

Hearing Protection Basic



OSHA's hearing conservation program is designed to protect workers with significant occupational noise exposures from hearing impairment even if they are subject to such noise exposures over their entire working lifetimes. This course introduces requirements and best practices with emphasis on monitoring, audiometric testing, hearing protectors, training, and the hearing conservation program.

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OSHAcademy Course 159 Study Guide

Hearing Protection: Basic

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Contact OSHAcademy to arrange for use as a training document.

This study guide is designed to be reviewed off-line as a tool for preparation to successfully complete OSHAcademy Course 159.

Read each module, answer the quiz questions, and submit the quiz questions online through the course webpage. You can print the post-quiz response screen which will contain the correct answers to the questions.

The final exam will consist of questions developed from the course content and module quizzes.

We hope you enjoy the course and if you have any questions, feel free to email or call:

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Modules and Learning Objectives

Module 1: Noise and the Basics of Hearing Loss

Learning objectives in this module include:

- Define "sound" and "noise" and discuss how they differ in meaning.
- Describe how sound is measured in the decibel system.
- Discuss the affects to hearing of exposure to excessive noise and hazardous chemicals in the workplace.
- Describe symptoms and ways to detect possible hearing loss.
- Describe the methods used to evaluate noise exposure in the workplace.
- Identify and describe the two basic types of sound level meters used to evaluate noise levels in the workplace.

Module 2: Hazard Controls and Protective Measures

Learning objectives in this module include:

- Describe the three primary strategies in the Hierarchy of Controls for hearing protection.
- Give an example of an engineering control to eliminate or reduce noise at the source.
- Give at least three examples of administrative controls to limit exposure to excessive noise in the workplace.
- Describe the three types of hearing protective devices (HPDs) commonly used in the workplace.
- Define and describe the concept of "attenuation" as it relates to hearing protection.
- Describe employee training requirements in the Hearing Conservation Program.
- List and describe the five components of the Hearing Conservation Program.
- Describe basic employee responsibilities related to hearing protection.

Course Introduction

Noise, or unwanted sound, is one of the most common occupational hazards in American workplaces. The National Institute for Occupational Safety and Health (NIOSH) estimates that 30 million workers in the United States are exposed to hazardous noise. Exposure to high levels of noise may cause hearing loss, create physical and psychological stress, reduce productivity, interfere with communication, and contribute to accidents and injuries by making it difficult to hear warning signals.

Other consequences of excessive workplace noise exposure include interference with communications and performance. Workers might find it difficult to understand speech or auditory signals in areas with high noise levels. Noisy environments also lead to a sense of isolation, annoyance, difficulty concentrating, lowered morale, reduced efficiency, absenteeism, and accidents.

In some individuals, excessive noise exposure can contribute to other physical effects. These can include muscle tension and increased blood pressure (hypertension). Noise exposure can also cause a stress reaction, interfere with sleep, and cause fatigue.

This course will introduce you to the basics of sound and how exposure to excessive workplace noise can damage hearing. We'll also look at the Hierarchy of Controls for hearing protection, the various types of hearing protection available, and information on the Hearing Conservation Program and employee training.

Module 1: Noise and the Basics of Hearing Loss

Sound and Noise – What’s the Difference?

Sound - consists of pressure changes in a medium (usually air), caused by vibration or turbulence. These pressure changes produce waves emanating away from the turbulent or vibrating source.

Noise - is nothing more than *unwanted sound*. Noise is one of the most widespread occupational health problems. It is a by-product of many industrial processes.

How is Sound Measured?

Sound is measured in two ways: decibels and frequency.

Decibels measure the pressure of sound. Frequency is related to a sound’s pitch and is measured in units called hertz (Hz), or cycles per second. The pitch of a sound — how high or low it seems — is how you perceive its frequency; the higher the pitch, the higher the frequency. High-frequency sounds are generally more annoying than low-frequency sounds and can be more harmful to hearing.

Human hearing is most sensitive to frequencies between 3,000 and 4,000 Hz. That’s why people with damaged hearing have difficulty understanding higher-pitched voices and other sounds in the 3,000 to 4,000 Hz range.

Check out the [CDC Noise Meter](#) page to get a better idea how “loud” is loud.

1. Noise is nothing more than _____.

- a. sound that vibrates
- b. loud sound
- c. non-sinusoidal waves
- d. unwanted sound

How Does the Ear Work?

The **outer ear** consists of the pinna, the ear canal, and the eardrum. When sound waves enter the outer ear, the vibrations impact the ear drum and are transmitted to the middle and inner ear.

The **middle ear** consists of the ossicles (malleus, incus, stapes) and the ear drum. In the middle ear three small bones called the malleus (or hammer), the incus (or anvil), and the stapes (or stirrup) amplify and transmit the vibrations generated by the sound to the inner ear.

The **inner ear** consists of the cochlea, the auditory (hearing) nerve, and the brain. The inner ear contains a snail-like structure called the cochlea which is filled with fluid and lined with cells with very fine hairs. These microscopic hairs move with the vibrations and convert the sound waves into nerve impulses—the result is the sound we hear. Exposure to loud noise can destroy these hair cells and cause hearing loss!

2. In which part of the ear does injury occur due to excessive workplace noise?

- a. Ear drum
- b. Cochlea
- c. Incus
- d. Semicircular ducts

The Perils of Exposure

As mentioned earlier, very loud sounds can damage the sensitive hair cells in your inner ear. Hair cells are the foot soldiers for your hearing. As the number of damaged hair cells increases, your brain receives fewer impulses to interpret as sound. When you damage hair cells, you damage hearing.

Exposure to high levels of noise may cause other harmful health effects as well as hearing loss. The extent of damage to the ear mostly depends on the intensity of the noise and the duration of the exposure. Hearing loss caused by noise can be temporary or permanent.

- Temporary hearing loss results from short-term exposures to noise, with normal hearing returning after a period of rest.
- Prolonged exposure to high noise levels over a period of time gradually causes permanent damage.

Loud noise can also create physical and psychological stress, reduce productivity, interfere with communication and concentration, and contribute to workplace accidents and injuries by making it difficult to hear warning signals.

Noise-induced hearing loss limits your ability to hear high frequency sounds, understand speech, and seriously impairs your ability to communicate.

The effects of hearing loss can be profound as hearing loss can interfere with your ability to enjoy socializing with friends, playing with your children or grandchildren, or participating in other social activities you enjoy, and can lead to psychological and social isolation.

3. The extent of damage to the ear from excessive noise mostly depends on the _____ and the _____.

- a. dBA rating; distance from the noise source
- b. frequency of the sound; direction of exposure
- c. intensity of the noise; duration of the exposure
- d. rate of vibration; length of noise level

Temporary and Permanent Hearing Loss

While a single exposure to loud noise can damage your hair cells, it probably won't destroy them. You may experience ringing in your ears and some sounds may be muffled, but your hair cells will recover and so will your hearing. This is called a temporary threshold shift.

Repeated exposures to loud noise can damage hair cells to the point that they won't recover. Because the damage is permanent, the result is called a permanent threshold shift. No treatment will restore it. When you destroy hair cells, you destroy hearing.

Exposure to Chemicals

No longer is noise considered to be the only source of hearing loss associated with work. Exposure to chemicals, like aromatic solvents, and metals, such as lead, arsenic, and mercury, can result in hearing loss.

Combined exposures to noise and chemicals can cause more hearing loss than exposure to either agent alone. Vibration and extreme heat are also potentially harmful to hearing when combined with noise.

4. Permanent hearing loss is usually the result of _____.

- a. repeated exposure to excessive noise
- b. an exposure to high-impact noise
- c. a combination of variable-impact noises
- d. numerous exposures to various noises

How to Know if Your Hearing is Damaged

Hearing loss is painless and gradual. It usually develops over several years — you might not even notice the loss during those years.

Sometimes, overexposure to loud noise can trigger ringing or other sounds in your ears, called Tinnitus. While tinnitus may be a symptom of damaged hearing, it can also be caused by infections, medications, and earwax.

The only way to know for sure if noise has damaged your hearing is to have a hearing examination by a certified audiometric technician, audiologist, otolaryngologist, or physician.

If you answer "yes" to any of the following questions, your hearing may be at risk:

- Do you frequently ask people to repeat sentences?
- Do you feel your hearing is not as good as it was 10 years ago?
- Have family members noticed a problem with your hearing?
- Are you exposed to loud noise without hearing protection where you work?
- Do you have to shout to a co-worker because of the noise around you?
- Are you exposed to noise from firearms, motorcycles, snowmobiles, power tools, or loud music without hearing protection?

5. What is the symptom called that causes ringing or other sounds in your ears due to overexposure to noise?

- a. Vertigo
- b. Otitis
- c. Tinnitus
- d. Ostosclerosis

Warning Signs of Hazardous Workplace Noise

There are various factors that may indicate noise is a problem in the workplace. While people react differently to noise, subjective responses should not be ignored because they may provide warnings that noise may be at unacceptable levels.

Noisy conditions can make normal conversation difficult. As a general guideline, the work area is too noisy if a worker cannot make himself understood without raising his or her voice while talking to a co-worker 3 feet away. Other clues that it's too loud include:

- When noise levels are above 80 decibels (dB), people have to speak very loudly.
- When noise levels are between 85 and 90 dB, people have to shout.

- When noise levels are greater than 95 dB, people have to move close together to hear each other at all.

Noise-induced hearing loss can develop rapidly in workers exposed to relatively high noise levels on a daily basis.

When It's Too Loud in the Workplace

OSHA requires that employees be placed in a hearing conservation program if they are exposed to average noise levels of 85 dB (called the "action level") or greater during an 8 hour workday. In order to determine if exposures are at or above the action level, it may be necessary to measure or monitor the actual noise levels in the workplace and to estimate the noise exposure or "dose" received by employees during the workday.

6. You can be pretty sure there is too much noise in your workplace when _____.

- a. you must shout at a co-worker 3 feet away to be heard
- b. the dust vibrates on the top of work surfaces
- c. others can't hear you from the next work station
- d. the music in your earphones makes it hard to hear

How to Evaluate Noise Exposure

The first step toward solving any noise problem is to define it. To understand what requirements must be implemented according to OSHA's noise standard, it is necessary to determine exposure levels. The following sections provide information about evaluating noise exposure levels:

- Walk-around Survey
- Work-shift Sampling
- Instruments Used to Conduct a Noise Survey

Walk Around Survey

A walk around survey should be performed to screen for noise exposures and to determine if additional monitoring is necessary. When screening for noise exposures, sound level meter measurements and estimates of the duration of exposure are sufficient. The resulting spot readings can be used to determine the need for a more thorough evaluation.

If the results of the walk around survey indicate time-weighted average (TWA) exposures of 80 dBA or more, then additional noise monitoring should be performed.

7. After you conduct a walk-around survey for noise levels, you determine the average noise level in a work area is 83 dBA. What should be your next action?

- a. Nothing, because noise levels are below the action level
- b. Immediately develop a hearing conservation program
- c. Conduct additional noise monitoring
- d. Hand out hearing protection to everyone in the area

Work-shift Sampling

When the results of the walk around survey indicate that the noise levels may exceed those outlined in OSHA's noise standard, additional monitoring is necessary. Establish a sampling protocol for your workplace. A general protocol is provided as an example below.

1. Inform the employee being monitored that the dosimeter (noise sampling equipment) should not interfere with his/her normal duties, and emphasize that the employee should continue to work as usual.
2. Explain the purpose of the dosimeter to each employee being sampled and emphasize that the dosimeter is not a speech recording device.
3. Instruct the employee being sampled not to remove the dosimeter unless absolutely necessary and not to cover the microphone with a coat or outer garment or move it from its installed position. Inform the employee when and where the dosimeter will be removed.
4. Check the dosimeter periodically to ensure the microphone is properly oriented.
5. Obtain and note sound level meter readings during different phases of work the employee performs during the shift.
6. Record the information required on the [OSHA-92 Noise Survey Report](#).

Personal and Area Monitoring

Personal monitoring: A sound level meter can also be positioned within the immediate vicinity of the exposed worker to obtain an individual exposure estimate.

Area monitoring: This method can be used to estimate noise exposure when the noise levels are relatively constant and employees are not mobile. In workplaces where employees move about in different areas or where the noise intensity tends to fluctuate over time, noise exposure is generally more accurately estimated by the personal monitoring approach.

8. Which type of monitoring process may be best to estimate noise exposure when noise levels are constant and employees are not mobile?

- a. Personal monitoring
- b. Area monitoring
- c. Long-term monitoring
- d. Position monitoring

Noise Survey Instruments

Basically, there are two different instruments to measure noise exposures: the sound level meter and the dosimeter.

Sound Level Meter (SLM)

A sound level meter is a device that measures the intensity of sound at a given moment. Since sound level meters provide a measure of sound intensity at only one point in time, it is generally necessary to take a number of measurements at different times during the day to estimate noise exposure over a workday. If noise levels fluctuate, the amount of time noise remains at each of the various measured levels must be determined.

Sound level meters can be used to:

- Spot-check noise dosimeter performance.
- Determine the employee's noise dose whenever use of a noise dosimeter is unavailable or inappropriate.
- Identify and evaluate individual noise sources for abatement purposes.
- Aid in determining the feasibility of engineering controls for individual noise sources.
- Evaluate hearing protectors.

9. Which type of measurement instrument measures sound intensity at a given moment?

- a. Audio meter
- b. Dosimeter
- c. Noise detector
- d. Sound level meter

Noise Dosimeter

A dosimeter is like a sound level meter except that it stores sound level measurements and integrates these measurements over time, providing an average noise exposure reading for a given period of time, such as an 8-hour workday.

Dosimeters can be used to:

- Make compliance measurements according to OSHA's noise standard.
- Measure the employee's exposure to noise and automatically compute the necessary noise dose calculations.

With a dosimeter, a microphone is attached to the employee's clothing and the exposure measurement is simply read at the end of the desired time period. A reader may be used to read-out the dosimeter's measurements. Since the dosimeter is worn by the employee, it measures noise levels in those locations in which the employee travels.

10. Which type of measurement instrument provides an average noise exposure reading for a given period of time?

- a. Audio meter
- b. Dosimeter
- c. Noise detector
- d. Sound level meter

Module 2: Hazard Controls and Protective Measures

Noise control strategies are the first line of defense against excessive noise exposure. The use of these controls should aim to reduce, eliminate, or replace the sources of excessive noise and to reduce exposure to noise hazards to the point 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 annoyance is reduced. There are several ways to control and reduce worker exposure to noise in the workplace.

Reduce the Hazard and Exposure

OSHA's hierarchy of controls for noise can be summarized as:

1. **Engineering controls** to eliminate or contain the escape of the hazardous noise at its source;
2. **Administrative controls** to control exposure by changing work schedules to reduce the amount of time any one worker spends in the hazard area; and
3. **Personal protective equipment (PPE)** to control the exposure with barriers between the worker and the hazard.

This hierarchy highlights the principle that the best prevention strategy is to eliminate the source of hazardous noise levels, and if that is not successful, manage exposure to those hazards through scheduling and the use of PPE. When it is not possible to eliminate the noise hazard or relocate the worker to a safe area, the worker must be protected with personal protective equipment.

The use of these controls should reduce hazardous exposure to the point where the risk to hearing is eliminated or at least more manageable.

1. Which of the following strategies is best to protect employees from workplace hearing loss?

- a. Eliminate the source of the noise
- b. Eliminate exposure to the source of the noise
- c. Place a barrier between the source and the employee
- d. Wear approved noise protection devices

Engineering Controls

For hearing loss prevention purposes, "engineering controls" is defined as any modification or replacement of equipment, or related physical change at the noise source or along the transmission path (with the exception of hearing protectors), that reduces the noise level at the employee's ear.

Typical engineering controls involve:

1. Reducing noise at the source
2. Interrupting the noise path
3. Reducing reverberation
4. Reducing structure-borne vibration

Simple engineering noise control solutions can reduce the noise hazard to the extent that audiometric testing, a hearing conservation program, and the use of hearing protectors are not necessary. Examples of inexpensive, effective engineering controls that can be applied include:

- Choosing low-noise tools and machinery (e.g., compressors, grinders, etc.)
- Maintaining and lubricating machinery and equipment (e.g., oil bearings)
- Placing a barrier between the noise source and employee (e.g., sound walls or curtains)
- Enclosing or isolating the noise source

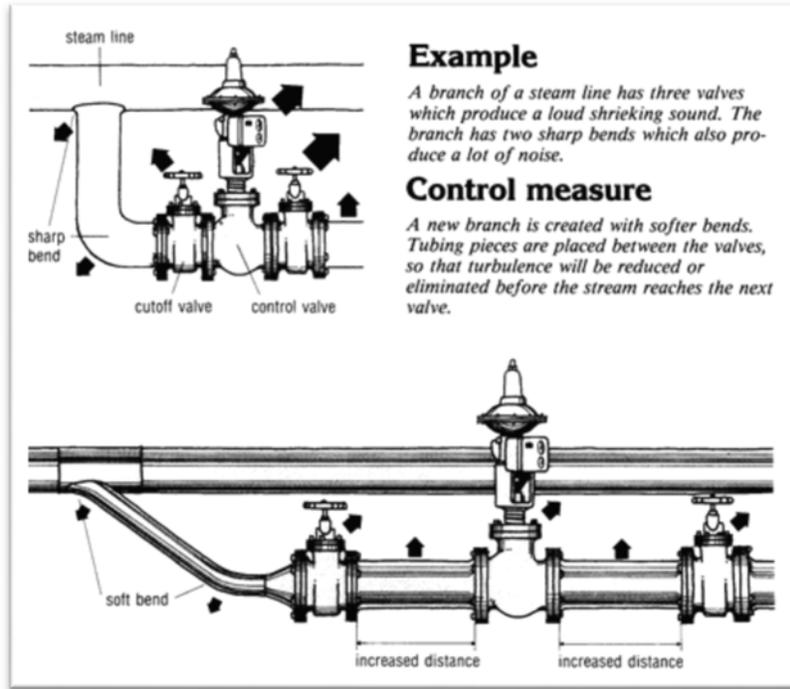
2. Which of the following is defined as any modification or replacement of equipment, or change at the noise source or along the transmission path, that reduces the noise level at the employee's ear?

- a. Administrative controls
- b. Engineering controls
- c. Equipment controls
- d. Interim measures

Engineering Control Examples

The diagram below shows how installing softer bends in the pipe and increasing the distance between the valves will reduce the turbulence in the line and, consequently, reduce the noise generated. Often, large pressure drops across valves, which cause noise, can be prevented with

in-line diffuser silencers, which reduce the pressure upstream of the valve. Installing a muffler on the end of the nozzle is another option. All these methods can help reduce noise from compressed air sources.



Common examples of the implementation of such controls are:

1. Installing a muffler
2. Erecting acoustical enclosures and barriers
3. Installing sound-absorbing material
4. Installing vibration mounts and providing proper lubrication

3. Each of the following is an example of an engineering control for hearing protection, EXCEPT _____.

- a. Erecting acoustical enclosures
- b. Installing a muffler
- c. Installing sound-absorbing material
- d. Enforcing hearing protection rules

Administrative Controls

Administrative controls, defined as "management involvement, training of workers, and changes in the work schedule or operations that reduce noise exposure," may also effectively reduce noise exposure for workers. Examples include:

- Operating noisy machines during shifts when fewer people are exposed.
- Limiting the amount of time a person spends at a noise source. This is probably the most common administrative control being used today in the workplace.
- Providing quiet areas where workers can gain relief from hazardous noise sources (e.g., construct a soundproof room where workers' hearing can recover – depending upon their individual noise level and duration of exposure, and time spent in the quiet area).
- Restricting worker presence to a suitable distance away from noisy equipment.

Controlling noise exposure through distance is often an effective, yet simple and inexpensive administrative control. This control may be applicable when workers are present but are not actually working with a noise source or equipment. In open space, for every doubling of the distance between the source of noise and the worker, the sound level of the noise is decreased by 6.02 decibels. No matter what the scale of measurement, you will get a 6.02 decibels sound level drop for every doubling of distance.

- 4. No matter what the scale of measurement, you will get _____ sound level drop for every doubling of distance.**
- a. a 2.06 decibel
 - b. a doubling of the
 - c. a 6.02 decibel
 - d. a 4X reduction in

Hearing Protection Devices (HPDs) - Basic Requirements

Hearing protection devices (HPDs) are considered the last option to control exposures to noise. HPDs are generally used in conjunction with other hazard controls.

- Employers must make HPDs available to all employees exposed at or above the action level.
- Employers must ensure that HPDs are worn by employees as required by [Table G-16 of 29 CFR 1910.95](#) or who are exposed at or above the action level and who:

- have not yet had a baseline audiogram established or
- have experienced a standard threshold shift (STS).

HPD Selection and Use

It is essential to the success of the program to have someone responsible for the selection of hearing protection devices and the supervision of their use. They must be able to evaluate and select appropriate devices for each employee, based on proper fit, the employee's noise exposure, hearing ability, communication needs, personal preferences, and other constraints imposed by job tasks or work environment.

1. **Earplugs** come in a variety of sizes, shapes, and materials and can be reusable and/or disposable. Earplugs are designed to occlude the ear canal when worn.
2. **Earmuffs** are another type of hearing protector. They are designed to cover the external ear and thus reduce the amount of sound reaching the inner ear. Care must be taken to ensure that the seal of the earmuff is not broken by safety glasses, facial hair, respirators, or other equipment, as even a very small leak in the seal can destroy the effectiveness of the earmuff.
3. **Hearing bands** are a third type of HPD and are similar to earplugs, but with a stiff band that connects the portions that insert into a worker's ears. Hearing bands may not provide the same noise attenuation as properly fitting earplugs, as the portions that fit into the ears are stationary and cannot be twisted into place like earplugs.

Earplugs, earmuffs, or hearing bands alone might not provide sufficient protection from significantly high noise levels. In this case, workers should wear double hearing protection- earmuffs with earplugs. Avoid corded earplugs, as the cord would interfere with the muff seal. Additionally, hearing bands cannot be worn with earplugs or earmuffs, as the connected band would interfere with the muff seal, and there is no room to insert earplugs at the same time.

5. What should you do if your earplugs can't provide adequate reduction in noise levels?

- a. Wear earmuffs with earplugs
- b. Wear hearing bands with earmuffs
- c. Wear hearing bands with earplugs
- d. Wear two sets of earplugs

Fitting HPD's

When fitting hearing protectors, attention needs to be given to each ear. It is not uncommon for a person to have right and left ear canals that are different sizes and must, therefore, be fitted with earplugs that are separately sized for each ear.

Ear canals should be inspected to assure that no physical problems, such as infections or excessive ear wax, will compromise or complicate the use of hearing protectors. Other employer requirements for providing hearing protection include:

- Employees must be given the opportunity to select their HPDs from a suitable variety. Generally, this should include a minimum of two devices, representative of at least two different types.
- The employer must provide training in the use and care of all HPDs provided to employees.
- The employer must ensure proper initial fitting of HPDs and supervise their correct use.

Program implementers should be alert for common pitfalls associated with use and care of hearing protectors. For example, motorcycle helmets, personal stereo headsets, swimmer's earplugs, and hearing aids cannot be substituted for hearing protectors. Program implementers should be proactive in working with employees to avoid such pitfalls.

6. Which of the following is TRUE regarding the use of hearing protection?

- a. Earplugs should be inserted as far as possible into the ear canal.
- b. Hair within the outer ear must be removed prior to insertion of earplugs.
- c. Employees must generally pay for additional pairs of hearing protectors.
- d. Employees must be allowed to select from a variety of hearing protectors.

HPD Attenuation

Attenuation refers to the damping or decrease of noise levels as a result of wearing HPDs. All hearing protectors are provided with an Noise Reduction Rating (NRR). Although earplugs can offer protection against the harmful effects of impulse noise, and some earplugs are designed specifically to reduce this type of noise, the NRR is based on the attenuation of continuous noise and may not be an accurate indicator of the protection attainable against impulse noise. Earplugs are better suited for warm and/or humid environments, such as foundries, smelters, glass works, and outside construction in the summer. Requirements related to attenuation include:

- The employer must evaluate HPD attenuation for the specific noise environments in which the HPD will be used.
- HPDs must attenuate employee exposure to at least an eight hour time-weighted average of 90 dBA.
- For employees who have experienced a standard threshold shift (STS), HPDs must attenuate exposure at or below the action level of 85 dBA-TWA (time-weighted average).
- The adequacy of the HPDs must be re-evaluated whenever employee noise exposures increase to the extent that they may no longer provide adequate attenuation. The employer must provide more effective hearing protectors as necessary.
- Employer needs to know and understand the [methods for estimating HPD attenuation](#).

7. HPDs must attenuate employee exposure to at least an eight hour time-weighted average of _____.

- a. 80 dBA
- b. 85 dBA
- c. 90 dBA
- d. 95 dBA

Employee Training and Education

The employer must institute a training program for all employees with noise exposures at or above the action level and ensure employee participation.

- Training must be repeated **annually** for each employee in the hearing conservation program.
- Information must be updated to be consistent with changes in protective equipment and work processes.

Cultivate a vigilant attitude about hearing protection: Employees should expect their hearing protectors to slip or work lose over a period of time. Throughout their work shift, employees must periodically check to see if they need to readjust or refit their protector in order to maintain a reliable fit.

Guard against acquiring a false sense of safety: As the discussion and figures in this section have illustrated, it is easy to misuse hearing protectors and greatly reduce their effectiveness. Employees can be effectively protected from hearing health hazards if they:

- properly wear their hearing protectors,
- exercise a commitment to wear their hearing protectors consistently, and
- maintain their hearing protectors by repairing or replacing them when necessary.

Hearing protectors break and become worn: Employees also need to check their protector regularly and to seek repair or replacement whenever necessary. Lastly, they can help each other by encouraging their co-workers to use hearing protectors and to seek help when they have problems.

8. Annual hearing protection training must be conducted for ____.

- a. all employees in noisy work areas
- b. all employees who chose to wear hearing protection
- c. each employee in the hearing conservation program
- d. each employee at in the workplace or worksite

The Hearing Conservation Program

An effective hearing conservation program can prevent hearing loss, improve employee morale and a general feeling of well-being, increase quality of production, and reduce the incidence of stress-related disease.

The employer should administer a continuing, effective hearing conservation program whenever employee noise exposures are at or above an eight hour time-weighted average (TWA) sound level of 85 decibels or, equivalently, a dose of 50 percent.

Program Elements

As detailed in [OSHA's 1910.95](#) rule, the elements of an effective hearing conservation program are:

- **Monitoring Program:** When any employee's exposure may equal or exceed an 8-hour time-weighted average of 85 decibels, the employer must develop and implement a monitoring program.

- **Audiometric Testing Program:** Establish and maintain an audiometric testing program by making audiometric testing available to all employees whose exposures equal or exceed the "action level" - 8-hour time-weighted average of 85 decibels.
- **Hearing Protection Devices (HPDs):** Employers must make hearing protectors available to all employees exposed to an 8-hour time-weighted average of 85 decibels or greater at no cost to the employees.
- **Employee Training and Education:** The employer must train each employee who is exposed to noise at or above an 8-hour time weighted average of 85 decibels. The employer must institute a training program and ensure employee participation in the program.
- **Recordkeeping:** The employer shall maintain an accurate record of all employee exposure measurements.

9. When must the employer institute a hearing conservation program?

- a. Whenever employee noise exposures are determined to be more than 85 decibels during any workshift
- b. Whenever employee noise exposures are at or above an 8-hour TWA of 85 decibels or a dose of 50 percent
- c. Whenever employees are exposed to noise are at or above an 90 decibels or more.
- d. Whenever the employer determines employees are exposed to 80 decibels or more during any part of the workshift

Employee Responsibilities

Employees who operate or maintain and repair the equipment are often the ones who know most about the processes involved. They need to express their concerns and ideas to management, the program implementer, or the noise-control engineer so that the noise-control devices will be as practical and effective as possible.

- Employee assistance is especially critical to the success of engineering noise surveys where sound sources within a work process or a piece of equipment need to be evaluated, and only the employee knows the proper operation of the equipment.
- Employees also need to cooperate by maintaining their normal work routine when asked to wear dosimeters, so that the results will be representative of their actual exposures.

Sound levels often increase when equipment begins to wear or fails to receive appropriate maintenance. Also, changes in equipment placement may cause unintended effects on sound levels.

- When employees notice such changes, they need to inform the supervisory personnel or the program implementer that a change has occurred. A re-survey will be needed to evaluate the new sound levels and employee exposures whenever equipment or production changes occur.
- Employees also have the responsibility of learning to operate their machines with the noise controls in place, of maintaining the controls properly, and of notifying the appropriate personnel when additional maintenance is needed.

10. Employee responsibilities regarding hearing protection include all of the following, EXCEPT _____.

- a. Cooperating during noise surveys
- b. Reporting changes in noise exposure to supervisors
- c. Changing the type of hearing protectors to ensure comfort
- d. Operating machines with noise controls in place

Additional Resources

- [Glossary of Terms](#)
- [Hearing Conservation](#), OSHA
- [Noise and Hearing Loss Prevention](#), NIOSH
- [Occupational Noise Exposure](#), OSHA
- [OSHA Technical Manual - Noise](#), OSHA