

Save the Ears!

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Noise-related hearing loss has been listed as one of the most prevalent occupational health concerns in the United States for more than 25 years¹.

- What is noise?
- What are some common noises on the job?
- How can noise affect me?
- Is it a concern?
- How do I stay safe?
- What's the best hearing protection?
- What is a hearing conservation program?

What is noise?

We generally consider 'noise' any unwanted sound. Sound is a vibration, a fluctuation in the pressure of air which is detected by the human ear and affects the human body.

When sound waves enter the outer ear, these vibrations strike the ear drum and transmit into the middle and inner ear. The inner ear contains a snail-like shaped cavern, the cochlea, which is filled with fluid and lined with microscopic hairs. These hairs move with the vibrations and convert the sound waves into nerve impulses to give us the ability to hear!

What are some common noises on the job?

You know what noises are around you in your workplace. You probably have an idea of what will be found in at a job site based on the type of business. Many of us work in different places every day due to the nature of our jobs. For most of us the loudest longest noise we will be exposed to every day will be on the way to work; the noise of the road. Notice in the list below how close to the noise you are and what barrier (distance, inside car) to the sound result in different noise levels reaching your ears.

- | <u>dba</u> | <u>Sound source</u> ² |
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Just for reference, here are some other commonly occurring noises found in our lives.

<u>dB</u> A	<u>Sound source</u> ²
• 52	People eating and talking at 15 meters
• 58-65	Printer in office at ear
• 61	Electric nose hair trimmer at ear
• 94	Power washer at ear
• 100	Alice Cooper Rock concert at 25 meters
• 125	Jet at 100 meters

How can noise affect me?

Short term exposure to loud noise can cause temporary changes. An example is a ringing in the ears (tinnitus) or the feeling of cotton wool in your ears. (Don't put cotton in your ears!) Such short-term problems may go away within a few minutes or hours after the noise is gone. However, repeated exposures to loud noise can lead to permanent tinnitus and/or hearing loss.

Exposure to high levels of noise can cause permanent hearing loss by destroying those hair cells in the cochlea. When cells are gone, neither surgery nor a hearing aid can help correct this type of hearing loss.

Loud noise can have secondary effects such as interfere with communication, mask over helpful warning tone signals, be a distraction, create stress and create fatigue as ears "tire out".

If you experience noise-induced hearing loss it may limit your ability to hear high frequency sounds, understand speech, and impair your ability to communicate. The effects of hearing loss can be profound for a person, as hearing loss can interfere with the ability to participate in social activities.

Is it a concern?

Noise and vibration can harm workers when they occur at high levels, or continue for a long time. OSHA has some rules of thumb for you to consider if noise may be a problem. Noise may be a concern in your workplace if:

- You have to shout to be heard by a coworker an arm's length away.
- You experience temporary hearing loss.
- You hear ringing or humming in your ears after you leave work.

If there is a concern, a noise survey with proper sound detecting equipment may be the next step. A little bit more about how noise is measured and what limits are set will give you an idea of how to handle noise.

Noise is measured in units called decibels. Decibel A-weighted sound levels (dBA) are often used for comparison analysis as it matches the perception of loudness by the human ear. Decibels are logarithmic. This means that a small change in the decibel number results in a large change in the amount of noise and hence the potential for hearing damage.

OSHA has set legal limits on noise exposure in the workplace. These limits are based on a worker's time weighted average over an 8 hour day. With noise, OSHA's permissible exposure limit (PEL) is 90 dBA for all workers for an 8 hour day. The OSHA standard uses a 5 dBA exchange rate. This means that when the noise level is increased by 5 dBA, the amount of time a person can be exposed to a certain noise level to receive the same dose is cut in half. For example OSHA permits 8 hours at 90 dBA, but only 4 hours at 95 dBA and 2 hours at 100 dBA levels. National Institute for Occupational Safety and Health (NIOSH) recommends a 3 dBA exchange rate so that every increase by 3 dBA doubles the amount of the noise and halves the recommended amount of exposure time.

How do I stay safe?

First, control the noise. Then reduce worker exposure and noise reaching the ear. The use of controls should aim to reduce the hazardous exposure to the point where the risk to hearing is eliminated or minimized. With the reduction of even a few decibels, the hazard to hearing is reduced, communication is improved, and noise-related stress is reduced. There are three types of controls.

Engineering controls reduce sound exposure levels by making related physical changes at the noise source or path to reduce the noise level at the worker's ear. In some instances the application of a relatively simple engineering noise control solution reduces the noise hazard to the extent that further requirements (e.g. hearing conservation program, provision of hearing protectors, etc.) are not necessary. Examples include some of the following:

- Choose low-noise tools and machinery
- Maintain and lubricate machinery
- Place a barrier (sound wall) between the noise source and employee
- Enclose or isolate the noise source.

Administrative controls reduce or eliminate the worker exposure to noise by changing the workplace. Examples include:

- Operating noisy machines during shifts when fewer people are exposed.
- Limiting the amount of time a person spends at a noise source.
- Providing quiet areas where workers can gain relief from noise sources
- Restricting worker site to a suitable distance away from noisy equipment.

Controlling noise exposure through distance is often an effective, yet simple and most inexpensive administrative control. This control may be applicable when workers are present but are not actually working with a noise source or equipment. Increasing the distance between the noise source and the worker, reduces their exposure. In open space, for every doubling of the distance between the source of noise and the worker, the noise is decreased by 6 dBA.

Hearing protection devices (HPDs) decrease the intensity of sound that reaches the eardrum. They come in two forms:

- Earmuffs, which fit over the entire outer ear
- Earplugs, small inserts that fit into the outer ear canal

HPDs are considered an acceptable but less desirable option to control exposures to noise and are generally used after other controls are determined to not be feasible. Hearing protection will enhance your ability to hear speech in very noisy environments by reducing sound level.

When dealing with noise you can; use equipment in controlled areas, move away from the noise and protect your ears.

What's the best hearing protection?

Each person's ear shape and size are different. You should choose a hearing protection product that works well for you. First, consider the earplug. Earplugs work by sealing the ear canal. Fit must be a snug seal so the entire circumference of the ear canal is blocked. An improperly fitted, dirty or worn-out plug may not seal and can irritate the ear canal. They are available in a variety of shapes and sizes to fit individual ear canals and can be custom made. They can be fitted to a headband for best fit or on a lanyard for accessibility.

Next, consider the earmuff. Earmuffs work by forming an air seal so the entire circumference of the ear canal is blocked. They are held in place by an adjustable band. Earmuffs will not seal around eyeglasses or long hair and you must adjust the headband tension to be sufficient to hold earmuffs firmly in place around the ear.

Both earplugs and muffs are approximately equal as both can reduce noise 15 to 50 dB when properly fitted. Remember to read the information provided by the manufacturer for the noise reduction rating and proper use to achieve the rated protection. You can wear plugs and muffs at the same time and your protection will increase by about an additional 10 dB. In case you are wondering, cotton balls or tissue paper stuffed into the ear canals are very poor protectors as they reduce noise only by approximately 7 dB, which is very low protection, and may irritate the ear.

Whichever HPD you choose, the most important part is to get the full benefit by using them properly. Always make sure protection is on and fit is good before entering a noise hazard area. Workers can miss out on the full benefit of the noise reduction potential of their protectors if they do not wear them continuously while in noise. A hearing protector that gives an average of 30 dB of noise reduction if worn continuously during an 8-hour workday becomes equivalent to only 9 dB of protection if taken off for one hour in the noise. This is because decibels are on a logarithmic scale, and there is a 10-fold increase in noise energy for each 10 dB increase. During the hour with unprotected ears, the worker is exposed to 1,000 times more sound energy than when wearing the earplugs or muffs. If workers do not wear or wear protection loosely because they do not fit properly, again they do not provide the rated protection. If there is an incomplete air seal between HPD and ear, then the effectiveness of the protection is compromised and does little good. Interesting fact, you will hear your own voice as louder and deeper when wearing hearing protection. This is a useful sign that the hearing protectors are properly positioned.

Remember, noise exposure is cumulative. So the noise at home or at play must be counted in the **total** exposure during any one day. A maximum allowable while on-the-job exposure followed by an exposure to noisy lawnmower or loud music will definitely exceed a safe daily limit. High frequency sound is the most damaging to human ears.

What is a Hearing Conservation Program?

In 1981, OSHA implemented requirements for employers in general industry to implement a Hearing Conservation Program at such workplaces/jobs where **workers are exposed to a time weighted average noise level of 85 dBA** or higher over an 8 hour work shift. Some specific industries, like agriculture, maritime or construction, have specific limits. When the conditions of 85 dBA or higher at 8 hour shift is met, then Hearing Conservation Programs require employers to measure noise levels, provide free annual hearing exams and free hearing protection, provide training, and conduct evaluations of the adequacy of the hearing protectors in use and/or make changes to tools, equipment and schedules so worker exposure to noise is less than the 85 dBA.

The program strives to prevent initial occupational hearing loss, preserve and protect remaining hearing, and equip workers with the knowledge and hearing protection devices necessary to protect them. For more information on hearing conservation program, see OSHA's website <https://www.osha.gov/dts/osta/otm/noise/hcp/>.

SOURCES

Protecting Yourself from Noise in Construction - Pocket Guide (PDF). OSHA Publication 3498, (2011).

OSHA Technical Manual (OTM) Chapter - Noise. OSHA Directive TED 01-00-015, (2013, August 15).

¹www.osha.gov. US Department of Labor on March 28, 2016

HearForever.org on March 28, 2016. A Howard Leight by Honeywell initiative.

²Noise Navigator™ Sound Level Database. June 26, 2015, Version 1.8