Occupational Noise Exposure

29 CFR 1910.95

High noise intensity is a common occupational health problem present in many industrial settings. Unprotected exposure to high levels of noise can cause hearing loss and may cause other harmful health effects. The extent of damage depends primarily on the intensity of the noise and the duration of the exposure. Noise-induced hearing loss can be temporary or permanent.

This standard requires hearing conservation programs for all employees whose noise exposures equal or exceed an 8-hour time-weighted average (TWA) of 85 decibels (dBA). The final rule became effective in April 1983.

Must Employers Monitor Noise?

Yes. This standard requires employers to monitor noise exposure levels so they can accurately identify employees who are exposed to noise at or about 85 dBA averaged over eight working hours (an 8-hour TWA). The exposure measurement must include all continuous, intermittent and impulsive noise within an 80 dBA to 130 dBA range and must be taken during a typical work situation.

Noise can be monitored with a noise level meter or a noise dosimeter. If a noise level meter is used, the employer can calculate the time weighted-average by determining how long an employee is exposed to the various noise levels throughout the workday. The allowable exposure is based on eight-hour workdays….standards are made on the "A-scale". The scale type refers to a set of filters applied to the various sound frequencies (pitches).

Re-monitoring must be done anytime there is a change in production, process, equipment or controls which increase the noise exposures to the extent that additional employees may be exposed or the attenuation provided by the hearing protection devices may no longer be adequate for the exposure.

This requirement is performance-oriented since it allows employers to choose the monitoring method that best suits each individual situation. Employers are responsible for the correct calibration of monitoring equipment. Monitoring equipment should be calibrated annually by the manufacturer or other qualified third-party. A pre and post calibration should be performed prior to and following every survey.

Employees are entitled to observe monitoring procedures and must be notified of the results. The method used to notify employees is up to the employer.

How Loud is It?

OSHA requires actions at 85 dBA TWA to protect employees from hearing loss. Decibels measure sound pressure. They are on a logarithmic scale. As a result a small reduction in decibel levels represents significant reductions in sound pressure intensity. As a rule of

thumb, if the noise in the work area requires workers to speak above a normal volume level, the noise levels are too high.

Some examples of various noise levels are shown below:

Source	Noise Level
Immediate Ear Damage & Pain / Explosion Close Proximity to Jet Engine during taking off.	140 dBA+
Live Music at Speaker – Painful to Ears Loud Car Horn at Close Range.	120 dBA
Chainsaw / Jack Hammer / Hammer Drill	110 dBA
Lawnmower / Grinder	95 dBA+
Heavy Truck / Circular Saw	90 dBA
Busy Office / Vaccum Cleaner Within a 1-2 feet a person speaking to a crowd.	75 dBA
Quiet Office / Conversation	60 dBA
At Home in a Quiet Environment	50 dBA
Whisper	20 dBA
Breathing	10 dBA
Threshold of Hearing	0 dBA

What is Audiometric Testing?

Audiometric testing monitors the sharpness or acuity of an employee's hearing over time and provides an opportunity for employers to educate employees about their hearing and the need to protect it. Employers must establish and maintain an audiometric testing program that includes baseline audiograms, annual audiograms, training and follow-up procedures. This testing must be free of charge to all employees exposed to an action level of 85 dBA or above, measured over an 8-hour TWA.

A licensed or certified audiologist or appropriate physician must be responsible for the audiometric testing program. Both professionals and trained technicians may conduct audiometric testing. The professional in charge of the program does not have to be present when a qualified technician is conducting testing.

Both baseline and annual audiograms are required in the hearing conservation program.

What is a Baseline Audiogram?

This is the reference audiogram against which future audiograms are compared. It must be provided within six (6) months of an employee's first exposure at or above an 8-hour TWA of 85 dBA. An exception is the use of mobile test vans to obtain audiograms. In this case, baseline audiograms must be completed within one (1) year after an employee's first exposure to workplace noise at the levels described here.

It is important that employees are not exposed to noise for 14 hours prior to an audiogram or the results may be inaccurate. Properly-worn hearing protection devices may be used as a substitute for no noise exposure.

What About Annual Audiograms?

Annual audiograms must be conducted within one (1) year of the baseline to identify deterioration in hearing ability. Annual audiograms must be routinely compared to baseline

audiograms to determine whether the employee has lost hearing ability. This will identify if a standard threshold shift has occurred. Standard Threshold Shift (STS) is an average shift in either ear of 10 dBA or more at 2000, 3000 or 4000 hertz. An averaging method of determining STS was chosen because it diminishes the number of persons falsely identified as having STS and who are later shown not to have had a change in hearing ability. Also, the method is sensitive enough to identify meaningful shifts in hearing early on.

If an STS is identified, employees must be fitted or re-fitted with adequate hearing protectors, shown how to use them and required to wear them whenever they are exposed to more than 85 dBA. Employees must be notified within 21 days from the time it is determined their audiometric test results showed a STS.

If an employee experiences a STS, it is prudent to have the audiometric test re-performed within 30 days. If the re-test shows that the STS is not persistent, then the re-test results can be used in place of the initial testing. OSHA also permits employers to use age-correction factors to account for presbycusis (hearing loss from aging). You may want to determine if your audiologist applies these factors to their determination of STSs. Many professional audiologists and others are concerned that age correction factors could mask a problem that is developing. For this reason, some companies opt not to have age correction factors applied even though OSHA permits the practice.

An annual audiogram may be substituted for the original baseline audiogram if the professional supervising the program determines the employee's STS is persistent. The original baseline audiogram, however, must be retained for the duration of the employee's employment.

Audiometric testing must be conducted in a room meeting specific background levels and with calibrated audiometers that meet ANSI specifications of S3-1969.

What are the Requirements for Hearing Protectors?

Hearing protectors must be available to all workers exposed to an 8-hour TWA noise level of 85 dBA or above to ensure employees have access to protectors **before** they experience a hearing loss.

Hearing Protectors Must be Worn By:

- Employees for any period exceeding six (6) months from the time they are first exposed to 8-hour TWA noise levels of 85 dBA or above until they receive their baseline audiograms. This may occur in situations where baseline audiograms are delayed because it is inconvenient for mobile test vans to visit the workplace more than once a year;
- Employees who have incurred standard threshold shifts, since these workers have demonstrated they are susceptible to noise;
- Employees exposed over the permissible exposure limit of 90 dBA over an 8-hour TWA.

Hearing protectors must adequately reduce the severity of the noise level for each employee's work environment. Whenever there is a change in working conditions that may cause the hearing protector to be inadequate, the employer must re-evaluate the protector's suitability.

There are several ways OSHA permits employers to determine the effectiveness of hearing protection devices in the workplace. One of the most common is to determine the hearing protection device's Noise Reduction Rating (NRR). This is the rating of average decibel reduction afforded by the hearing protector. Reduce this number by seven (7) and then

subtract this from the employee's TWA dBA exposure level. If the level is below 85 dBA the protector is probably adequate to meet OSHA's requirements.

For example:

NRR	33
Less	7
Effective NRR	26
Exposure Level	100 dBA (TWA)
Less NRR Adjusted	26
Exposure	74 dBA

Since the exposure is below 85 dBA, OSHA considers this exposure to be reduced to a safe-level with hearing protection devices.

Other safety and health professionals may suggest a more conservative approach by reducing the NRR by 50%. The NRR is reduced to account for the variance between laboratory testing and real-world application of the devices.

Some employers find it necessary to require that employees wear double ear protection (i.e., muffs and plugs) to control noise.

Hearing Protection Alone is Not Adequate

When a noise exposure is present in a workplace, OSHA requires that the employer implement administrative and/or engineering controls to control the noise exposure. Only as a last resort are hearing protection devices to be used. Often engineering controls can significantly reduce the noise level in a workplace. Companies may have the opportunity to avoid the complexity and administrative requirements of this regulation by focusing on removing or controlling the hazard from their workplaces. Qualified consultants can assist with noise abatement and control. Be aware that "noise absorbing" baffles will usually not significantly impact noise levels in a workplace.

How Must Employees be Trained?

Proper training encourages proper wearing of protective equipment. Employees exposed to TWAs of 85 dBA and above must be trained at least annually in the effects of noise.

Required Training Topics:

- Purpose, advantages and disadvantages of various types of hearing protectors;
- The selection, fit and care of protectors; and
- The purpose and procedures of audiometric testing.

The training program may be structured in any format, as long as these required topics are covered.

Are There Record Keeping Requirements?

Yes. Noise exposure measurement records must be retained for two (2) years. It is suggested that documentation of the noise levels in a facility be available to OSHA to meet the requirements of determining the noise level to which employees are exposed.

Audiometric test records shall be retained for the duration of the affected employee's employment. It is suggested that these records be retained indefinitely to reduce an employer's liability under workers' compensation and to assure compliance with the 1910.1020 medical records provisions of the standards.

It is recommended that records of employee training, consultations with employees regarding STSs and all other records pertaining to the hearing conservation program be retained.

Posting Requirement

OSHA requires that a copy of the noise standard (29 CFR 1910.95) be posted in the workplace and that copies be made available to affected employees.

Does OSHA Require that Hearing Loss be Recorded on the OSHA Log of Injuries (300 Log)?

Yes. The criteria for recording a hearing loss on the OSHA Log changed in 2003. Hearing loss cases must put onto the OSHA 300 Log when a STS occurs AND the loss is work-related AND there is an average shift in hearing of 25 dB in the frequencies of 2000, 3000 and 4000 Hertz from audiometric zero. Age correction can be applied in evaluating the STS, but no adjustments to the 25 dB-from-zero shift is permitted.

Is the OSHA Noise Standard Adequate?

Pennsylvania employers who have had hearing loss claims within their organization have incurred significant expenses. Many of these companies have employees that experienced hearing loss long before OSHA's requirements were enacted. For this reason, it is prudent for employers to seek the best practice based on available research, rather than rely on regulatory requirements solely.

The National Institute for Occupational Safety and Health (NIOSH) published a paper in June of 1998 laying out some recommendations for a revised noise standard. Some of the highlights of their recommendations include:

- The exchange rate for determining permissible exposure should be reduced from a 5 dBA to a 3 dBA rate. This would significantly reduce the amount of noise to which an employee could be exposed. For example, an employee exposed to 95 dBA for four hours with no other exposure, under the existing standard would only be permitted to be exposed to 93 dBA for the same four hours with a 3 dBA exchange rate.
- The STS would be changed to recognized a 15 dBA STS versus the current 10 dBA STS. This would also be evaluated over more specific frequencies than OSHA's current requirements. This would reduce the amount of false positive STSs identified and improve the identification rate of employees with problems.
- The NRR value would be reduced according to the type of hearing protector being used:

  25% Muffs
  50% Formable Earplugs
  70% All Other Plugs
- Additional requirements for the management of the hearing conservation program are outlined.

At an 85 dBA level over a forty-year period of occupational exposure, NIOSH estimates that a 16% excess risk for hearing loss still exists.

At the time of this writing, NIOSH's recommendations are not law, nor has OSHA proposed them. They do, however, provide some considerations for employers when evaluating the effectiveness of their existing noise control programs.