Sensear

Hear Speech Stay Protected

How Loud is Too Loud?

Best Practices in Preventing Occupational Hearing Loss

Sensear Safety Guide

Introduction

Each year approximately 22 million workers are exposed to noise levels severe enough to cause hearing loss.[1] At Sensear we get asked a lot of questions regarding harmful noise levels and what are the best practices for communicating in high-noise environments. This safety guide provides an overview of the recommendations by various organizations such as Occupational Safety and Health Administration (OSHA) and The National Institute for Occupational Safety and Health (NIOSH).

Noise-induced hearing loss (NIHL) affects a diverse group of industries, but is most prevalent in mining, transportation, construction, and manufacturing. Repeated exposure to high levels of noise can cause permanent hearing loss and severe tinnitus (ringing in the ears). With noise-induced hearing loss, individuals are unable to hear high frequency sounds and understand speech, seriously impairing the ability to communicate. This can result in a greater number of accidents and injuries in the workplace, as well as lawsuits and higher insurance premiums.[2]

Hearing loss can also affect one's personal life, interfering with the ability to enjoy socializing with family and friends. The first step in preventing hearing loss and any possible workplace accidents caused by high noise levels is to identify the level of noise encountered throughout the daily work shift.

What is Considered a Harmful Noise Level?

Noise is measured in units of sound pressure levels called decibels, using A-weighted sound levels (dBA). This A-weighted sound level measurement is key in the assessment of the overall noise hazard as it provides the best rating of industrial broadband noises indicative with the injurious effects noise has on the human ear. A-weighted sound levels closely match the perception of loudness by the human ear. Decibels are measured on a logarithmic scale which means that a small change in the number of decibels results in a huge change in the amount of noise and the potential damage to a person's hearing.

OSHA sets legal limits on noise exposure in the workplace, based on a worker's time weighted average over an 8-hour day. The permissible exposure limit (PEL) is 90 dBA for all workers for an 8-hour day. The OSHA standard uses a 5 dBA exchange rate, which means that when the noise level is increased by 5 dBA, the amount of time a person can be exposed to a certain noise level to receive the same dose is cut in half.[3]

Comparison of Duration Per Day in Hours to Allowable Sound Level in dBA (Slow-Response SPL)		
Duration per day (hours)	Sound level (dBA, slow response)	
8	90	**PEL = 90 dBA (TWA), or 100% Dose**
6	92	
4	95	
2	100	
1	105	
½	110	
0.25	115	

Figure 1 - OSHA Guidelines for Noise Exposure

NIOSH recommends that all worker exposures to noise should be controlled below a level equivalent to 85 dBA for eight hours to minimize occupational noise-induced hearing loss. Based on updated information obtained from literature reviews, NIOSH has found that significant noise-induced hearing loss occurs at the exposure levels equivalent to the OSHA PEL. The organization also recommends a 3 dBA exchange rate so that every increase by 3 dBA doubles the amount of the noise and halves the recommended amount of exposure time.[4]

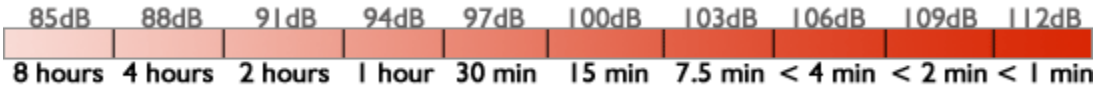

Figure 2 - NIOSH Guidelines for Noise Exposure

Visitors to the NIOSH website can access an interactive noise meter to hear the different sounds and sound intensities of everyday objects (i.e. jackhammer, power lawn mower, jet airplane at takeoff, ambulance siren, and more). The meter also shows how long it takes before a particular sound level becomes dangerous to the human ear. For example, a chain saw has a sound intensity of about 110 dB, so running one for only 2 minutes can cause injury to the human ear without proper protection.

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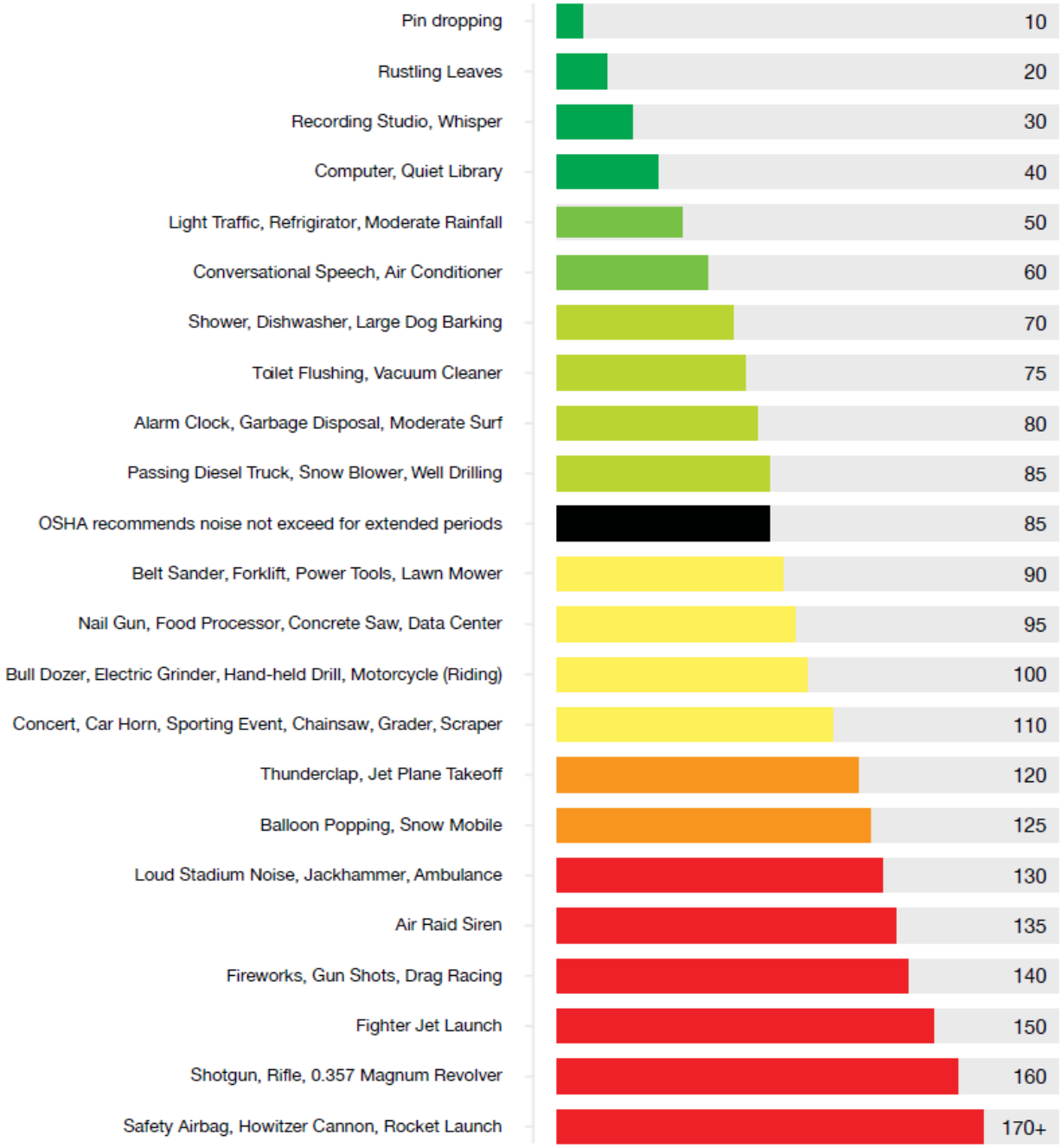
Levels of Noise in Decibels (db)

- Soft - Comfortable over 30 minutes
- Moderate - Normal everyday noise
- Loud - Uncomfortable over 30 seconds
- Not to exceed - Can cause hearing loss
- Very Loud - Dangerouse over 30 minutes
- Uncomfortable - Dangerouse over 30 seconds
- Painful & Dangerouse - Instantly Dangerouse



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How Does Hearing Protection Change Decibel Exposure Levels?

Noise Reduction Ratings are important because they indicate the functionality of a device, and the ability for that device to protect hearing in noisy environments.

In order to approximate an NRR, a little math is required, as the equipment used to protect hearing does not reduce the decibel levels within a given environment by the precise decibel number that is tied to the NRR for that device. For example, a person who is working in a loud occupational environment may be exposed to noise as great as 100 decibels. If an individual is wearing hearing protection equipment with an NRR of about 30 decibels, the noise exposure amount would not be lowered to 70 decibels. Instead, it would be lowered to 88.5 decibels. Take a look at the following steps taken to determine the level of noise exposure after reduction:

- Subtract seven from the NRR number, which is given in decibels.
- Divide the result by two.
- Subtract the result from the original noise exposure level in decibels.

Check out our new online **Hearing Protection Calculator** with 4 methods of calculation to meet the requirements in your region.

For more information, feel free to visit the OSHA website.

Hearing protection is a must in noisy work environments to protect employees. Keeping the information above in mind can help you better understand noise exposure levels and Noise Reduction Ratings for specific hearing protection devices. For more information on what to look for when buying a noise suppression headset check out our Buyer's Guide to Headsets. Sensear provides hearing protection that allows you to hear your environment, communication with others, while still protecting your hearing.

Standards and Regulations for Hearing Loss Protection

In 1981, OSHA instituted new standards requiring employers to administer a continuing, effective hearing conservation program for employees continuously exposed to high levels of noise. Since that time, many other recommendations and standards have been implemented in an effort to reduce workplace hearing loss.[5]

Working together, NIOSH and the National Occupational Research Agenda (NORA) have developed strategic goals related to the prevention of occupational hearing loss. The Hearing Loss Prevention Program is a partnership program designed to stimulate innovative research and improve workplace practices. NORA was formed in 1996 as a framework to guide

occupational safety and health research, with approximately 500 diverse organizations and individuals providing input. Setting up goals allows the Agenda to focus on a subgroup of issues where NIOSH can make a significant impact.[6]

To protect against excessive noise in the workplace, NIOSH recommends an approach based on a hierarchy of controls. These are controls both at the source of noise, along the path of the noise, and finally at the receiving end of the noise – where Personal Protective Equipment (PPE) worn by the user is so very important. Enclosures, and resilient vibration mounting of noise generating equipment, even isolation of the source are the first step. Looking at reflection paths from ceiling, acoustical tiles, the floor and the direct air path are key to looking at the noise transmission path. Finally, PPE in terms of appropriate HPD in the form of plugs or muffs, and even possible enclosures for worker protection can all be looked at to reduce hazardous noise exposure to the point where the risk to hearing is eliminated or minimized. Engineering controls can effectively be used to reduce sound exposure levels by modifying or replacing equipment, or making related physical changes at the noise source or along the transmission path.

In situations where noise levels cannot be reduced through engineering controls, OSHA requires workers to use of hearing protection devices (HPDs) for noise reduction, such as earmuffs and plugs. Employers must make HPDs available to all employees exposed at or above the action level, and must be provided and replaced as necessary at no cost to the employee.

Employees must be given the opportunity to select their HPDs from a suitable variety (generally, a minimum of two devices, representative of at least two different types). OSHA also holds the employer responsible for ensuring the following:

- Proper fitting and training in the use and care of the devices
- How essential the ability to communicate is during the daily work shift
- Importance of maintaining audible awareness of their surroundings or nearby hazards

These factors will help determine whether the employees need passive or active hearing protection and if they require a situational awareness feature.

Worksite Noise Data Collection

In 2009, the NIOSH Occupational Hearing Loss (OHL) Surveillance Project was launched to develop a national surveillance system for occupational hearing loss. Partnering with audiometric service providers and others, the Project has allowed NIOSH to collect millions of de-identified audiograms from thousands of workplaces across the United States while protecting the identities of workers, companies and providers.[7]

NIOSH also offers several tools that provide workers with valuable information about HPDs. The Hearing Protector Device Compendium is a comprehensive searchable database that identifies hearing protector devices by type, manufacturer, and noise exposure level, allowing workers and safety professionals to select the most appropriate product for their unique environment.

The HPD Well-Fit™ system provides an easy and inexpensive test that measures the noise reduction an HPD provides for an individual worker and calculates that worker's Personal Attenuation Rating (PAR). Universal implementation of hearing protector fit-testing can greatly reduce the incidence of hearing loss among noise-exposed workers using HPDs.[8]

Hearing Protection, Communication and Technology

There are a variety of industrial hearing protection devices available, but only a few of them offer the ability to communicate with coworkers while protecting hearing. Sensear headsets use SENS® Technology to processes all 3 types of noise: broadband, tonal, and impulse. This innovative technology, combined with high noise reduction ratings (NRR) are integrated with advanced communication options like VOX, Bluetooth® and Short Range to provide users with a customized communication solution. For more information about hearing protection and communication in high-noise environments, visit www.sensear.com and talk to one of our specialists today.

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[1] http://www.cdc.gov/niosh/topics/noise; *Noise and Hearing Loss Prevention*. Centers for Disease Control and Prevention. 25 January 2016. Web. 5 March 2016.
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[8] http://www.cdc.gov/niosh/topics/noise; *Noise and Hearing Loss Prevention: Noise Meter*. Centers for Disease Control and Prevention. 22 October 2013. Web. 5 March 2016.