Effective Hearing Conservation Program Elements – Quick Tips



Occupational noise exposure is one of the most significant health hazards present in the modern industrial workplace. According to the National Institute for Occupational Safety and Health (NIOSH) 22 million workers are exposed to potentially damaging noise each year. It impacts both employees, who suffer permanent hearing loss due to exposure to excessive industrial noise levels, and employers, whose profits are reduced by the increased costs of worker compensation claims related to noise induced hearing loss.

The serious consequences of industrial noise have not been lost on the Occupational Safety and Health Administration (OSHA). In March of 1983, OSHA incorporated the Hearing Conservation Amendment (HCA) into its existing occupational noise exposure standard that had been enforced since 1974. The occupational noise exposure standard is located in 29 Code of Federal Regulations (CFR) 1910.95.

Occupational Noise Exposure Standard

As OSHA standards go, the Occupational Noise Exposure Standard is a relatively user-friendly document. It’s extremely thorough, thus eliminating much of the reader interpretation that most standards require.

The standard implements a three-pronged approach to address industrial noise exposure. The basic components are recognition, evaluation and control. Additionally, training and record keeping are used to support each of the standard’s basic components. The importance of these support elements cannot be underestimated.

Recognition

Before determining whether an employee is being exposed to an unsafe level of noise, the level of noise must first be quantified. OSHA identifies 90 decibels (dB) based on an eight-hour time- weighted average (TWA) as the absolute “safe” level of noise exposure. This 90dB concentration is referred to as the OSHA permissible exposure limit (PEL). Any eight-hour TWA exceeding 90dB requires the employer to implement control measures to reduce the exposure to 90dB or below.

In addition to the 90dB PEL, OSHA also recognizes an 85dB TWA as its action

level. The action level was established in the 1983 HCA. While employee exposure to the action level does not force an employer to take measures to reduce employee noise exposure, it does require the employer to establish a hearing conservation program. The HCA defines a hearing conservation program in detail. It mandates that the employer conduct noise exposure monitoring, perform audiometric testing on employees, provide hearing protection to employees who request it, conduct employee training and retain records of the aforementioned activities.

Noise Level Monitoring

Under 29 CFR 1910.95(d), OSHA states noise levels must be monitored, "When information indicates that any employee's exposure may equal or exceed an eight-hour time-weighted average of 85 decibels." As a general rule of thumb, if an individual's voice must be raised to carry on a conversation at a distance of three feet, the noise level probably exceeds 85dB. At the very least, this is an indication that monitoring should be conducted.

Two basic types of instruments are available to monitor noise levels: sound level meters and noise dosimeters. Both instruments measure in decibels. It's important to note that decibels are not linear units like feet or pounds. The decibel is a dimensionless unit that expresses a logarithmic ratio to an established reference level. To put the decibel into perspective, remember that while a reading of 10 decibels is 10 times greater than one decibel, a reading of 20 decibels is 100 times greater (10 x 10) than one, and a reading of 30 decibels is 1000 times greater (10 x 10 x 10).

Both sound level meters and noise dosimeters are usually capable of measuring decibels in two or three different frequency scales. Frequency refers to the number of vibrations per second a noise contains; it is measured in hertz (Hz). There are three frequency scales—A, B and C. The A scale most closely resembles the perception of loudness by the human ear. The B scale follows the human ear at moderate intensities; and the C scale resembles the human ear at very high noise levels. OSHA requires that noise measurements be conducted using the A scale, which most closely resembles the perception of loudness by the human ear.

Sound level meters are direct reading instruments that provide a "snap shot" measurement of noise levels at a particular time. They do not average noise levels to provide the eight-hour TWA on which OSHA bases its noise exposure levels. Because of this, sound level meters are most appropriate for preliminary noise surveys to determine if any work areas exceed the 85dB action level. If these areas are identified, then a noise dosimeter can be used to determine an employee's TWA exposure.

Noise dosimeters are physically worn by employees for an entire work shift in order to record exposure levels. These levels are used to calculate an employee's TWA exposure.

Regarding calibration of noise monitoring equipment the OSHA standard states, "Instruments used to measure noise exposure shall be calibrated to ensure measurement accuracy" (29 CFR 1910.95(d)(2)(ii)). For more specific guidance concerning calibration, refer to the manufacturer's instructions for the instrument.

After the initial noise monitoring, OSHA requires that additional monitoring be

performed whenever there is a change in the production process that may increase noise exposure. It is also required that employers document all noise exposure measurements and retain these records for at least two years.

Should the noise level monitoring show that employees are being subjected to levels equaling or exceeding the 85dB action level, the next step is to establish an audiometric testing program for those exposed. In addition, the employer must provide hearing protectors at no cost and institute a training program for all affected employees. According to OSHA, the training program must be conducted annually and ensure that the employees are informed of, “The effects of noise on hearing; the purpose of hearing protectors; the advantages, disadvantages, and attenuation of various types of hearing protectors; instructions on their selection, fitting, use and care; the purpose of audiometric testing; and an explanation of the test procedures.”

Evaluation

The backbone of the employee evaluation is audiometric testing. This is more commonly referred to as a hearing test. Under 29 CFR 1910.95(g), OSHA details the requirements of an audiometric testing program. An audiometric testing program is comprised of two types of tests, or audiograms: baseline and annual. Audiograms are used to document an employee’s hearing level. The baseline audiogram must be conducted within six months of confirmation of an exposure equal to or exceeding the 85dB action level. It establishes a reference point to which future annual audiograms can be compared. The initial annual audiogram must be conducted within one year of the baseline. Subsequent annual audiograms must be performed yearly thereafter.

By comparing the annual audiogram to the baseline audiogram, an employer can evaluate whether an employee has experienced any recordable hearing loss during this window of employment. This hearing loss is referred to as a standard threshold shift (STS). OSHA defines a STS as, “a change in hearing threshold relative to the baseline audiogram of an average of 10dB or more at 2000, 3000, and 4000 Hz in either ear” (29 CFR 1910.95(g)(10)).

Should the audiogram results indicate a STS has occurred, OSHA requires that the affected employee be fitted (or refitted) with hearing protectors, trained on the proper use of them and required to wear them. The employee must be informed of the STS and may be referred for further audiometric testing.

OSHA is very specific in terms of who can administer audiometric testing and the type of equipment that must be used. The criteria for those who can perform audiometric tests are referenced under 29 CFR 1910.95(g)(3). Basically, OSHA requires a licensed or certified audiologist or a technician who is certified by the Council of Accreditation in Occupational Hearing Conservation. 29 CFR 1910.95(h) gives detailed specifications for the instrumentation required for audiometric testing.

The employer is required to retain all of the audiometric test records for a given employee for the duration of the affected employee’s employment. The specific guidelines for what must be included on these records are located under 29 CFR 1910.95(m)(2)(ii).

Control

The final basic component of the OSHA standard involves controlling employee exposure to excessive noise levels. This element comes into play primarily when noise level monitoring indicates employee exposure levels are surpassing the 90dB PEL. 29 CFR 1910.95(b)(1) states that if the 90dB PEL is being exceeded, “feasible administrative or engineering controls shall be utilized. If such controls fail to reduce sound levels within the levels of Table G-16 (90dB PEL), personal protective equipment shall be provided and used to reduce sound levels within the levels of the table.”

The OSHA standard does not offer any guidance on appropriate engineering or administrative control measures. It does, however, thoroughly address the selection process for personal protective equipment (PPE).

Engineering controls are the first and best strategy to control the hazard at its source. The concept of engineering controls is that the work environment and the job itself should be designed to eliminate hazards or reduce exposure to hazards. Examples of engineering controls include: isolating the source of the sound to eliminate or reduce employee exposure, installing noise- absorbing acoustical foam or baffles to capture and deaden reverberating noise, or, where possible, incorporating noise-reducing technology into the design of a piece of equipment or work area.

Administrative controls are defined by OSHA as, measures aimed at reducing employee exposure to hazards. These measures include additional workers and rotation of workers used in conjunction with other controls that prevent or control exposure to the hazard. This can be accomplished by moving an employee from a job in a high-noise setting to a job in a low-noise setting. For example, if an employee worked in a 92dB environment, after six hours the individual would reach 100% of his daily time-weighted exposure. This same employee could work in the 92dB environment for five hours and then rotate to an 80dB location for the remaining three hours of the work shift and not exceed the 90dB TWA PEL.

PPE is available in two basic formats: earmuffs, which fit over the entire external ear and seal against the side of the head, and ear plugs, which are inserted directly into the ear canal. Hearing protectors must attenuate employee exposure at least to an eight-hour TWA of 90dB (29 CFR 1910.95(j)(2)). For employees who have experienced a STS, hearing protectors must attenuate employee exposure to an eight-hour TWA of 85db or below (29 CFR 1910.95(j)(3)).

In either format, hearing protectors will always have an assigned noise reduction rating (NRR). The NRR was developed by the Environmental Protection Agency (EPA) as a method of gauging the adequacy of a hearing protector’s attenuation, or noise-reducing capacity. The EPA regulation requires that the NRR be printed on the packaging for each hearing protector. In theory, the NRR of a hearing protector is the amount of decibels by which a given device will reduce noise exposure.

Employers must evaluate hearing protector attenuation for the specific noise environments by using one of the evaluation methods described in 29 CFR 1910.95 Appendix B: “Methods for Estimating the Adequacy of Hearing Protection Attenuation.”

If a worker exposed to a 100dB TWA was assigned a pair of earmuffs with an NRR of 26, the 26dB would be subtracted from 100dB, leaving the worker with a 74dB TWA exposure. It is important to note this calculation is true only if the

original TWA exposure (in this case the 100dB TWA) was arrived at with a noise measuring instrument reading in the C scale.

When the A scale is used for the initial noise level monitoring, OSHA requires a slightly different adjustment: 7dB must first be subtracted from the hearing protector's NRR; this number is then subtracted from the TWA exposure.

If the A scale had been used to record the above 100dB TWA exposure, then 7dB must be subtracted from the hearing protector's 26dB NRR. This leaves a 19dB NRR. This number is then subtracted from the 100dB exposure, leaving the worker with an 81dB TWA exposure. In either of the above examples, the worker would be well below the 90dB TWA PEL.

OSHA also suggests using a 50 percent safety factor when performing either of the above adjustments. This 50 percent safety factor is suggested because the manufacturers' assigned NRRs are obtained under ideal conditions, in a laboratory setting. This environment is typically different from the conditions under which the hearing protectors are being used. If the 50 percent safety factor were used in either of the above examples, the 26dB NRR of the hearing protector would have been immediately cut in half to a 13dB NRR. The respective calculations would then be performed, leaving the worker for the C scale example with an exposure of 87dB. In the A scale example the 50 percent safety factor is applied after the 7dB are subtracted from the NRR. This leaves the worker with a TWA exposure of 90.5dB. This exceeds the OSHA PEL. Remember, OSHA only suggests using the 50 percent safety factor; they cannot issue citations based on the safety factor adjustment.

Occasionally, high-noise environments may necessitate using earmuffs and ear plugs in combination. As referenced In OSHA's hearing standard, Appendix IV:C. "Methods for Estimating the Adequacy HPD Attenuation", it allows 5dB to be added to the greater of the two NRRs. This is added after all other adjustments are made. If ear plugs with an NRR of 21 were used in combination with the earmuffs in the above examples, five additional dB of protection would be added to each exposure. In the last example, this would bring the 90.5dB exposure down to 85.5dB. The worker's exposure would then drop below the PEL.

When it comes to hearing protectors, OSHA requires that employees be given the opportunity to select their hearing protectors from a variety of suitable options, and that the employer provides training on the use and care of the selected devices.

Source

29 CFR 1910.95, Occupational Noise Exposure

NIOSH Noise and Hearing Loss Prevention

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