

## **MAJOR PROGRAM POINTS**

# **"HEARING CONSERVATION AND SAFETY"**

**Training for the  
OSHA OCCUPATIONAL NOISE EXPOSURE  
STANDARD**

**Quality Safety and Health Products, for Today...and Tomorrow**

# Outline of Major Points Covered in the "Hearing Conservation and Safety" Course

The following outline summarizes the major points of information presented in the course on Hearing Conservation and Safety. The outline can be used to survey the course before taking it on a computer, as well as to review the course when a computer is not available.

- **We live in a noisy world.**
  - The sound that surrounds us can often help us to communicate with our environment.
  - But it can hurt us as well, often without our even realizing it.
  
- **Many of the sounds we take for granted, both at home and at work, can actually be harmful over time.**
  - Before we know it, the damage is done and our hearing is impaired.
  
- **For about 10 million people, hearing loss resulting from loud noise is a grim reality. Noise can also cause:**
  - Stress.
  - Fatigue.
  - Interference with concentration.
  - Lower morale.
  - Accidents.
  
- **That's why the Occupational Safety and Health Administration (OSHA) created a regulation to protect workers from high levels of noise.**
  - It's called the Occupational Noise Exposure Standard.
  - The regulation requires employees to be trained regarding how to protect their hearing when they work in areas where sound levels can be harmful.
  - That's what this program is all about.

- **Protection begins with awareness. You need to understand:**
  - The effects of noise on hearing .
  - The purpose, value and care of hearing protection.
  - Hearing test procedures.
  
- **Your first hearing safeguard is to understand how noise can injure your ears.**
  - This will help you recognize the conditions that can damage your ability to hear.
  
- **Noise has often been called any unwanted sound, but harmful noise is much more than that.**
  - The physical pressure created by high levels of sound can have a powerful effect on your body and your mind.
  - While noise has many different characteristics, there are three that can be dangerous.
  
- **The first is known as "frequency."**
  - The notes produced by a piano change as each new key is struck.
  - This is because the vibrations sent out by the individual strings are different.
  - These waves can be measured in cycles per second, or "Hertz."
  - The higher the number of cycles per second a sound has, the higher the frequency of the sound.
  
- **The frequency of a noise is a concern because higher frequencies are more damaging to our hearing.**
  - So pay special attention to the high frequency sounds (the higher pitched ones) that you hear in your surroundings.
  - But don't forget to stay alert for the loudness of sound in the area too.
  
- **The second source of potential trouble for your hearing is a sound's volume.**
  - Loud noise is often called "deafening" for good reason.

- **Sound volume is measured on a mathematical scale of units known as decibels, or "dBs."**
  - Each of these increments represents a significant increase in the power of a noise.
  - For example, a three dB increase is a doubling of sound energy.
  - Because volume multiplies as it rises up the scale, a 10 decibel gain represents a 10-fold increase in power.
  
- **The third potentially harmful characteristic of sound is the length of time you remain within a noisy area.**
  - The louder a sound is, the less time you should be around it.
  
- **This duration of sound is defined by three categories.**
  - "Continuous" noise is a steady sound with little or no change over time.
  - Constantly-running machinery is a good example of a continuous noise level.
  
- **Home construction sites often have "Intermittent" noise levels.**
  - In these situations, loud noises can occur for significant time spans, but are separated by relatively quiet pauses.
  
- **"Impulsive" noise lasts for less than a second, but is generally very loud.**
  - A hydraulic punch press, or a stamping machine, often produces this type of noise each time it is activated.
  
- **Noise that is loud and continuous is especially dangerous to your hearing.**
  - It is when the loudness level reaches an average of 90 decibels over an eight-hour time frame that your hearing is in jeopardy.
  - That's when OSHA's Noise Exposure regulation says you must take steps to protect your ability to hear.

- **To fully understand the effect that these three types of noise can have on your hearing, you need to understand how the ear works.**
  - The ear is a delicate but remarkably efficient amplifier.
  - In fact, even modern electronics are no match for the human ear.
- **It can detect even faint sound waves traveling through the air, using a system of structures located within the:**
  - Outer Ear.
  - Middle Ear.
  - Inner Ear.
- **The Outer Ear collects sound waves as they come into the area.**
  - These are then funneled down the ear canal toward a tight membrane called the ear drum.
- **When the sound waves strike the ear drum, it vibrates.**
  - The vibrations are then transmitted to the Middle Ear.
- **Three small bones within the Middle Ear amplify the power of the sound about 1000 times greater than that of the original sound wave.**
  - This intensified sound vibration is then transmitted to the fluid-filled Inner Ear, or Cochlea.
  - As this happens, it stirs thousands of hairs within the Cochlea.
  - Finally, the movement of these hairs sends electrical signals to the brain, which interprets them as "sound."
- **As efficient as the ear is, with all these moving parts it's easy to see how it can get damaged.**
  - What is important for us to recognize is how noise can cause harm to them.
- **Hearing loss most often occurs when the hairs within the Cochlea are harmed.**
  - Loud noise can easily injure these fragile hairs and their associated nerve cells.

- **Picture a field of wheat during a calm summer day.**
  - A light breeze does no harm to the wheat.
  - A strong wind, however, can bend and break the wheat shafts, and they will not bounce back.
  - The hairs of the Cochlea react to sound in a similar way.
  
- **Once harm is done to your Cochlea, there is no medical treatment that can bring your hearing back.**
  - This makes it especially important to protect yourself.
  - To be safe, we have to maintain an awareness of how the noise we encounter on a daily basis can threaten our hearing.
  
- **Most of us don't realize how much noise there is in our lives.**
  - At work, the legal limit for noise is an average of 90 decibels over an eight-hour period.
  
- **Let's compare that to some of the noise levels you face every day.**
  - The background noise in your home is normally about 55 decibels.
  - A ride in a convertible can be as high as 90 decibels.
  - Motorcycle riders contend with sound levels between 80 and 110 decibels.
  - Music at a rock concert can reach levels between 105 and 115 decibels.
  - The noise from a jet airplane is about 140 decibels.
  
- **Noise is practically everywhere we go, and that includes the workplace.**
  
- **Most facilities use a "system of controls" to protect workers from this noise.**
  - Often, the first thing that is done is to limit the amount of time an employee spends in a noisy area.
  - At other times, it's possible to use sound muffling equipment on the source of the noise.
  - When neither of these work, hearing protection is used.
  - There are a variety of hearing protection devices available for just about every situation.

- **Hearing protection is designed to reduce the sound that reaches your ears.**
  - This ability is expressed as the "Noise Reduction Rating" (NRR).
  - This number helps to indicate how well the device can reduce noise.
  - But it's important to realize that these ratings may not be accurate for your work environment.
- **During testing, the device's manufacturer assigns an NRR based upon a "best-case" scenario.**
  - Since this rarely, if ever, matches the conditions found in a workplace, OSHA recommends that the NRR be reduced by half when you are determining what type of protection you should use.
- **To calculate the amount of protection you need:**
  - First ask your supervisor what the noise level is in your area.
  - Next, subtract 90 decibels from the figure they give you.
  - Multiply the resulting number by two.
  - That number is the minimum Noise Reduction Rating your hearing protection device should have.
- **Once you know how much noise reduction you need, you also have to choose the type of protection that is best for your working conditions.**
  - There are almost as many reasons for choosing a type of hearing protection as there are models to choose from.
  - Remember, protection is only effective when it is worn, so the device has to satisfy both your needs and the situation's.
- **Adequate protection is the first selection concern.**
  - As we've discussed, the equipment must lower the noise exposure below the legal limit of 90 decibels.
- **Proper fit is important too.**
  - An inadequate fit allows noise to enter your ear.
  - You may also be tempted to remove the equipment because it's not comfortable.

- **You also need to choose a protector that is practical.**
  - It should not interfere with doing your job.
  - Otherwise, you may again be tempted to remove it.
- **As you consider your choice of equipment, keep in mind:**
  - Protection.
  - Fit.
  - Practicality.
- **It is also important to realize that each piece of equipment has its own:**
  - Advantages and disadvantages
  - Specific instructions for use and care.
- **Earmuffs are used in a number of situations.**
  - Muffs feature cups filled with sound-dampening material, generally joined together by a headband.
- **Cap mounted earmuffs attach to safety helmets.**
  - They are used in places where multiple personal protective equipment is necessary and both the head and ears need protection
  - A face shield can also be attached to the helmet for complete head and face protection.
- **Muffs are popular because:**
  - They are easy to use.
  - They are designed to fit anyone.
  - They aren't easily lost or misplaced.
  - They don't irritate infections or other ear conditions.
  - They can be worn with ear plugs if additional protection is needed.
- **Muffs can't be worn in all situations, however. Some of their disadvantages include:**
  - They are heavier than other types of protection.
  - In hot working conditions, they can be uncomfortable.

- **A muff's protection can also be reduced (through an inadequate seal) by:**
  - Glasses.
  - Facial hair.
  - Other personal protective equipment, such as respirators.
  
- **Also, because muffs can be bulky, they can make working in confined spaces difficult.**
  
- **If you decide to use earmuffs, you need to follow some basic guidelines to ensure top performance:**
  - Place the cups over your ears, and make sure that the cuffs provide a secure seal with your head.
  - The headband should be tight enough to provide a proper seal, but not so tight that it becomes uncomfortable.
  - Never remove your muffs when you are still in a noisy environment.
  
- **It is also important to follow all of the manufacturer's instructions for care of your muffs.**
  - Inspect your muffs regularly for wear and tear.
  - Don't use them if they are defective in any way.
  - Wash the cups and headband with a mild detergent (but be careful that the sound-reducing material does not get wet).
  
- **Keep ear cushions clean, by using a soft brush to remove oil and dirt that can harden the cushioning material.**
  - Replace the cushions when they get stiff or brittle.
  
- **If earmuffs aren't right for your situation, ear plugs might be a good alternative.**
  - These are designed to fit inside the ear canal, and come in both reusable and disposable models.

- **There are a number of good reasons to use plugs:**
  - They are small and lightweight.
  - They're inexpensive and easily replaced if lost.
  - In hot or humid conditions, they can be more comfortable than other types of ear protection.
  - They don't interfere with other personal protective equipment.
  
- **But just like all hearing protection, plugs are not ideal in every instance... they have disadvantages too. For instance:**
  - Each of us is different, and for some people, plugs may irritate the ear canal.
  - Plugs are easily lost, so you may need to carry extra pairs with you.
  - They don't provide adequate protection for high levels of noise.
  
- **Putting plugs in can be a problem too:**
  - Washing your hands prior to inserting plugs can be difficult if your work area doesn't have water readily available.
  - Both inserting and removing plugs can be hard for some people as well.
  
- **If you do prefer earplugs for your protection, be sure to take these steps to get their full benefit:**
  - Always wash your hands before handling plugs (this will help to prevent ear infections, which can also be dangerous to your hearing).
  - When using foam-type plugs, first shape them between your thumb and forefinger for easy insertion.
  - When your plugs are ready, use your "opposite" hand to pull the ear outward and upward, to enlarge and straighten the ear canal.
  - Then, insert the plug (for foam plugs, allow a little extra time so the foam can expand to form the proper seal against the canal walls).
  - Release your ear, and make sure that the plug is fully inserted, so it will not fall out.

- **Once you are in a noisy environment, be sure to keep your plugs in place.**
- **Caring for your plugs are just as easy as using them.**
  - Always follow the guidelines from the manufacturer.
  - Keep the plugs well maintained with some basic upkeep.
- **The only "care" required for disposable plugs is that you throw them away.**
  - Never use disposable plugs more than once.
- **Regularly inspect reusable plugs for torn flanges or other signs of wear.**
  - Don't use plugs that are weakened, because they won't protect you well.
- **Keep reusable plugs clean to avoid infection and to ensure a proper fit.**
  - Wash them with a toothbrush in a mild detergent.
  - Rinse the detergent off, then allow the plugs to air dry on a clean surface.
  - Once they are completely dry, store them in their own plastic container.
- **Ear plugs work well in a variety of situations, but in locations where noise levels are intermittent, they can be bothersome.**
  - For these circumstances, canal caps may be more useful.
- **Canal caps, sometimes called pods, consist of two ear plugs held in place by a rigid band.**
  - As a result, these are easy to remove when sound levels decrease.
  - The thing to remember about canal caps is that they offer less protection than either muffs or individual plugs.
  - Ask your supervisor if this type of protection is suitable for your work area.

- **Even if you have taken every precaution, your employer will want to make sure your hearing is healthy, so be prepared to take a hearing test.**
  - Hearing tests provide an accurate measure of your hearing ability.
  - They also make it possible to start early medical treatment, if your test shows a hearing loss.
  - Your employer will provide these tests free of charge each year that you work in an area where the noise level averages 85 decibels or higher during an eight-hour period.
  
- **The first test establishes a starting point, or baseline, of your hearing.**
  - Health professionals will compare the results of the tests you take each year to see if any change has occurred.
  
- **Remember, the goal of OSHA's Noise Exposure Standard is to preserve your ability to hear human speech.**
  - Since the human voice is made up of many frequencies of sound, a hearing test is designed to measure your ability to hear at the 500, 1000, 2000, 3000, 4000 and 6000 Hertz frequencies.
  
- **The results of your hearing test are plotted on a graph called an audiogram.**
  - This is your hearing record.
  
- **If a 10 decibel reduction in your ability to hear is detected at the 2000, 3000 or 4000 Hertz frequencies, you will be notified.**
  - This kind of hearing change is known as a "Standard Threshold Shift."
  - It means that a sound has to be 10 decibels louder for you to hear it than was necessary in previous years.

- **If the test shows you have experienced this kind of hearing loss, you may be asked to take the test again.**
  - This is to make sure the first test was accurate, or that the change was not a temporary one (temporary hearing loss can be common).
- **The hearing loss could also be the result of an ear infection or some other reason.**
  - To rule these out, you may be referred to another physician for a medical exam.

**\*\*\*SUMMARY\*\*\***

- **The real test of any hearing conservation program is that it works. Remember these key points to keep your hearing in top condition.**
- **Noise can damage hearing when it averages 90 decibels or more for an eight-hour time period. Be particularly aware of:**
  - High frequency sound.
  - Loud sound.
  - The duration, or length of time, you are exposed to harmful sound.
- **Worn properly, hearing protection blocks noise from reaching your ears. When choosing protective equipment, consider its:**
  - Noise reduction rating.
  - Comfort and fit.
  - Practicality in your work environment.
- **Hearing tests are a valuable tool in your fight to maintain your ability to hear... so make sure to have them regularly.**
- **Your life would not be the same without the ability to hear.**
  - Our hearing allows us to communicate with others, warns us about dangerous situations and makes it possible to enjoy simple pleasures like music.

- **Hearing is irreplaceable. Do everything you can to preserve this precious gift... before it is too late!**