Hearing Loss

How to Develop an Effective Hearing Conservation Program

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Our sense of hearing plays an essential role in how we communicate and experience the world, how we stay aware of our surroundings and thus, safe. That's why, when ***hearing loss*** becomes an all-too-common reality, taking its irreversible toll on individuals, businesses, and society, organizations need to step in and take preventive action.

A Hearing Conservation Program places hearing loss prevention at its core. This typically includes these six initiatives:

1. Noise exposure assessment
2. Audiometric testing
3. Hearing protection selection and fit testing
4. Employee training and education
5. Record keeping
6. Program evaluation

In this guide, Honeywell will review the fundamentals that go into a Hearing Conservation Program for your organization. To start, they will discuss:

- What is occupational noise-induced hearing loss (NIHL)?
- How to measure noise and monitor noise exposure
- Types of hearing protection devices
- Earplug fit testing
- How to motivate employees to wear hearing protectors

But first, what causes hearing loss?

Over 5% of the world's population – around 466 million people – suffer from disabling hearing loss, according to the ***World Health Organization*** (WHO).

Hearing loss, ranging from mild difficulty in hearing conversational speech to profound deafness, is influenced by factors like genetics, certain diseases and medicines, and aging, but also by a factor well within our control – excessive exposure to loud noise.

How do you recognize NIHL?

1. It is permanent and progressive
2. It is usually bilateral (affects both ears)
3. It typically causes no pain
4. It leaves no visible trauma

5. It is often unnoticeable in its early stages and may take years to realize

6. It accumulates with each over-exposure

Its global economic impact for businesses is estimated at US $750 billion. But there are localized and personal costs associated with NIHL as well. Hearing aids, while beneficial, can be expensive. Untreated hearing loss can lead to social withdrawal and depression, physical and psychological stress, resulting in reduced worker productivity and efficiency, and other ***associated chronic health conditions, such as cardiovascular diseases.***

Hearing loss in the workplace also increases the risk of accidental injuries. According to one ***study***, respondents with hearing troubles were twice as likely to experience an accidental injury than those with good hearing.

NIHL occurs across a wide spectrum of industries, but workers in some industries are more exposed to dangerous levels of noise. These industries are agriculture, mining, construction, manufacturing, utilities, transportation and the military.

Studies show construction workers have significantly increased risk of hearing loss compared to others, with increasing risk by work duration.

Signs that noise may be a problem in your workplace

1. Employees hear ringing or humming after exposure to loud sounds.

2. Noise is impeding communication so that employees must shout to be heard by a coworker an arm's length away.

3. Employees experience temporary loss of hearing after leaving work.

If you observe any of the symptoms above, it's time to measure environmental noise.

MEASURE

Hearing loss prevention starts with measuring noise levels and monitoring exposure to noise.

According to the Occupational Safety and Health Administration (OSHA) Noise Standard and Hearing Conservation Amendment ("Noise Standard"), a hearing conservation program is required "whenever employee noise exposures equal or exceed an 8-hour time-weighted average sound level (TWA) of 85 decibels measured on the A scale (slow response) or, equivalently, a dose of 50 percent.

So, employers are required to monitor all employees whose noise exposure exceeds 85dBA in 8 hours. This includes all continuous, intermittent and impulsive noise between 80 and 130dBA.

There are two commonly used methods for assessing noise exposure levels:

1. Area sampling using a sound level meter

2. Personal sampling with a noise dosimeter, also called a personal sound exposure monitor.

Sound level meters read the instantaneous or continuous noise level in a particular area at a particular point in time. Sound level meters are useful for evaluating the noise produced by a machine, but are only accurate for estimating long-term exposure when noise levels are constant in the area.

For mobile workers, or for assessing the long-term average sound level, the personal noise dosimeter gives a more accurate measurement of unprotected noise exposure. The dosimeter microphone is

clipped on the shoulder near the ear. The dosimeter remains on the worker for a certain sampling period – several hours, or even the entire workday – and continuously monitors the incoming noise. At the end of the sampling period, a readout shows the average equivalent noise exposure level for that employee over the entire sampling period.

Both methods measure the unprotected exposure; an estimate of the protected exposure must be calculated using the noise attenuation rating of the hearing protector. Without fit testing, there's no way to tell how much protection an individual worker is receiving from their hearing protector, so such an estimate is merely a guess.

FIT

Hearing conservation practices require a clear picture of hearing protector effectiveness. ***Earplug fit testing*** provides a real-world metric to determine if employees are receiving optimal protection for their noise environment, require additional training, or need a different model of hearing protector.

Earplug fit testing benefits safety managers as well as employees. For managers, it fulfills regulatory requirements for training and documentation. For employees, it showcases the importance of proper protection in the workplace, helps them select and compare protectors to find the best choice for their ears and specific applications, and provides feedback on what a proper fit looks and feels like.

Other benefits of fit testing:

- Workers can try different earplugs to find the best combination of fit, comfort and attenuation
- Overprotection can be identified
- Wearers receive immediate feedback on their fittings
- Perpetuates peer training as trained workers share their knowledge

New technology combines a direct measure of an individual's unprotected noise exposure with protected noise dose with dose-at-the-ear noise exposure monitoring. Along with the dose measurements, continuous fit testing is conducted in real-time.

This technology is found in Honeywell Howard Leight's VeriShield Smart Hearing Solutions (VSHS) line of products. The measured data can be collected, stored, and uploaded to a cloud system for graphical display and analysis. Immediate dose-at-the-ear exposure data can be used to head-off an individual's potential NIHL before it starts.

At-ear exposure monitoring measures and records the worker's actual protected noise exposure over their entire work shift and also alerts the worker when noise dose approaches or exceeds safe limits.

EVALUATE

Assessment of a hearing conservation program also requires a review of audiograms, hearing protection data, and the clinical history of workers. This is necessary to ensure the effectiveness of the hearing conservation program, identify and counsel workers who remain at risk for hearing loss, and gauge activities outside of work that may be affecting workers' hearing.

Performed by audiologists, industrial hygienists, physicians, and hearing conservationists certified by the Council for Accreditation in Occupational Hearing Conservation (CAOHC), audiograms are a common way to evaluate workers' hearing sensitivity over time. These tests, performed within the first six months of an employee's first exposure to noise (baseline audiograms), and annually thereafter, constitute a record of worker's hearing thresholds over time at various frequencies.

A threshold between 0 and 25dBHL is considered the normal range for an adult.

- Mild hearing loss happens at 25-40dBHL
- Moderate hearing loss at 40-55dBHL
- Moderate to severe at 55-70dBHL
- Severe hearing loss at 70-90dBHL
- Profound hearing loss – 90dBHL or higher

According to regulations, audiograms and audiogram results must be made available to all employees and at no cost. They also need to be stored for the duration of employment and a review of audiograms should indicate if a referral is required for further testing.

HEARING PROTECTION STANDARDS

The American National Standards Institute (ANSI) promulgates consensus standards used to inform regulations. In the OSHA Noise Standard, ANSI standards are cited for the equipment used in annual testing (ANSI S3.6), and for the sound level meters used in noise measurements (ANSI S1.4 and ANSI S1.11).

OSHA has established specific regulations for recordkeeping and general industry, including methods for estimating the adequacy of hearing protector attenuation and acoustic calibration of audiometers.

CONTROL

When noise exposures exceed mandated levels, engineering and administrative controls are the first lines of defense. Engineering controls reduce sound exposure by modifying or replacing equipment, physically enclosing the noise source, or disrupting the sound transmission path. Engineering controls include installing low-noise machinery, regular maintenance, and lubrication of equipment, or adding barriers or sound walls to separate the employee from the noise.

Administrative controls include such actions as giving noise-exposed employees break time in quiet areas, or rotating employees among noisy and quiet work tasks to safeguard them from long exposure to noise.

Sometimes, administrative and engineering controls alone are effective in reducing noise exposure and solving the problem.

When are employers required to provide hearing protectors?

If administrative and engineering controls are not feasible, practical, or sufficient to reduce workplace noise to acceptable levels, the employer must fit employees with appropriate hearing protection.

Under OSHA, employers are required to provide hearing protection to all workers exposed to 8-hour TWA noise levels of 85 dBA or above, and the use of hearing protection is mandatory at levels above 90 dBA. The variety of earplugs and earmuffs should be sufficient to accommodate all workers and work environments.

How do I find the right hearing protection?

Diverse scenarios condition the selection of the most appropriate hearing protector. When choosing hearing protection for your workers, it's important to take into consideration a few key aspects:

1. The environment. Climate influences the selection of hearing protectors – earmuffs are generally more suitable in colder climates, for instance. The type of work being performed should also be

considered: Is communication required or the noise intermittent, causing frequent donning and removal of hearing protection? Do the workers handle materials that are dusty, oily, corrosive, or caustic? Is detectability of foreign material in the process necessary? What other PPE is required to be worn with the hearing protection?

2. The Noise Reduction Rating (NRR) is an estimate of the average sound level reduction or attenuation provided by a hearing protector in a laboratory environment. It is not an accurate predictor of an individual's protection from noise exposure.

3. The user's personal attenuation rating (PAR) from individual fit testing. The PAR is an actual attenuation value measured for an individual earplug fitting. Hearing protector fit testing is an ***OSHA Best Practice*** and is one of the best ways to know how much attenuation an individual worker is capable of receiving from his or her hearing protection.

4. Ease-of-fit and in-ear comfort for workers. This has a heavy impact on the effectiveness of a hearing protector. If the hearing protector isn't comfortable, it is less likely to be worn–or worn correctly–and provide the noise reduction it was designed to offer.

Types of earplugs

Earplugs provide an air-tight seal of the ear canal. They come with different attenuation ratings (NRRs) for different noise levels.

They can be either disposable (single-use) or reusable (multiple use).

Foam earplugs are affordable, effective and easy to use. They conform to the shape of the ear canal and change shape dynamically to accommodate jaw movement from chewing, talking, etc. That's what makes them particularly effective and one of the reasons they provide the highest attenuations of any hearing protector.

Banded earplugs are connected by a flexible band and are suitable for people who move in and out of noisy areas. They are worn under the chin and can be easily stored around the neck when not in use.

Detectable earplugs are designed for high-visibility and detectability by a variety of methods in processing environments where foreign material contamination must be avoided.

Regardless of the material, earplugs are most effective when the wearer has been properly trained on use and insertion.

Types of earmuffs

Made from rigid cups with soft cushions that seal around the ear, earmuffs come in a variety of shapes and sizes. Three common designs include: over-the-head, cap mounted and behind-the-neck.

To attenuate noise effectively, a tight seal between the ear cushion and the head is critical. Gaps provide an easy path for sound to bypass the earcup, thus reducing the amount of attenuation provided by the earmuff.

Why choose an earmuff over an ***earplug***?

It's easier to achieve proper fit with an earmuff, but earplugs typically provide higher noise reduction if used correctly. Obtaining correct deep insertion of an earplug is more challenging. Other advantages of earmuffs include convenient wearing during exposure to intermittent noise and more warmth in cold environments. Earmuffs can also be worn with hearing aids and are longer lasting. However, by

comparison, earmuffs may become uncomfortable when used for longer periods of time and may be incompatible with other PPE such as hard hats or eyewear.

In some situations, personal protective equipment needs to preserve situational awareness and remain communication-friendly, preserving speech while protecting hearing.

Depending on the work environment, any hearing protection that reduces sound levels far below the OSHA-defined 85 dBA action level and interferes with communication may be considered overprotecting. The ideal hearing protector reduces hazardous noise levels to a safe range without overdoing it.

MOTIVATE

The best hearing protection devices have no value if they are not worn. Getting workers to wear hearing protection starts with helping them understand the long-term implications of NIHL.

Here are some tactics to help workers start caring and become experts at identifying the early warning signs of NIHL:

- Discuss with employees their annual audiograms and explain the results
- Publish information on noise and noise levels
- Use audio demonstrations to illustrate the impact of hearing loss
- Use older, experienced employees as teachers and advocates: "When you teach, you learn twice"
- Reward workers who comply and assist their colleagues
- Encourage workers to take hearing protectors home with them outside of work.

One-on-one training is the most effective method for educating workers on how to use and maintain personal protective equipment. By the way, ***here is a quick guide*** on how to clean and care for hearing devices.

When it comes to timing, many employers find that the most convenient and effective time for administering hearing conservation training and fit testing is in conjunction with the annual audiometric testing, when the worker is tuned into his personal safety and health.

IMPROVE

Finally, always make sure your program is running smoothly by constantly evaluating performance – asking for employee feedback and reviewing responsibilities and records.

Hearing conservation is a serious issue. Honeywell is here to help. ***Learn more.***

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