

## Occupational Noise Exposure

### EFFECTS OF NOISE EXPOSURE

Noise is commonly defined as “unwanted sound”. It is unwanted for a variety of reasons. Some of these reasons are:

Psychological effects - noise can interfere with concentration, through annoyance or disruption of thought. It also has the ability to startle or irritate those exposed.

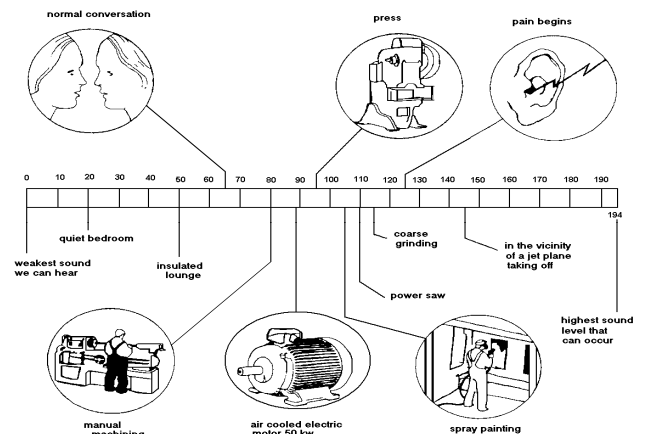
Noise can interfere with necessary communication that could affect the quality or quantity of work processed as well as the safety of the individual.

Physiological effects (noise induced hearing loss) - if the ear is subject to high levels of noise for sufficient periods of time, hearing loss will occur. Some of the factors that can affect hearing loss are listed below:

- The level of noise (intensity or loudness)
- The duration of daily exposure
- The number of years or total time worked in the noisy environment
- The frequency patterns of the noise
- An individual's susceptibility to noise
- Age of the employee
- Medications such as some antibiotics

Noise induced hearing loss is a gradual process that may take a number of years of exposure before the exposed person notices that their hearing has been affected. This type of hearing loss is irreversible and permanent.

How do you know if employees are exposed to excessive noise levels? Ask yourself several simple questions: Do you have to shout above equipment noise to communicate with employees? Do employees complain about ringing in their ears at the end of the day? Do sound level measurements exceed the permissible noise exposures set by OSHA? These are all common indicators of excessive noise levels. If you want to prevent permanent employee hearing loss, you need to take action now.



Sound is often described in terms of sound pressure levels (SPL). The units of sound pressure level is decibels (dB). A quiet bedroom would typically have a SPL of 20 dB; normal conversation is typically 60-70 dB (see below). Most people can hear sounds ranging from very low to very high frequencies, Most sound measuring equipment can quantify the combined sound at all frequencies with several different weighting filters. The most common single number measure is the A-weighted sound level, denoted dBA. The A-weighted response simulates the sensitivity of the human ear to moderate sound levels. There is a good correlation between the A-weighted sound level and

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the potential loss of hearing from prolonged noise exposure.

If you have reason to believe employees are exposed to excessive noise levels, appropriate steps need to be taken to develop a hearing conservation program.

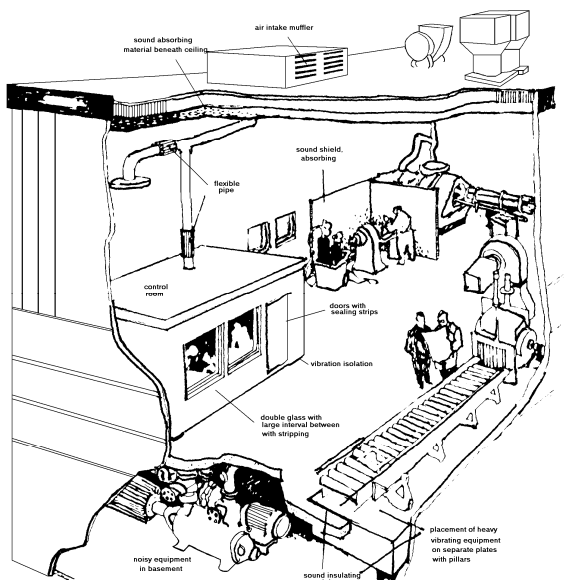
## OCCUPATIONAL EXPOSURE LIMITS

Although OSHA sets an exposure limit of 90dBA, research shows that hearing loss occurs at lower levels. For this reason, the American Conference of Governmental Industrial Hygienists (ACGIH) and other organizations set an exposure limit of 85 dBA for an 8-hour time-weighted-average and require reduction of noise exposure at this level. Although this is not a regulatory requirement, the 85 dBA level should be considered a “best practice” limit for employee noise exposures. Zenith recognizes this lower exposure limit and strongly encourages implementation of a full noise control program, as outlined below.

## CONTROLS

An engineering control is any change made to the noise source or in the noise path between the source and the work which reduced noise levels. Hearing protectors worn by employees do not constitute an engineering control.

The drawing below is an example of some control measures which can be carried out in an industrial building to control noise.



An administrative control is any method which limits the employees' noise exposure by adjustment of the work procedure and/or schedule.

## Hearing Conservation Program

A continuing effective hearing conservation program must be administered when employee noise exposure is equal to or exceeds an 8 hour Time Weighted Average (TWA) of 85 decibels - A scale (dBA).

## Selecting Personal Hearing Protection

The essential elements of a hearing conservation program include:

- Sound level measurements must be made for employees who may be exposed at or above an 8 hour TWA of 85 dBA. Employees or their representatives must be given the opportunity to observe any measurements of employee noise exposure and must be notified of results at or above 85 dBA (TWA).
- An audiometric testing program must be made available to all employees whose exposure equals or exceeds an 8 hour TWA of 85 dBA. A baseline audiometric examination must be performed, the results of which will be used for subsequent audiogram comparison. Audiograms must be conducted at least annually following the baseline to determine the effectiveness of the hearing conservation program. Any employee experiencing a significant (“standard threshold”) shift in their hearing must be informed of the test results in writing within 21 days of the determination.
- The wearing of hearing protection must be enforced when employees are exposed to noise levels exceeding an 8 hour TWA of 90 dBA, or when employees experience a standard threshold shift in hearing and are exposed to noise levels at or above an 8 hour TWA of 85 dBA. The hearing protection selected must reduce employee noise exposure to at least an 8 hour TWA of 90 dBA. For employees who have experienced a standard threshold shift, hearing protection must reduce

employee exposure to an 8 hour TWA of 85 dBA or below.

- The employer must also institute a training program for all employees who are exposed to noise at or above a TWA of 85 dBA. This program is to be run annually for each employee affected and shall include information on the effects of noise on hearing, the purpose of hearing protectors, the advantages, disadvantages and attenuation of various types, and instructions on selection, fitting, use and care as well as the purpose of audiometric testing including an explanation of the test procedures.

The two most common types of hearing protectors available are earplugs and ear muffs. There are a variety of each type available. It is important that the proper protector be selected so that it will be the most effective and most comfortable one for the specific application.

When selecting hearing protection, it is important to review the attenuation characteristics of the particular device being considered. The attenuation characteristics of the device must be correlated with the noise exposure so that adequate attenuation is achieved. Attenuation, commonly stated as the noise reduction rating (NRR), represents the approximate decibel (db) noise reduction afforded by the protector.

*Rule of thumb: Subtract 7 db from the NRR and divide the result by 2 to obtain a conservative estimate of the effective noise attenuation offered by the hearing protector.*

Both earplugs and ear muffs have distinct advantages and disadvantages. Two factors that are often overlooked is the selection of either type of protection are comfort and appearance. It is much more likely that workers will accept hearing protection if devices are relatively comfortable for them to wear. A variety of devices should be made available to suit the individual wearer's needs.

Consider the following:

### Earplugs

Advantages:

- Relatively inexpensive compared to muffs
- Lightweight / small, good in confined spaces
- Disposable types available
- Available in dispensers

Disadvantages:

- More difficult to fit user's ear
- Proper fit is essential for protection
- Training to insert plugs properly is crucial
- Not as visible to supervisors
- Easily lost
- Need regular cleaning

### Ear Muffs

Advantages:

- Easier to put on and take off
- Visible to supervision
- Attachable to hard hats

Disadvantages:

- Bulky for work in confined spaces
- Poor fit when worn over glasses with large temples
- Seals need to be replaced periodically

Simply handing out a set of earplugs or ear muffs does not protect employees against the hazards of occupational noise exposure. It is essential that management be committed to a hearing conservation program, and that the established policies are enforced. It is most important for management to set a good example for employees by wearing hearing protection when they enter areas where hearing protection is required.

For further information and assistance contact your Zenith Safety & Health Consultant.