

## Noise Exposure at Work

Hearing Loss Prevention Rule (Noise)  
WAC 296-817



Developed by the Division of Occupational Safety & Health (DOSH) for employee training

---

---

---

---

---

---

---

---

## Meeting DOSH Training Requirements

This training module gives basic information on noise as outlined in the Hearing Loss Prevention Rule – WAC 296-817.

To meet the DOSH training requirements for Hearing Loss Prevention, you must include information specific to your worksite as indicated in slides #15, 16, 29, 41 and 42.

Preview this program and include your specific workplace information prior to conducting the training.

It is recommended you keep an attendance roster for your records to document training.

---

---

---

---

---

---

---

---

## Noise Exposure at Work

This presentation will cover the following topics:

The effects of noise on hearing,

Hearing protection – their purpose, types and use,

The purpose of audiometric testing and how it works,

Your right to see noise measurement records and hearing test results.



---

---

---

---

---

---

---

---

## Effects of exposure to loud noise



Exposure to loud noise will inevitably cause hearing loss over time.

Loud noise damages or destroys the nerves in the inner ear.

Another effect can be "tinnitus" or permanent ringing in the ear.

2

---

---

---

---

---

---

---

---

## When is Noise Too Loud?

Noise is measured in units called "decibels" or "dB"

If two people 3 feet apart must shout to be heard, the background noise is too loud (above 85 decibels).



• Noise above 140 decibels causes pain and immediate hearing loss.



3

---

---

---

---

---

---

---

---

## Long Term Exposure to Noise

Our ears can recover from short exposure to loud noise, but over time nerve damage will occur.

The longer and louder the noise, the greater chance permanent damage will occur.

There is really no such thing as "tough ears" or "getting used to it".



4

---

---

---

---

---

---

---

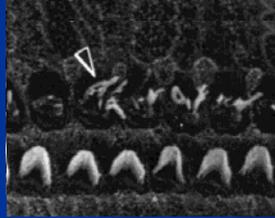
---

## Effects of noise to inner ear

Hair cells in inner ear transmit noise signals to the brain



Normal hair cells



Noise-damaged hair cells

5

---

---

---

---

---

---

---

---

---

---

## Hearing Loss From Noise Exposure

Hearing loss from noise exposure is usually not noticed because it is so gradual.

Usually a person loses the ability to hear higher pitches first.

Often the first noticeable effect is difficulty in hearing speech.



Normal hearing 

Hearing loss 

6

---

---

---

---

---

---

---

---

---

---

## Tinnitus From Noise Exposure

Exposure to high noise levels can also cause permanent ringing in the ear or "tinnitus".

Tinnitus sufferers usually complain of constant whistling, squealing, roaring or buzzing in one or both ears.

Severe tinnitus may disrupt sleep, reduce concentration and cause irritability and depression.



7

---

---

---

---

---

---

---

---

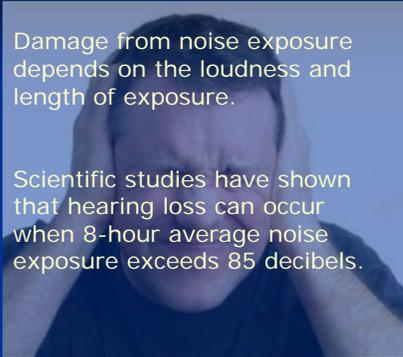
---

---

## What is Too Much Noise Exposure?

Damage from noise exposure depends on the loudness and length of exposure.

Scientific studies have shown that hearing loss can occur when 8-hour average noise exposure exceeds 85 decibels.



8

---

---

---

---

---

---

---

---

## What is Too Much Noise Exposure?

The risk of hearing loss increases dramatically as noise levels increase.

Exposure to noise levels above 115 decibels for even five minutes is very risky.

Impact or banging noise above 140 decibels will cause immediate damage to nerves in the ear.



9

---

---

---

---

---

---

---

---

## Daily Allowable Exposure Times to Noise

The table below shows noise levels and how long a person can be exposed without hearing protection before there is damage to the ear.

<u>Noise Level</u>	<u>Allowable Exposure Time</u>
85 decibels	8 hours
90 decibels	4 hours
100 decibels	1 hour
105 decibels	30 minutes
110 decibels	15 minutes
115 decibels	0 minutes

10

---

---

---

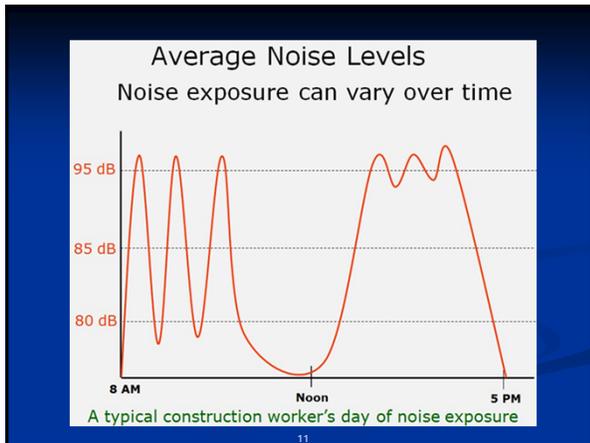
---

---

---

---

---




---

---

---

---

---

---

---

---

---

---

### Examples of Noisy Equipment

Equipment	Noise Level
Back Hoe	85-95 decibels
Chain Saw	110 decibels
Front-end Loader	90-95 decibels
Gunshot	140 decibels
Jackhammer	112 decibels
Lawn Mower	90 decibels
Tractor	95-105 decibels
Circular Saw	90-100 decibels

12

---

---

---

---

---

---

---

---

---

---

### Noisy areas & equipment at our company

List or discuss your noisy equipment and noise sources and their noise levels here.

13

---

---

---

---

---

---

---

---

---

---

## Noise controls we use in our workplace

List equipment or methods you have used to reduce noise levels to employees – enclosures, barriers, mufflers, noise absorbing materials, etc. and/or the use of hearing protection.

14

---

---

---

---

---

---

---

---

## Types of Hearing Protection



earmuffs

There are three types of hearing protection – ear muffs, earplugs and ear caps.

Ear muffs and earplugs provide about equal protection, ear caps somewhat less.



earplugs

15



ear caps

---

---

---

---

---

---

---

---

## Types of Hearing Protectors

All hearing protectors are designed to reduce the intensity (loudness) of noise to the inner ear.

They work much better than wads of cotton or bits of cloth stuffed in the ear.



All three types have advantages and disadvantages and people vary on which they prefer to use.

Cotton doesn't work!!

16

---

---

---

---

---

---

---

---

## Hearing Protection – Ear Plugs

Earplugs are made of foam, rubber or plastic and are either one-size-fits-all or in sizes small, medium and large.

Some are disposable, some are reusable.

They are lightweight, and require no maintenance.

They are inserted into the ear canal.



17

---

---

---

---

---

---

---

---

## Ear Plug Comfort

Some people may find ear plugs uncomfortable to wear for long periods at first.

Ear plugs rarely cause infection or prolonged irritation of the ear canal.

Most people can find a comfortable fit by trying several different sizes, types or brands.

Custom-molded earplugs can be obtained for maximum comfort.



custom molded earplugs

18

---

---

---

---

---

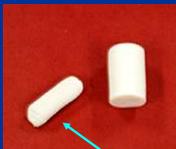
---

---

---

## Inserting Foam Earplugs

Foam type earplugs are one-size-fits-all and must be inserted properly into the ear.



Roll earplug into small cylinder first, then insert in ear.

19

---

---

---

---

---

---

---

---

## Inserting Foam Earplugs



Earplug incorrectly inserted



Earplug correctly inserted

20

---

---

---

---

---

---

---

---

---

---

## Ear Muffs

Ear muffs cover the whole ear and are preferred by some people.

They have replaceable pads and some high-tech styles filter out specific noise pitches.

They last longer than most plugs.



21

---

---

---

---

---

---

---

---

---

---

## Attached Earmuffs

Some muffs are attached to hard hats or goggles.



Some high-tech muffs can filter out certain frequencies or have radios inside for communication in high noise areas.



22

---

---

---

---

---

---

---

---

---

---

## Ear Muff Comfort & Glasses



Muffs can be uncomfortable in hot weather.

Muffs don't seal well for someone with glasses or heavy sideburns.



23

---

---

---

---

---

---

---

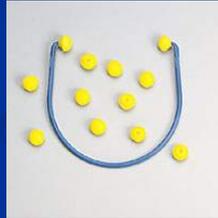
---

## Ear Caps

Ear caps are like earplugs, except they do not go into the ear canal, they only block it.

They are good for occasional use or for people who find earplugs uncomfortable.

They are not as protective as earplugs or muffs.



24

---

---

---

---

---

---

---

---

## Noise Reduction of Hearing Protection

The "noise reduction rating" or "NRR" of hearing protection is measured in decibels.

The NRR is found on the earmuff or earplug package. The higher the number, the greater the protection.



25

---

---

---

---

---

---

---

---

## NRR Example



Grinder noise level – 95 decibels

26

---

---

---

---

---

---

---

---

## Hearing Protection Available at our Company

Insert the list of hearing protection used at your company here.

Alternatively, you can simply show the actual hearing protection you provide your employees. Include NRR rating of each and when or where hearing protection is needed or required.

27

---

---

---

---

---

---

---

---

## How can you hear anything with earmuffs on?

Using earmuffs or plugs in noisy areas can actually make it easier to hear coworkers or machinery.

They reduce overwhelming loud background noise.

They are similar to dark glasses that reduce the sun's glare making it easier to see.



28

---

---

---

---

---

---

---

---

## Proper Use of Hearing Protection

Earmuffs and plugs provide good protection only when used properly.

Sometimes people will remove hearing protection for "just a minute" in a noisy area.

In areas of very high noise exposure, this could result in noise overexposure.



It won't protect your ears if it is around your neck!!!

29

---

---

---

---

---

---

---

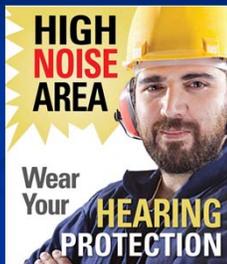
---

## Proper Use of Hearing Protection

It takes just a few minutes of unprotected exposure at noise above 115 decibels to risk hearing damage.

Earplugs not well inserted into the ear canal will not provide complete protection.

Likewise, earmuffs not snug against the head will "leak" noise into the ear.



30

---

---

---

---

---

---

---

---

## Hearing Aids Are Not Hearing Protection

Hearing aids do not block out enough sound for most workplace noise.

Some hearing aids can actually increase the noise level at the ear.

Just turning off the hearing aids will not prevent further hearing loss from noise exposure.



Photo by Birmingham Museum in Creative Commons

31

---

---

---

---

---

---

---

---

### Portable Radios/CD Players/iPods

Most of these devices do not provide protection from noise.

The earphones are not earmuffs and the music only adds to background other noise.

The music level in the earphones themselves can exceed 85 decibels and cause hearing loss.



32

---

---

---

---

---

---

---

---

### What is Audiometric Testing?

"Audiometric testing" is the same thing as hearing tests.

It is done by trained technicians to detect any hearing loss.

Audiometric testing is required by DOSH for any employees exposed to excessive noise.



33

---

---

---

---

---

---

---

---

### Purpose of Audiometric Testing

Most of us develop a mild hearing loss as we age, especially in the higher pitches.

A severe or significant hearing loss at a younger age may mean you have had excessive noise exposure.

Audiometric testing done yearly can detect early stages of hearing loss.



34

---

---

---

---

---

---

---

---

## Audiometric Testing

Audiometric testing results can be used to check the following:

If the hearing protection in use is adequate,

If there is a change in noise exposure,

If there is a medical condition of the ear unrelated to noise exposure.



35

---

---

---

---

---

---

---

---

## How Does Audiometric Testing Work?

When you are first hired, a baseline test is taken.

The testing is repeated every year after that and compared to the baseline test result.

If a hearing loss is detected, we will ask the doctor or audiologist what is the cause.



36

---

---

---

---

---

---

---

---

## Audiometric Testing

Audiometric testing produces printed **audiograms** which show hearing ability at several pitches or frequencies.

These frequencies include those of the human voice.

The second and following year tests are compared to the first year tests or baseline.



37

---

---

---

---

---

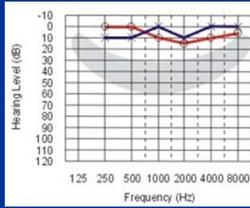
---

---

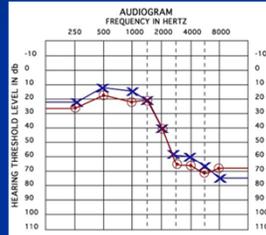
---

## What is an Audiogram?

An audiogram is a printed chart of the results of the hearing test. They look similar to the results below.



Normal hearing



Severe hearing loss

38

---

---

---

---

---

---

---

---

---

---

## Noise measurement records & hearing test results

You have the right to see noise measurement records and get copies of your hearing test results.

Show here where noise records and/or audiometric testing results are kept or give employees copies of these records.

39

---

---

---

---

---

---

---

---

---

---

## Noise Audits

Describe your noise auditing program here, if you do it.

Hearing protection audits are a tool for use in evaluating your hearing loss prevention program in cases where audiometric testing doesn't provide a useful measure.

40

---

---

---

---

---

---

---

---

---

---

## Noise Quiz

The following questions are optional. They can be used to check employee's understanding of this training and promote discussion. You can add more questions for a short written or verbal quiz.

---

---

---

---

---

---

---

---

### Question 1

What happens when people are exposed to excessive noise?

- a) They can't hear someone talking to them.
- b) Over a period of time, they will develop hearing loss.
- c) Some people may develop permanent ringing in their ears.
- d) Some people will be stressed out by constant exposure to loud noise.

---

---

---

---

---

---

---

---

### Question 2

What is the lowest level of noise that can cause hearing loss?

- a) When it hurts your ears.
- b) 65 decibels
- c) 85 decibels
- d) An average of 85 decibels over 8 hours.

---

---

---

---

---

---

---

---

Question 3

What is NRR?

- a) The noise level of rifles.
- b) The noise rating of any loud machinery.
- c) The noise reduction rating of hearing protection.
- d) A measure of how well earplugs work.

---

---

---

---

---

---

---

---

Question 4

Ear plugs work better than ear muffs in blocking out noise.

- a) True.
- b) False.
- c) It depends.

---

---

---

---

---

---

---

---

Question 5

Why is audiometric testing required?

- a) To make sure you haven't gone deaf.
- b) To test for any hearing loss during your employment.
- c) To test the noise of machinery.
- d) To see how well you remember noise training material.

---

---

---

---

---

---

---

---