

# Hearing Conservation

*Hearing conservation is a major issue in the construction industry and in roofing operations, as well. A wide variety of roofing equipment is capable of producing levels of noise that may be harmful. Drills, saws, gasoline-powered equipment such as gravel sweepers, roof cutters, planers, rock removers, pneumatic tools or power washers can create enough noise to present a hazard to nearby workers. Roofing workers also may be subject to other noise from equipment operated on the job site by other trades. This chapter is intended to address hearing-loss issues in the workplace and the procedures for ensuring compliance with the Occupational Safety and Health Administration's (OSHA's) hearing conservation requirements found at 29 CFR 1926.52. Following this chapter, a sample hearing conservation program that can be adapted and included in a company's overall health and safety program is provided.*

*OSHA has developed a more comprehensive hearing conservation program that applies to employers covered by the general industry standards of 29 CFR 1910.95. At the time of publication of this manual, the agency is considering whether provisions of the general industry standard are appropriate to be included in a revised version of the construction standard. Until such time as new regulations are proposed, roofing contractors are urged to become familiar with the requirements of the construction standard that relate to occupational noise exposure and the engineering controls, work practices and personal protective equipment (PPE) that can help reduce that exposure.*

## Sound

*Sound is the result of rapid atmospheric pressure changes caused by agitation of the air. Imagine a cymbal being struck. As the cymbal vibrates, it alternately pushes and pulls the air, creating a compression and then a vacuum. The cycle repetition causes a wave to resonate in an outward direction.*

*The wave travels through the air, ultimately reaching the ear drum and causing it to vibrate. The vibration is transferred from the drum to the inner ear, which is comprised of three bones: the anvil, stirrup and hammer. These bones are attached to the cochlea, a liquid-filled tube with thousands of tiny hair cells. The vibrating inner ear bones move the cochlea, which disturbs the liquid and ultimately moves the hair cells. When the hair cells move, they transmit electrical impulses to the auditory nerve. Those impulses are interpreted as sound.*

*Under normal, quiet conditions, the hair cells are erect, or perpendicular, to the cochlea's wall. Exposure to loud noises causes the hair cells to lie down, or move closer to parallel, which creates the familiar "ringing" sensation. Over time, the hair cells move back to their perpendicular position, which ends the ringing sensation.*

*Human beings gradually lose hair cells in the cochlea as they age. These hair cells do not regenerate; once they die, they are gone forever. In the case of natural hearing loss, hearing aids can be used to amplify sound to the remaining hair cells, allowing the auditory nerve to continue to receive impulses. Excessive exposure to noise in the workplace also can lead to the loss of hair cells. However, this type of hearing loss does not benefit from the use of hearing aids.*

## **Occupational Noise Exposure Requirements**

*There are three scales by which noise is measured: A, B and C. The American Conference of Governmental Industrial Hygienists has adopted the A scale as the basis of all measurements. The action level mandated by OSHA in construction, where engineering controls, work practices or hearing protection must be provided, is when noise levels exceed an eight-hour time-weighted average (TWA) of 90 decibels in the A-weighted scale (dBA).*

### **Engineering Controls**

*Roofing contractors should assess all options available for reducing noise generation. Many of the typical engineering controls, such as acoustical tile, sound-proof rooms and other noise-dampening controls, are primarily indoor measures and therefore may be impractical for roofing contractors. Mufflers, however, are a practical solution for combustion engine noise, and some new equipment is being manufactured with silencing devices to reduce noise.*

### **Administrative Controls**

*Another option to reduce noise exposure is to implement administrative controls by rotating jobs so employees operate or work near noisy equipment for only a few hours at a time. Like engineering controls, administrative controls may be difficult for roofing contractors to implement because many crews do not have the manpower to support this procedure. **Table D-2**, reproduced from 29 CFR 1926.52(d)(2), illustrates the length of time an employee can be exposed to different noise levels.*

*Exposure Duration (Hours)*

*8*

*Noise Level (dBA)*

*90*

6	92
4	95
3	97
2	100
1.5	102
1	105
0.5	110
0.25 or less	

## **Personal Protective Equipment**

*The last option is the use of PPE. This is OSHA's least favorite option because human error—for example, failing to insert earplugs properly—can greatly reduce the effectiveness of the protection. However, regardless of OSHA's preferences, PPE is used extensively in the construction industry out of sheer necessity. Employers who choose the PPE option must ensure ear devices are fitted to employees or the proper devices have been selected by a competent person, according to the requirements of 29 CFR 1926.101.*

## **Determining Noise Levels**

*The first step in noise-level testing is to determine the noise levels generated by individual pieces of equipment, and this responsibility falls on the contractor. Hand-held sound meters measure noise exposure and are lightweight, easy to operate and relatively inexpensive—some cost less than \$100. However, many contractors prefer to hire a consultant to do more comprehensive testing to gauge noise exposure.*

*If the noise level exceeds levels in Table D-2 of 29 CFR 1926.52, engineering controls, work practices or PPE must be implemented to reduce the exposures to safer levels. More detailed, professional monitoring of noise levels may be required to get a specific picture of the nature of the exposure so that appropriate action may be taken.*

## **Hearing Protection**

*If hearing protection is necessary, employers must provide it at no cost to the employee. Employees may select from a variety of hearing protection options. There are two basic styles: over-the-ear protectors (ear muffs) and in-the-ear protectors (ear plugs or canal caps). Ear plugs can be reusable and fitted to a person's ear or disposable and made of expandable foam. Expandable foam plugs are generally the cheapest, most popular and most hygienic.*

*All hearing protectors have a noise reduction rating (NRR) that is required to be stated on the package containing the device. The method for determining the NRR was developed by the Environmental Protection Agency (EPA). To determine the effectiveness of a given hearing protector, take the NRR on the package and subtract seven from that number (which relates to an additional safety factor). Subtract the resulting number from the noise level determined from dosimetry. This value will approximate the noise level to which the employee is exposed when wearing the protector correctly.*

*For example, suppose the noise level is 104 dBA TWA and the hearing protectors have an NRR of 31. In order to measure their effectiveness, subtract 7 from 31, which gives an approximate 24 dBA reduction. If 24 dBA is subtracted from 104 dBA, an employee wearing the protectors properly would be exposed to an approximate noise level of 80 dBA, which falls within acceptable limits.*

## **Hearing Conservation Programs**

*General industry employers are required to create and administer a hearing conservation program when employees are exposed to noise levels in excess of regulatory maximums. The general industry hearing conservation program requirement, which is not present in the construction standard, outlines the specific elements that must be included in a hearing conservation program. Some of those elements may be of interest to roofing contractors in developing their safety program. These include:*

- *Monitoring employee exposure*
- *Instituting engineering, work-practice and administrative controls*
- *Fitting each employee exposed to excessive noises with hearing protection*
- *Training each exposed employee to understand noise hazards and techniques to protect themselves*
- *Monitoring employee exposure through baseline and annual audiometry readings*
- *Taking measures to prevent further hearing loss when any loss has been detected during annual audiograms*
- *Keeping records*

# Sample Program

## Hearing Conservation Program

*[Company name] recognizes that exposure to loud noise can damage employees' hearing. The following work practices have been implemented to minimize the potential risks.*

### *Introduction*

- Appropriate hearing protection will be worn as specified by project supervisors. Hearing protection will be worn when it will provide greater safety and protection benefits.*
- When working at a client's site, employees will adhere to the hearing-protection requirements of either the client or [company name], whichever requirements are more stringent.*
- The requirements outlined below are mandatory while working in this company's workshop or on its projects. They apply to all employees, visitors and contractors.*

### *Identification of Noise Sources*

- Noise levels will be determined for all high-noise areas and equipment.*
- Representative monitoring will be performed to determine personnel exposures where appropriate.*
- Equipment or areas with noise levels equal to or exceeding 85 dBA will be identified with labels or signs, which will be posted on the individual pieces of equipment (whether owned and leased) or at the entrance to noisy areas.*
- The sign or label will state either "Hearing Protection Is Required While the Equipment Is Operating" or "Hearing Protection Is Required While Working in the Area" or similar wording, as appropriate.*
- Equipment typically requiring labels includes but is not limited to compressors, forklifts, generators and pneumatic tools.*
- Labels will be placed where the operator can readily see the warning, such as next to power switches.*
- The requirements of this policy will be included in specifications when purchasing, renting or leasing equipment.*

## *Reduction of Noise Levels*

- *Whenever practical, noise levels identified as exceeding 85 dBA will be reduced by means of engineering or administrative controls, including isolation, enclosure and application of noise-reduction materials.*
- *Noise reduction ratings (NRRs) must be considered when selecting the type of hearing protection (ear plugs, ear muffs or both) for a particular job.*

## *Hearing Protection*

- *Only company-approved hearing protection will be used.*
- *Hearing protection will be worn at all times when noise levels are suspected of equaling or exceeding 90 dBA.*
- *Use of portable radios with earphones is prohibited at all times.*

## *Training*

- *A current copy of the Occupational Noise Standard, 29 CFR 1926.52, will be posted in the company's main office. Copies will be made available to employees on request.*
- *Once each calendar year, training will be conducted for all employees who may be exposed to noise levels of 85 dBA or greater.*
- *At a minimum, the training program will include a discussion of the following:*
  - *The purpose of hearing protection*
  - *The effectiveness, advantages and disadvantages of various types of hearing protection*
  - *Pertinent noise-monitoring results*
  - *Specific equipment and/or operations that produce high noise levels*
  - *The purpose of audiometric testing and an explanation of testing procedures*
- *Training records will be kept at the main office.*

## *Responsibilities*

- *Each employee is responsible for:*
  - *Following the instructions received in the training program*
  - *Wearing proper hearing protection when needed*
- *Foremen and supervisors are responsible for ensuring:*

- *Hearing protection is used in areas or operations where such use is required*
- *Affected employees receive appropriate training and participate in annual audiometry as required*
- *High-noise areas and equipment are identified and labeled accordingly*
- *Management is responsible for:*
  - *Determining whether noise reduction is feasible by means of engineering controls*
  - *Ensuring adequate supplies of ear plugs or other well-maintained hearing protection devices are available*
  - *Determining the adequacy of hearing-protection devices*
  - *Assisting in training as necessary*
  - *Coordinating and overseeing all audiometric testing*

## **Hearing Conservation Checklist**

### *Procedures to be taken*

1. *Have all employees been monitored for exposure to noises?*
2. *Do monitoring results indicate that employees are overexposed?*
3. *If testing indicates overexposure, circle the types of controls implemented:*  
*Engineering    Administrative    Work Practices*
4. *Have employees been provided with hearing protectors?*
5. *If hearing protectors have been provided, circle the type being used. If multiple types are used, list employees and types being used in the space below.*  
*Ear Muffs    Disposable Ear Plugs    Fitted Ear Plugs*
6. *Have employees been trained to understand noise hazards and the measures taken to control noise, including wearing protectors?*
7. *Have employees received baseline audiometry?*

