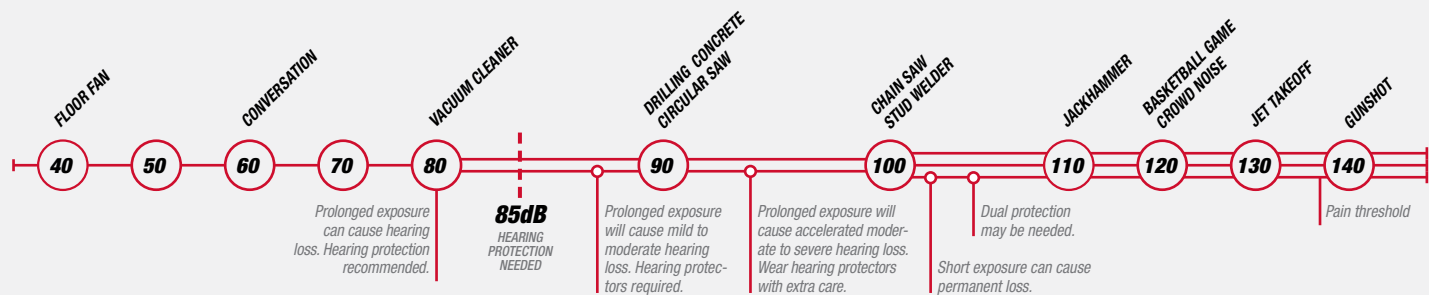
Hearing damage from noise exposure depends on the loudness, length of exposure, and the person. Habitual exposure to noise above 85dB will cause hearing loss in most people. OSHA requires HPD be provided when noise exposure is 85dB or more, with average exposure level of no more than 90dB for 8 hours. For each increase of 5dB, the maximum exposure limit is cut in half.

TIME WEIGHTED AVG.	PERMISSIBLE EXPOSURE LIMIT
90 dB	8 Hours
95 dB	4 Hours
100 dB	2 Hours
105 dB	1 Hour
110 dB	30 Minutes
115 dB	15 Minutes

FOR EXAMPLE:

The two most common methods for monitoring noise levels are area sampling with a sound level meter or personal sampling with a noise dosimeter. Whereas a sound level meter reads the instantaneous noise level for continuous noises, a dosimeter takes measurements over time to provide a time weighted average. The time weighted average is a much better estimation of exposure in most cases. There are several noise and dosimeter apps available for tablets and smartphones which can give you an idea of the noise level, but they are not suitable for compliance purposes. The NIOSH SLM (Sound Level Meter) app is a good starting point.

TYPICAL SOUND LEVELS



NRR (NOISE REDUCTION RATING)

The Environmental Protection Agency (EPA) specifies ANSI S3.19 as the test method for all hearing protection sold in the US. This method measures the attenuation for the hearing protector using a minimum of 10 human test subjects. The NRR is then calculated from the test results. While the NRR is calculated to indicate at least 98% of wearers will achieve the rated NRR, actual attenuation varies greatly based upon user anatomy and training. The NRR can range from 1 to 33 depending on the effectiveness of the protector. Values greater than 33 are not achievable due to different paths the noise can take entering the human ear. The NRR will be published in an EPA label on the packaging of any complaint protector.

HEARING CONSERVATION PROGRAM

OSHA requires a Hearing Conservation program when noise exposure exceeds 85dB. This requires:

- 1 Making at least 3 styles of hearing protection available to exposed employees
- 2 Limiting employee exposure to no more than 90dB / 8 hours (Time Weighted Average) by:
 - A Engineering controls to reduce noise levels,
 - B Limiting employee exposure time to elevated noise levels, or
 - C Providing suitable hearing protection
- 3 Annual testing of hearing levels for exposed workers.

HPD SELECTION

HPD selection should be based on several factors, including the type of noise, continuous vs. intermittent exposure, cost, and worker preference. Keep in mind that worker compliance is one of the most important factors when considering the effectiveness of any HPD. If employees refuse to wear a given HPD because it is uncomfortable, cumbersome, or ineffective, then they are at risk for NIHL.

Make sure you choose a HPD that is appropriate for the working environment. Over protection is just as potentially harmful as under protection. Simply choosing the highest NRR regardless of the decibel level of the environment can have hazardous consequences. For example, if noise levels while using a HPD are brought below 70dB then some workers may be unable to hear verbal communication or warning alarms.

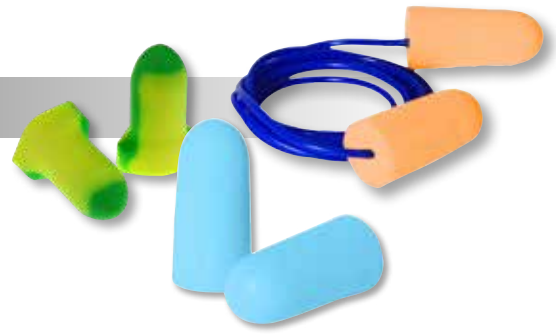
Ask the end user if they have an on-site conservation program or if they have had a recent noise survey. Are their employees complaining about noise? Their answers will allow you to help them choose the right HPD for their working environment.



HEARING PROTECTION TYPES

FOAM EARPLUGS

Radians produces multiple foam earplug styles, including the bullet, bell, and wing, to fit different applications and user anatomies. Foam earplugs provide the highest attenuation available, but may require more training to wear properly. All Radians foam earplugs are made in the USA from polyurethane foam for long-term comfort. They are designed for a single use and are available in a variety of safety-focused colors to aid in compliance verification.



REUSABLE EARPLUGS

Reusable earplugs are made of silicone, polyvinyl, and other types of plastics/rubber, making them water and soap washable. They offer slightly lower NRR values than foam earplugs, but require much less training to wear properly.



CUSTOM EARPLUGS

Radians' Made-in-USA custom molded earplugs offer a personalized fit and take only 10 minutes to form and cure. They are made of a safe, non-toxic, hypoallergenic silicone that is long-lasting and washable.



METAL DETECTABLE

Designed primarily for the food processing industry, metal detectable plugs are embedded with a metal ball in the earplug for easy detection. They are available in reusable and disposable foam styles.



BANDED

Used in work environments where hearing protection is needed intermittently, banded hearing protection can be a good lightweight alternative to earmuffs. Although they tend to have a lower NRR than earplugs, they can be put on and taken off very quickly and easily. Hearing bands traditionally consist of a plastic band with foam or silicone rubber earplug pods, which can be reused. Radians' banded HPD are made in the US.



EARMUFFS (PASSIVE)

Earmuffs are easy to fit properly and great for intermittent use. They come in a variety of shapes, sizes and styles with NRRs around 20 for slimmer, lighter models to as high as 30 for larger muffs. They are also available with features such as padded, compact folding and adjustable headbands. Because earmuffs are very visible, it is easy to ensure compliance.



EARMUFFS (ACTIVE)

Active earmuffs use microphones and electronic circuitry to amplify sound around the listener and cut or compress amplification when louder noises occur. This allows the user to hear communication when noise levels are low, while still receiving the full protection of the passive earmuff when needed. Active earmuffs are tested with the electronics off, as the electronics do not contribute to the attenuation. With the electronics on, sounds may be louder than without protection.



ALL RADIANS HEARING PROTECTION HAS BEEN TESTED TO ANSI S3.19 STANDARDS.