

How Loud Is Too Loud?

Measuring Sound/Decibels

The pressure of a sound is measured in **decibels** (dB), or more specifically, dB sound pressure level (SPL). The decibel measure was developed to compare sound intensities. Like many temperature scales, the decibel scale goes below zero, the lowest level an average person can hear.

- Decibels (dBs) actually express a ratio. There has to be a reference value in order to calculate a ratio. The reference value for 0 dB SPL is 2×10^5 Newtons/meter². A filter can be used when measuring sound to give a correction equivalent to that of human hearing. When this is done, the units are measured in dB A (meaning the A-weighted measurement of sound pressure level).
- The average person can hear sounds down to about 0 dB³, the level of rustling leaves. Some people with very good hearing can hear sounds down to -15 dB.
- If a sound reaches 85 dB or stronger, it can cause permanent damage to your hearing.
- The amount of time you listen to a sound affects how much damage it will cause. The quieter the sound, the longer you can listen to it safely. If the sound is very quiet, it will not cause damage even if you listen to it for a very long time; however, exposure to some common sounds can cause permanent damage. With extended exposure, noises that reach a decibel level of 85 can cause permanent damage to the hair cells in the inner ear, leading to hearing loss.
- Many common sounds may be louder than you think.
- A typical conversation occurs at 60 dB, not loud enough to cause damage.
- A bulldozer that is idling (note that this is idling, *not* actively bulldozing) is loud enough at 85 dB that it can cause permanent damage after only 1 work day (8 hours).
- **When listening to music on many earphones at a mid-level volume, the sound generated reaches a level of 100 dB, loud enough to cause permanent damage after just 15 minutes per day!**

³ This is true only at 3 KHz frequency. Hearing specialists prefer to use a term dBA, a calibration of sound pressure level (SPL) using frequency range and sensitivity similar to human hearing. However, in this curriculum we will refer to the more commonly used dB.

- A clap of thunder from a nearby storm (120 dB) or a gunshot (140-190 dB, depending on weapon) can cause immediate damage.
- Noise is probably the most common occupational hazard facing people today. It is estimated that as many as 30 million Americans are exposed to potentially harmful sounds at work.
- Even outside of work, many people participate in recreational activities that can produce harmful noise (musical concerts, use of power tools, etc.). Sixty million Americans own firearms, and many people do not use appropriate hearing protection devices.
- Noise-induced hearing loss is of particular concern to veterans. Because NIHL is not immediately apparent (having a gradual onset), many veterans leaving the service are unaware of the full extent of hearing damage.