



ARMA

AUSTIN REGIONAL MANUFACTURERS ASSOCIATION

Welcome!

ARMA Environmental, Health & Safety Seminar

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Deep Dive Into OSHA's Hearing Conservation Program



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Agenda

- Terminology
- Effects of Noise
- How the Ears work
- Hearing conservation program



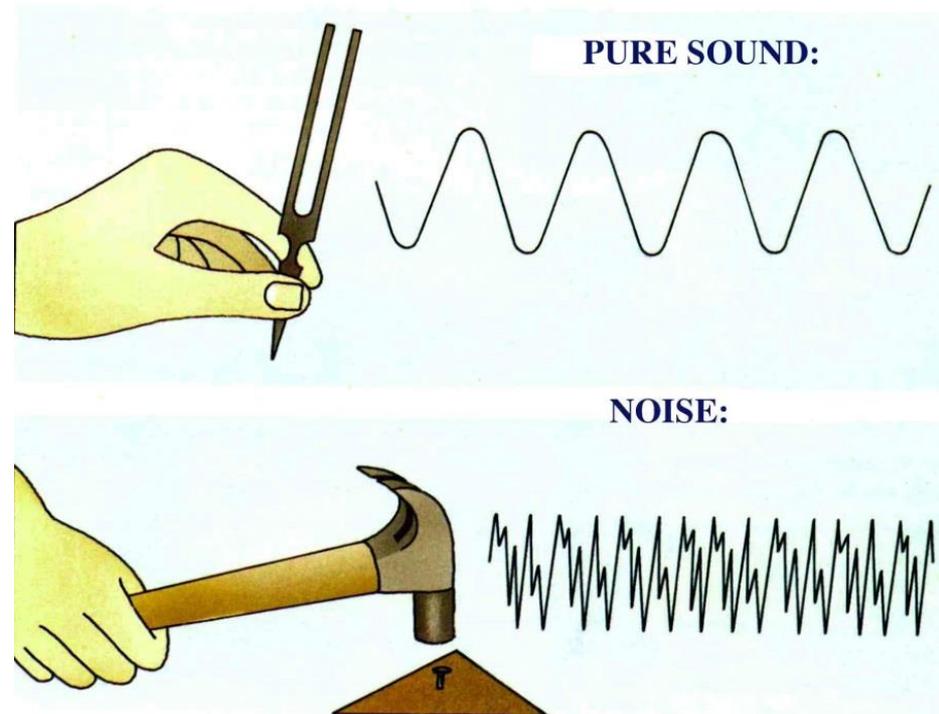
Why Talk About Noise

- **“Why should I be concerned about noise?”:**
 - Exposure to high levels of noise
 - 30 million people exposed to hazardous levels of noise
 - Noise-induced hearing loss is most common occupational
 - Hearing loss occurs is permanent and irreversible
 - Hearing loss can be prevented



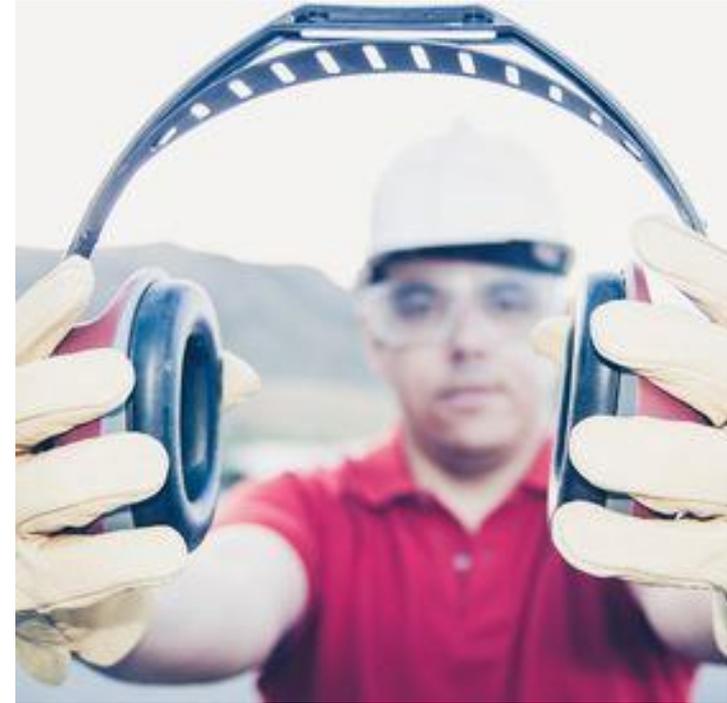
Clarification – Sound vs Noise

- Sound versus Noise
 - Sound:
 - The sensation perceived by the sense of hearing
 - Noise:
 - Any sound that is undesired or interferes with one's hearing of something
 - “Noise Pollution” annoying or harmful noise in an environment
 - Excess noise results in significant hearing loss



Sound Terminology

- **Understand terminology to discuss noise energy:**
 - Noise created by sound waves
 - Frequency of sound waves determines pitch of sound
 - Human ear capable of hearing sound waves that vibrate
 - Intensity is term used when we talk about how loud a noise is
 - Higher the intensity louder the noise
 - Intensities of 85 decibels or greater cause damage to hearing



Sound Terminology – Continued

- **PEL vs AL** – Permissible Exposure Limit (90dB) vs Action Level (85dB); Measured over an 8hr TWA.
- **TWA** – Time Weighted Average. Measured in decibels and commonly calculated to an 8 hour TWA to show what workers are exposed to throughout an entire shift.
- **Hearing Attenuation** – The reduction in sound pressure level incident upon the **ear** due to the application of a **hearing protector** or, specifically, the change in **hearing** threshold level that results when a **hearing protector** is worn.



Sound Terminology – Continued

NIOSH – The National Institute for Occupational Safety and Health. is the United States federal agency responsible for conducting research and making recommendations for the prevention of work-related injury and illness.

- NIOSH is part of the Centers for Disease Control and Prevention (CDC) within the U.S. Department of Health and Human Services.

NRR – Noise Reduction Rating. Every type of hearing protection has this rating assigned to let you know the level of protect



NRR 29

+



NRR 27

= Noise Reduction Rating of 34

Sound Terminology – Continued

Dosimeter – A specialized sound level meter intended specifically to measure the noise exposure of a person integrated over a period of time.



Sound Level Meter – Used for acoustic (sound that travels through air) measurements. It is commonly a hand-held instrument with a microphone.



Sound Terminology – Continued

Decibels – A unit used to measure the intensity of a sound or the power level of an electrical signal by comparing it with a given level on a logarithmic scale.

Frequency – The number of wavelike vibrations per second – is measured in units called hertz (Hz). A sound's pitch is how you perceive its frequency; the higher the pitch, the higher the frequency.

Sound Level – Usually measured in decibels. If you need to raise your voice to speak to someone 3 feet away, noise levels might be over 85 decibels.



Common Effects of Noise

- **Noise is everywhere in our world:**
 - “Noise pollution” used to refer to the constant presence of noise
 - High noise levels shown to increase stress levels
 - Can cause:
 - Hearing impairment
 - Hypertension
 - Annoyance
 - Sleep disturbance



How Much Noise Is TOO Much?

- There are **LEGAL LIMITS** on noise in the workplace, set by the Occupational Safety and Health Administration (OSHA).
 - According to OSHA noise regulations, workers: may not be exposed to more than an average of 90 dB(A), or decibels, over 8 hours
 - Must be included in a Hearing Conservation Program if exposure averages 85 dB(A) or more over 8 hours

DAMAGING EXPOSURE TIMES

120 dB = max exposure time of 7.5 minutes

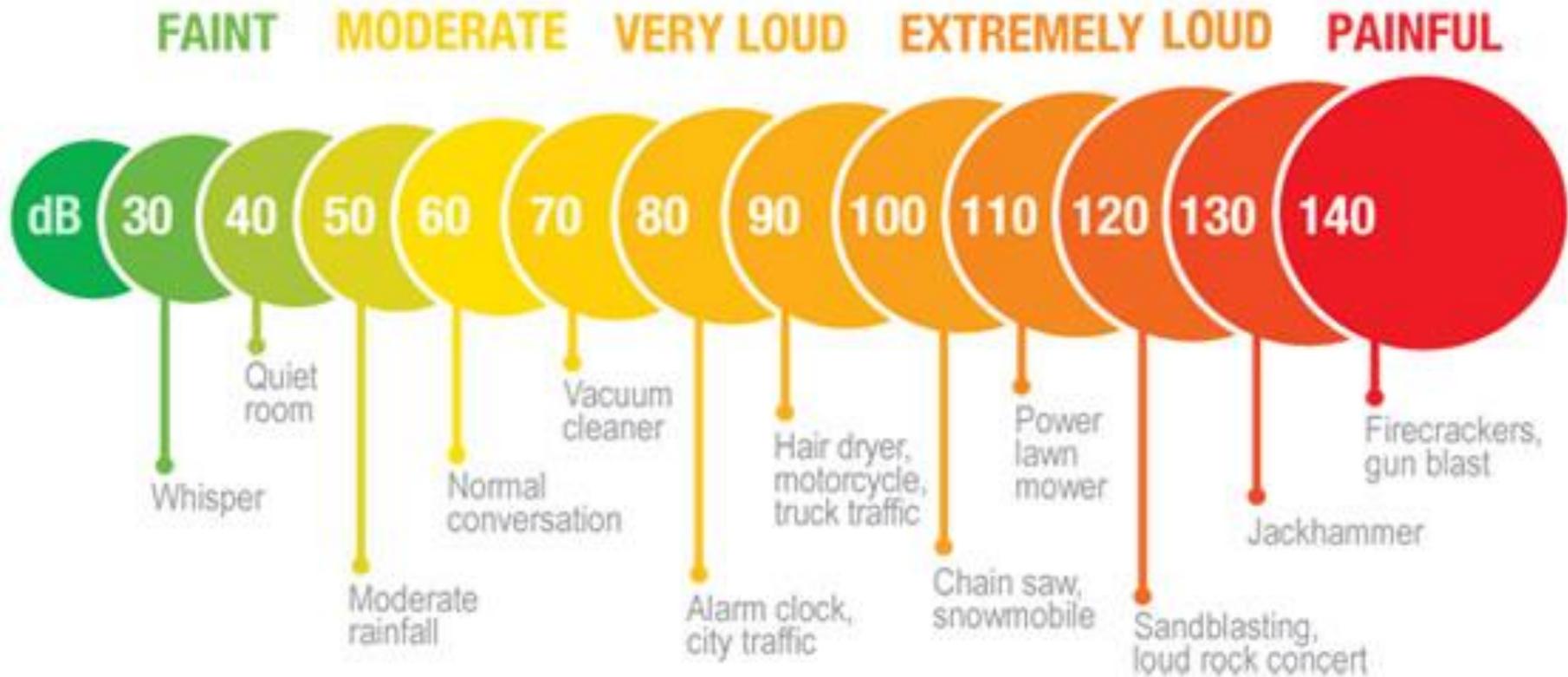
110 dB = max exposure time of 30 minutes

100 dB = max exposure time of 2 hours

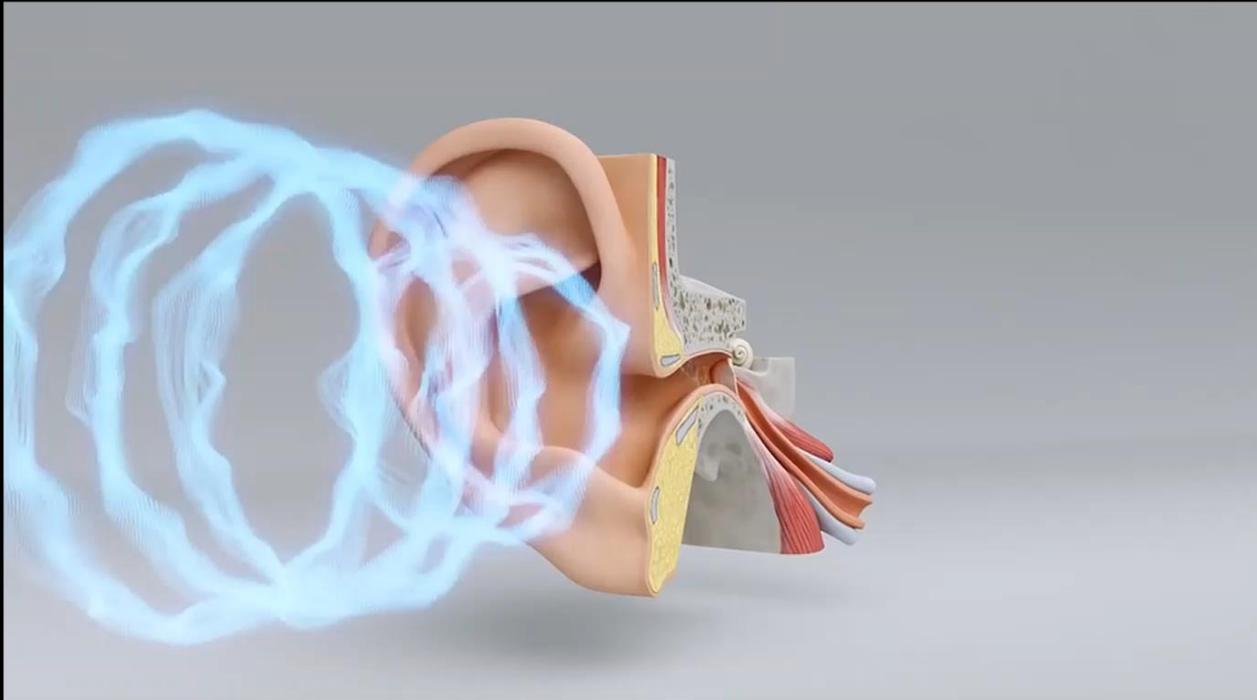
95 dB = max exposure time of 4 hours



Typical Sound Levels (dBA)



How you lose your hearing



Hearing Physiology – Lay Man's Terms

- Picture the ear's hair cells as grass in a lawn.
- If you walk on the lawn occasionally, the grass pops back up.
- But if you walk repeatedly in the same spot, the grass no longer recovers.
- This is what happens to the hair cells in your ears.

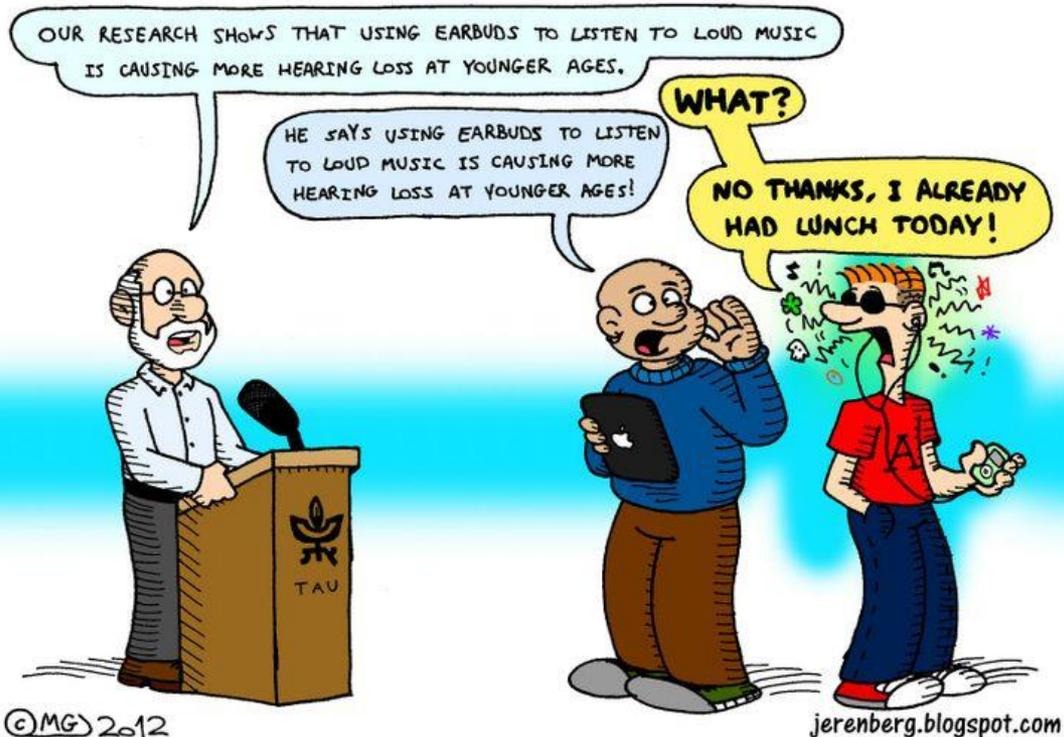


Symptoms of Hearing Loss

- **Possible symptoms of hearing loss:**

- People with noise-induced hearing loss:

- Can hear words, but can't distinguish them
- Speech slurred or mumbled
- Trouble following conversations
- Trouble catching everything said on the telephone
- Strain to hear
- Others complain TV too loud
- Certain sounds overly loud
- Often hear ringing inside one or both ears

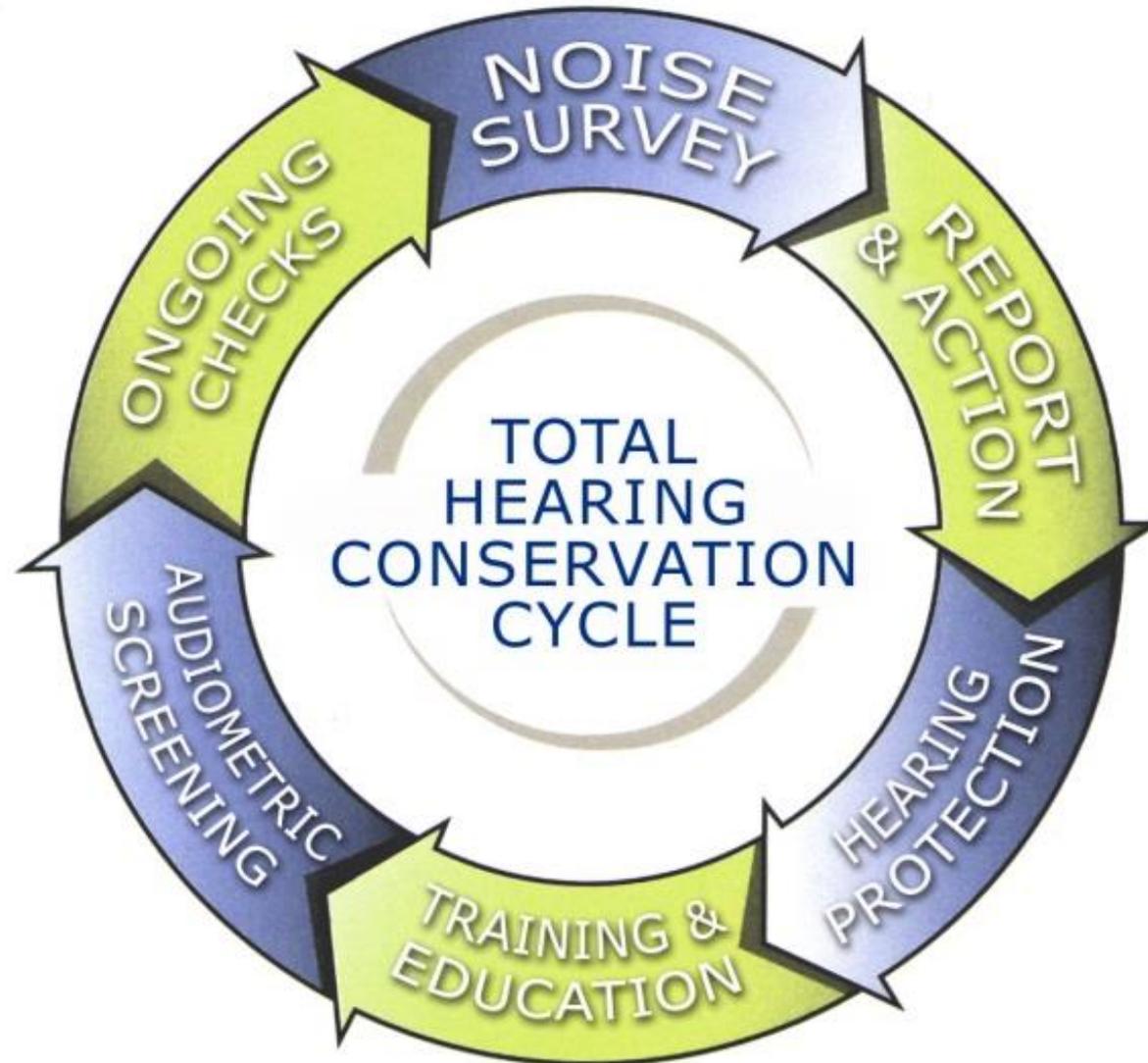


6 Hearing Myths

- **“You can build up noise resistant”**
 - There is no way to “toughen up” your ears or build resistance.
 - Your brain may “tune” out noise, but damage can/will occur.
- **“Noise can’t hurt me until it’s painful”**
 - At 85db damage starts. Pain does not start until 140db.
- **“No big deal, I’m only exposed for a few minutes”**
 - Damage starts once exposed. Damage can add up.
- **“My hearing will come back”**
 - Damage slowly builds up. Hearing loss is permanent.
- **“I’ll be fine, I have noise canceling earphones”**
 - They might be able to cancel out existing noise, but not the sound generated from the music you are listening to.
- **“I can always get hearing aids”**
 - Not the same as your ears. It helps, but does not replace
 - Not like glasses help with your vision

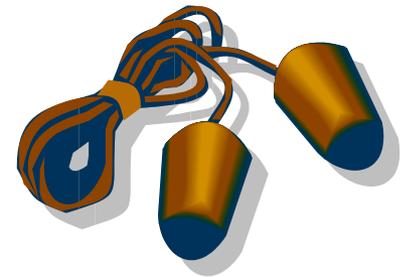


Hearing Conservation Program



Hearing Conservation

- Why is this important?
 - Adequately protect and inform employees
 - Meet OSHA requirements
 - Hearing Conservation Standard
 - Hearing Conservation Program



Hearing Conservation Program

Elements of a hearing conservation program:

- Company identified employee's exposure of 8-hour 85 decibels
- Employees included in hearing conservation program
- Provide hearing protection (minimum two forms)
- Hearing conservation program includes employee training
- Audiograms (Baseline and Annual)



Exposure Monitoring

- **Company measured noise levels:**
 - Surveys determine continuous noise levels above 85 decibels
 - Survey documents reviewed periodically
 - Relocating noise sources further away from employees



Determining the Need for Exposure Monitoring

- Conversation
 - Normal conversation voice = 60-70 dB
 - Sound in work area is irritating
 - Must raise voice to be heard
 - Cannot hear someone within two feet
 - Speech sounds dull after leaving
 - Pain or ringing in ears after exposure to noise
- Spot check with your smart phone
 - The NIOSH Sound Level Meter (SLM) app
 - Many sound meter apps are available to give you a snap shot of the noise in a given work area
 - **NOTE:** Smart phones are not 'calibrated equipment'



What is Process Knowledge?

- Industry specific information
- Do you have similar tasks, similar equipment, similar work space, etc. at your facility or a different location?
- Process knowledge can be very applicable if IH testing was conducted at the referenced location



Hearing Protection

- **Hearing protection is:**
 - Made available when noise levels are 85db or higher
 - Required whenever the 8-hour time-weighted average of 90 db or higher is reached



Available Hearing Protective Devices

- **Protective devices issued to employees:**
 - There are 3 basic types of hearing protective devices:

Earplugs fit into outer ear

Canal caps closes off the ear canal

Ear muffs fit over outer ear

Must offer at least two



How HPDs are Rated

- **Hearing protection devices block noise from reaching inner ear:**
 - Hearing devices have different capabilities and applications
 - Most important issue is the noise reduction rating (or **NRR**)
 - NRR is a measurement of how much noise device is blocking
 - Higher the NRR rating better the protection



Calculating Attenuation Protection

- Basic calculations for determine noise attenuation
 - Noise level db – (NRR – 7) = Attenuation
 - Example 95db – (NRR 27 – 7) = 75db
- OSHA Preferred calculation
 - Noise level db – (NRR – 7)/2 = Attenuation
 - Example 95db – (NRR 27 – 7)/2 = 85db
- Dual hearing protection
 - Noise level db – (NRR – 7)+5 = Attenuation
 - Example 95db – (NRR 27 – 7)+5 = 72db
 - OSHA Preferred Example 95db – ((NRR 27 – 7)/2)+5 = 80db



Earplugs

- **Earplugs offer the highest noise reduction rating:**
 - Good under most temperatures
 - Formable types are inexpensive, easy to use, and disposable
 - Some find insertion uncomfortable
 - Get dirty in dusty environments
 - Formable earplugs should be discarded after each shift



Canal Caps

- **Canal caps are easy to use, offer a quick fit, and are very compact:**
 - Convenient for workers when hearing protection must be taken off frequently
 - Typically offer only an NRR of 20 or so
 - Band should be evaluated to ensure it is capable of maintaining proper tension on the caps



Ear Muffs

- **Ear muffs offer most comfort:**

- Easy to take on and off
- Very simple in their design
- Can be combined with earplugs
- Cushions on muffs should be replaced periodically
- Ear muff exterior should be periodically cleaned
- Inspect the ear muffs for damage before each use



Fitting and Use of HPD's

- **Hearing protective device used in specific way:**
 - Formable earplugs used by rolling plug into a small cylinder and placing the cylinder into the ear
 - Custom fitted earplugs do not require rolling
 - Canal caps worn by placing pad over ear canal
 - Ear muffs worn by placing cups over each ear



With clean hands, roll the entire earplug into narrowest possible cause-free cylinder.



Reach over your head with a free hand, pull your ear up and back, and insert the earplug well inside your ear canal.



Hold for 30 - 40 seconds, until the earplug fully expands in your ear canal. If properly fitted, the end of the earplug's should not be visible to someone looking at you from the front.

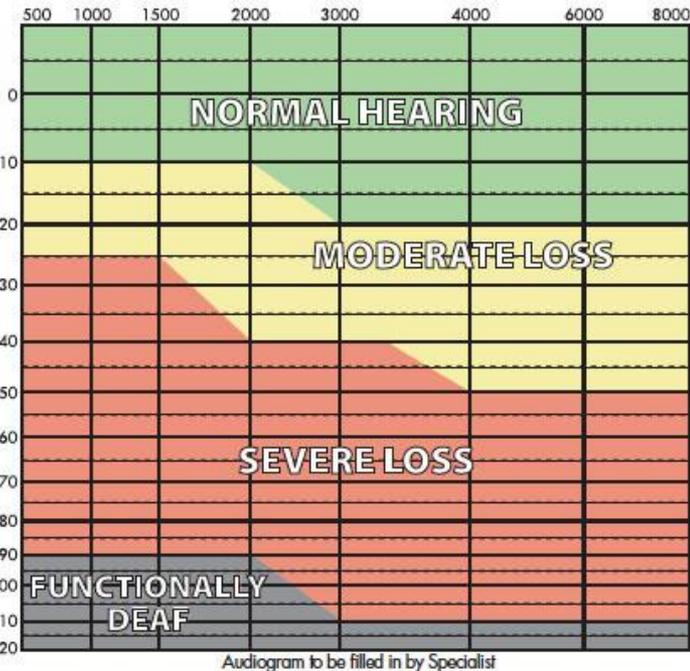
Employer Requirements – Employee Training

- **Employers are required to provide annual training in hearing conservation to employees:**
 - Effects of noise on hearing
 - Purpose of hearing protectors
 - Advantages and disadvantages of hearing protectors by type
 - Selection, fitting, use, and care of hearing protectors



Employer Requirements – Audiometric Tests

- **Baseline test**
 - Every employee in an identified high-risk area is given a hearing test to establish a baseline audiogram and show whether a hearing problem already exists.
- **Annual test**
 - Hearing tests are then given every year and compared to the baseline hearing results.
 - A Standard Threshold Shift has occurred when the hearing threshold has changed by an average of 10 dB or more in either ear at 2,000, 3,000, or 4,000 Hz.
 - If an employee shows a change in hearing, he or she will be notified.
 - Medical provider determines whether loss is work related



Employer Requirements – Recordkeeping

- **Recordkeeping:**
 - Noise exposure records kept for two years
 - All records shall be provided upon request to employees



Summary

- **Summary:**
 - Terminology
 - Effects of Noise
 - How the Ears work
 - Hearing conservation program



Questions

