



HEALTH & SAFETY TRAINING FOR SCHOOLS



Hearing Conservation

Effects of Noise on Hearing

Noise is part of our everyday life and exposure can occur both at home and at work. Hearing which is damaged by exposure to excessive noise is termed *Noise-Induced Hearing Loss*. Damage to hearing caused by excessive noise may not be apparent for years. While hearing loss cannot be treated or cured, it can be prevented. *Sound*, which is our sensation of very small, rapid changes in air pressure, is what you hear. *Noise* is any sound that you do not want to hear. Sound becomes a problem for everyone when it is so loud that it destroys our ability to hear the sounds we want to hear. Sound is measured in two ways:

1. **Decibels (dBA)** – indicates the pressure of a sound. Sound waves transfer that pressure from place to place.
2. **Frequency** – is related to the sound's pitch and is measured in units called *hertz (Hz)*. The higher a sound's pitch the higher its frequency.

Most hearing specialists agree that you can damage your hearing if you are continually exposed to noise greater than 85 decibels over an 8-hour period. As noise levels rise above 85 decibels, the safe exposure time for unprotected ears falls dramatically. When noise is too loud, it can damage the sensitive hair cells of the inner ear. 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. Sometimes your hair cells can be damaged from a single exposure to loud noise but not destroyed and allowing recovery. This is called *Temporary Threshold Shift*. However, repeated, unprotected exposure can cause permanent hair cell damage. This is called *Permanent Threshold Shift*.

Hearing Protection Program

Employers must establish a program for hearing conservation if employees are exposed to noise levels that are equal to or greater than 85 dBA averaged over an eight-hour period. The program should include *exposure monitoring, audiometric testing, hearing protector use, training, employee access to information, and recordkeeping*.

Exposure Monitoring

If employees are exposed to noise levels that equal or exceed 85 dBA over an eight-hour period, then exposure must be reduced. Exposure monitoring can evaluate this by determining *where it is too loud, when it is too loud, whose hearing may be at risk, and the level of employee hearing protection needed*. Monitoring is conducted as follows:

1. **Personal Monitoring (Dosimeter)** – is a method of measuring sound levels near individual workers over an eight-hour day.
2. **Area Monitoring (Sound-Level Meter)** - measures sound levels at different workplace locations at one point in time.



Sound-Level Meter



Dosimeter

What Do School Employees Need to Know?

Hearing Protectors

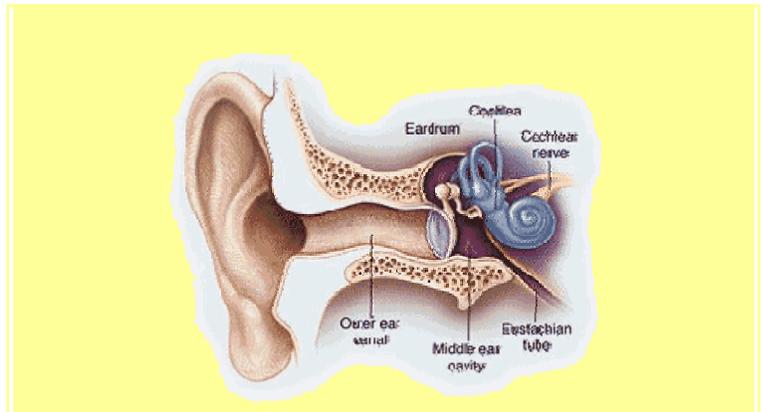
The two types of hearing protectors include *ear plugs* and *earmuffs*. Both types reduce the pressure of sound that reaches the eardrum and are advisable when the exposure cannot be reduced to safe levels through engineering or administrative controls. Ear plugs fit in the outer ear canal and must provide a tight fit to be effective. Earmuffs must fit firmly over the entire outer ear to provide protection. Both types can be equally effective and may sometimes be used in combination. Hearing protectors have a *noise reduction rating (NRR)* indicating their level of protection. This rating should be reduced by 7 dB to determine realistic effectiveness.



Audiometric Testing

Audiometric testing determines whether a person's hearing is stable or getting worse. Testing is conducted through the use of an *audiometer* and the test result is referred to as an *audiogram*. An audiogram provides a graphic representation of a person's hearing ability at different frequency levels. The audiometric test must be conducted by an audiologist, otolaryngologist, physician or a certified audiometric technician. A baseline audiogram establishes a reference point for future audiograms. Employees who are exposed to noise above 85 dBA over an 8-hour day must have baseline audiograms within six-months of their first exposure. Employees must be re-tested annually if exposure over the 85 dBA limit continues. Test results are compared to the baseline audiogram to determine if an employee's hearing has changed. If it has, the employee must be notified within 21 days. If hearing protectors are not being used, the employee must be fitted with them, trained in their use, and required to use them. If the employee has been wearing hearing protectors then re-fitting and training must occur.

How Does Hearing Work?



Hearing is a series of events in which sound waves in the air produce electrical signals and cause nerve impulses to be sent to the brain where they are interpreted as sound. The ear has three main parts: the outer, middle and inner ear. Sound waves enter through the outer ear and reach the middle ear where they cause the ear drum to vibrate. The vibrations are transmitted through three tiny bones in the middle ear, called the ossicles. These three bones are named the malleus, incus and stapes (and are also known as the hammer, anvil and stirrup). The ear drum and ossicles amplify the vibrations and carry them to the inner ear. The stirrup transmits the amplified vibrations through the oval window and into the fluid that fills the inner ear. The vibrations move through fluid in the snail-shaped hearing part of the inner ear (cochlea) that contains the hair cells. The fluid in the cochlea moves the top portion of the hair cells, called the hair bundle, which initiates the changes that lead to the production of the nerve impulses. These nerve impulses are carried to the brain where they are interpreted as sound. Different sounds move to the population of hair cells in different ways, thus allowing the brain to distinguish among various sounds, for example, different vowel and consonant sounds.

Employee Information Contacts

New York State Department of Labor
Division of Safety & Health
Public Employee Safety & Health Bureau

516-228-3970

Thank You!

If we can be of any assistance, please feel free to contact the **Nassau BOCES Health & Safety Training and Information Service** at:

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