OSHA & NIOSH Noise Exposure Limits: A Complete Guide (+ How to Measure)

Everything safety managers need to know about OSHA and NIOSH noise exposure limits, hearing conservation programs, and how to measure workplace noise levels with a smartphone.

Author: Lubor Šimůnek · Published: April 24, 2026 · Productivity

Online version: https://appstoryo.com/en/blog/osha-niosh-noise-exposure-limits



Noise-induced hearing loss is one of the most common occupational injuries in the United States, and it is entirely preventable. According to the CDC, approximately 22 million workers are exposed to hazardous noise levels every year. Once hearing is gone, it does not come back. That single fact is why OSHA and NIOSH have established noise exposure limits that every employer should understand, monitor, and enforce.

Whether you manage a construction site, a manufacturing floor, or even a busy open-plan office, understanding these limits is the first step toward protecting your workforce. And the good news is that monitoring noise levels no longer requires thousands of dollars in specialized equipment for every preliminary check.

Download NoiseLedger free on iOS

NoiseLedger turns your iPhone into a real-time dB meter with session recording, CSV export, and calibration support, giving safety managers a practical tool for baseline noise surveys without the cost barrier of traditional equipment.

OSHA Noise Standard (29 CFR 1910.95) Explained

The Occupational Safety and Health Administration (OSHA) sets legally enforceable noise exposure limits under 29 CFR 1910.95 for general industry and 29 CFR 1926.52 for construction. These are not recommendations — they are federal law, and violations can result in citations and significant fines.

Permissible Exposure Limit (PEL)

OSHA's Permissible Exposure Limit is **90 dBA as an 8-hour time-weighted average (TWA)**. This means that over a standard work shift, the average noise level a worker experiences must not exceed 90 dBA. If the noise level increases, the allowed exposure time decreases sharply.

Action Level

OSHA also defines an **Action Level of 85 dBA (8-hour TWA)**. While this is not the legal maximum, reaching the Action Level triggers mandatory requirements including the implementation of a hearing conservation program. Think of the PEL as the hard ceiling and the Action Level as the early warning threshold.

The 5 dB Exchange Rate

OSHA uses a **5 dB exchange rate** (also called the doubling rate). For every 5 dB increase above 90 dBA, the permissible exposure time is cut in half. This is a critical concept because it determines how quickly you exhaust your daily noise "budget."

OSHA Permissible Noise Exposure Table

Sound Level (dBA)	Maximum Exposure Time (OSHA)
85	16 hours (Action Level trigger)
90	8 hours
95	4 hours
100	2 hours
105	1 hour
110	30 minutes
115	15 minutes
120	0 minutes (immediate hazard)

Notice how dramatic the reduction is. A worker exposed to 100 dBA has only 2 hours before exceeding the PEL. At 110 dBA — roughly the level of a power saw or a rock concert — the limit drops to just 30 minutes.

NIOSH Recommended Exposure Limit (REL)

The National Institute for Occupational Safety and Health (NIOSH) is OSHA's research counterpart. While NIOSH standards are not legally enforceable the way OSHA's are, they represent the most current scientific evidence on what constitutes safe exposure.

The Key Difference: 85 dBA and 3 dB Exchange Rate

NIOSH recommends a **Recommended Exposure Limit (REL) of 85 dBA for an 8-hour TWA** — 5 dB lower than OSHA's PEL. More importantly, NIOSH uses a **3 dB exchange rate** instead of OSHA's 5 dB. This means that for every 3 dB increase, the allowed exposure time is cut in half.

The 3 dB exchange rate is based on the equal-energy principle, which states that the total acoustic energy a worker receives determines the risk of hearing damage. Most occupational health researchers and international standards bodies agree that the 3 dB rate more accurately reflects real-world hearing damage risk.

NIOSH Recommended Noise Exposure Table

Sound Level (dBA)	Maximum Exposure Time (NIOSH)
82	16 hours
85	8 hours
88	4 hours
91	2 hours
94	1 hour
97	30 minutes
100	15 minutes
103	7.5 minutes
106	3.75 minutes

Compare this to the OSHA table above. At 100 dBA, OSHA allows 2 hours of exposure while NIOSH allows only 15 minutes. This enormous gap illustrates why many safety professionals choose to follow the stricter NIOSH guidelines whenever possible.

OSHA vs NIOSH: Key Differences

Understanding the distinction between these two standards is essential for making informed decisions about your workplace noise program.

Parameter	OSHA PEL	NIOSH REL
Exposure limit	90 dBA (8-hr TWA)	85 dBA (8-hr TWA)
Exchange rate	5 dB	3 dB
Legal status	Enforceable by law	Recommendation only
Action Level	85 dBA	Not separately defined
Max exposure at 100 dBA	2 hours	15 minutes
Threshold level	80 dBA	80 dBA
Criterion level	90 dBA	85 dBA

When to Follow Which Standard

At minimum, you must comply with OSHA's PEL because it is federal law. However, there are

strong reasons to aim for the NIOSH REL instead.

- **Better worker protection.** The NIOSH limits are based on more recent research and protect a larger percentage of exposed workers from developing hearing loss.
- **Industry best practice.** Many Fortune 500 companies, military branches, and international employers already follow the 85 dBA / 3 dB standard.
- **Liability reduction.** If a worker develops hearing loss while you were technically within OSHA limits, the NIOSH data may be used to argue that a safer standard was available and not followed.
- **State regulations.** Some states with their own OSHA-approved plans (like California's Cal/OSHA) have adopted limits closer to the NIOSH recommendations.

When Is a Hearing Conservation Program Required?

Under OSHA regulations, a **Hearing Conservation Program (HCP)** must be implemented whenever worker noise exposure equals or exceeds the Action Level of **85 dBA as an 8-hour TWA**. Note that this is the Action Level, not the PEL — meaning the program requirement kicks in at a lower threshold than the legal exposure maximum.

Required Components of a Hearing Conservation Program

1. **Noise monitoring.** You must measure noise levels to identify which employees are at or above the Action Level. Monitoring must be repeated whenever changes in production, processes, or equipment could increase exposure.
2. **Audiometric testing.** Baseline audiograms must be established within 6 months of a worker's first exposure at or above the Action Level (or within 12 months if a mobile testing unit is used, provided the worker wears hearing protection for the interim). Annual audiograms are required thereafter to detect any shift in hearing threshold.
3. **Hearing protection.** Employers must provide hearing protection devices (earplugs, earmuffs) at no cost to all workers exposed at or above the Action Level. Workers exposed above the PEL (90 dBA) must be required to wear them; at the Action Level, they must be made available.
4. **Employee training.** Annual training on the effects of noise, the purpose of hearing protectors, and the purpose of audiometric testing is required for all exposed workers.
5. **Record keeping.** Noise exposure measurement records must be kept for 2 years. Audiometric test records must be kept for the duration of the worker's employment.

The hearing conservation program is one of the most common areas where OSHA issues citations. Even if your noise levels are well below 90 dBA, failing to establish an HCP when the 85 dBA Action Level is reached is a violation.

How to Measure Workplace Noise Levels

Accurate noise measurement is the foundation of any compliance program. There are three primary approaches, and each serves a different purpose.

Method 1: Area Surveys with Sound Level Meters

An area noise survey measures the sound level at fixed positions throughout a workplace. The goal is to create a noise map that identifies which zones exceed the Action Level and which are safe. Area surveys are the logical starting point because they tell you where to focus your efforts.

For this type of survey, you walk through the facility with a sound level meter (SLM), recording readings at regular intervals and near each significant noise source. You need A-weighted measurements (dBA) because both OSHA and NIOSH base their limits on A-weighting, which approximates the sensitivity of the human ear.

Traditional SLMs cost anywhere from $200 to $2,000. For preliminary area surveys and ongoing spot checks, a calibrated smartphone app can be remarkably effective. NoiseLedger provides real-time dBA readings with FAST and SLOW time weighting, displays MIN, LEQ, and MAX values for each session, and lets you record sessions with titles, tags, notes, and time-stamped markers. The FFT spectrum view shows you which frequencies dominate each noise source, and you can export session data as CSV files or PNG reports for your records.

Download NoiseLedger free on iOS

Method 2: Personal Noise Dosimetry

A noise dosimeter is worn by an individual worker throughout a shift and calculates the cumulative noise dose as a percentage of the permissible limit. Dosimetry answers the question: “How much total noise did this specific worker receive today?”

Dosimeters are essential when workers move between areas with different noise levels throughout the day, which makes a single area reading insufficient. OSHA requires that dosimeters use the 5 dB exchange rate, 90 dBA criterion level, and 80 dBA threshold level. If you are following NIOSH guidelines, the dosimeter should be set to the 3 dB exchange rate and 85 dBA criterion level.

A 100% noise dose means the worker has reached the maximum permissible exposure. Anything above 50% (which corresponds to the Action Level) triggers hearing conservation program requirements.

Method 3: Engineering Surveys

Engineering noise surveys go deeper than simple level readings. They involve detailed analysis of specific machines and processes to identify the root causes of excessive noise and evaluate potential engineering controls like enclosures, barriers, damping, and vibration isolation.

These surveys typically require octave-band or third-octave-band analysis and are conducted by acoustical engineers or industrial hygienists. The FFT spectrum view in tools like NoiseLedger can help you identify dominant frequencies before calling in a specialist, potentially saving time and money on the engineering consultation.

Can You Use a Phone App for Workplace Noise Monitoring?

This is one of the most frequently asked questions in occupational noise management, and

the answer is more nuanced than a simple yes or no.

What the Research Says

A landmark study published by NIOSH researchers evaluated the accuracy of smartphone sound measurement apps and found that several iOS apps measured within **±2 dBA** of a Type 1 reference sound level meter. That level of accuracy is sufficient for most area survey and screening purposes. The study specifically noted that iOS devices tend to produce more consistent results than Android devices due to the standardized microphone hardware across iPhone models.

Where Phone Apps Excel

- **Preliminary area surveys.** Before investing in professional monitoring, a phone app helps you identify which areas likely exceed the Action Level and which are clearly safe.
- **Ongoing spot checks.** Regular informal measurements between formal surveys help you catch changes in noise levels caused by new equipment, process changes, or deteriorating machinery.
- **Employee awareness.** Giving supervisors and workers a way to check noise levels in real time promotes a culture of noise awareness.
- **Documentation.** NoiseLedger's session recording with titles, tags, notes, and time-stamped markers creates a documented record of measurements that can support your compliance files. The CSV export makes it easy to pull data into spreadsheets for TWA calculations and trend analysis.

Where Phone Apps Have Limitations

- **Legal certification.** Phone apps are not Type 2 sound level meters. OSHA compliance measurements that will be used to demonstrate regulatory compliance or defend against citations should be made with ANSI-certified equipment.
- **Personal dosimetry.** A phone cannot be worn on a worker's collar the way a dedicated dosimeter clip can, so it cannot replace true personal noise dose monitoring.
- **Extreme environments.** Very high humidity, extreme temperatures, and heavy dust may affect a phone's microphone performance more than a purpose-built SLM.

The Practical Approach

Phone apps like NoiseLedger are ideal for preliminary assessments, routine spot checks, and building a culture of noise awareness. Use them to screen your workplace, identify problem areas, and build baseline documentation. Then bring in certified equipment and qualified professionals for the measurements that go on the official compliance record. Many safety managers find that this two-tier approach — phone app for day-to-day monitoring, certified equipment for formal documentation — is both effective and cost-efficient.

NoiseLedger's calibration feature with A-weighting and Z-weighting support, plus its offset calibration against a reference meter, makes it one of the more accurate options available. It works entirely offline, collects no user data, and is completely free with no ads.

Noise Exposure Quick Reference Table

This table combines common workplace noise sources with both OSHA and NIOSH exposure limits for quick reference. Print it and post it in your safety office.

Noise Source	Typical Level (dBA)	Max OSHA Exposure	Max NIOSH Exposure
Quiet office	50–55	No limit	No limit
Open-plan office	60–65	No limit	No limit
Busy restaurant	70–80	No limit	No limit (below 82 dBA)
Vacuum cleaner	75–85	16 hours (at 85)	8 hours (at 85)
Forklift / hand tools	80–90	8 hours (at 90)	2.5 hours (at 90)
Table saw	93–100	4 hours (at 95)	52 min (at 94)
Bulldozer / excavator	95–105	1 hour (at 105)	7.5 min (at 103)
Impact wrench	100–110	30 min (at 110)	3.75 min (at 106)
Jackhammer	100–115	15 min (at 115)	Less than 2 min (at 109)
Sandblasting	105–115	15 min (at 115)	Less than 1 min (at 112)
Jet engine (nearby)	130–140	Immediate hazard	Immediate hazard

Common Workplace Noise Sources and Their Levels

Understanding the typical noise profile of your industry helps you anticipate where problems are most likely to occur.

Office Environments: 50–65 dBA

Standard offices rarely approach the Action Level. However, open-plan offices with hard surfaces, poor acoustics, and many simultaneous conversations can reach 65–70 dBA, which causes concentration problems and productivity loss even though it is not a hearing hazard. If employees complain about noise in the office, a quick measurement with NoiseLedger can help you quantify the problem and justify acoustic improvements.

Manufacturing and Factory Floors: 80–100 dBA

This is the most common environment where hearing conservation programs are required. CNC machines, presses, conveyors, compressors, and pneumatic tools routinely produce noise in the 85–100 dBA range. The challenge in manufacturing is that noise levels can vary significantly from one workstation to another, making thorough area surveys essential.

Construction Sites: 85–110 dBA

Construction consistently ranks among the noisiest industries. Power saws, jackhammers, pile drivers, concrete mixers, and heavy machinery combine to create a complex noise environment where levels regularly exceed 100 dBA. The transient nature of construction work — different tasks in different locations throughout the day — makes personal dosimetry especially important in this sector. OSHA’s construction noise standard (29 CFR 1926.52) uses the same 90 dBA PEL and 5 dB exchange rate as the general industry standard.

Entertainment and Events: 100–120 dBA

Concert venues, nightclubs, sporting events, and entertainment productions can produce sustained levels above 100 dBA. Workers in these environments — sound technicians, security staff, bartenders, performers — face significant hearing risk, and this sector has historically had lower compliance rates than traditional industrial workplaces.

Steps to Achieve Noise Compliance

Bringing your workplace into full compliance with OSHA noise regulations does not have to be overwhelming if you approach it systematically. Here is a practical five-step framework.

Step 1: Conduct a Baseline Noise Survey

Walk through every area of your facility and measure noise levels during normal operations. Record readings at each workstation, near every significant piece of equipment, and in common areas. Use A-weighting (dBA) for all measurements. Document the time, location, operating conditions, and noise level for each reading. NoiseLedger's session recording with tags and notes makes this process straightforward — you can tag each reading by department, machine, or location and add notes about operating conditions.

Step 2: Identify Risk Areas and Affected Workers

Any area where noise levels equal or exceed 85 dBA requires further attention. Mark these zones on a facility map. Identify every worker who spends time in those zones and estimate their daily exposure. Workers who move between quiet and noisy areas during a shift will need personal dosimetry to determine their true TWA.

Step 3: Implement Engineering and Administrative Controls

OSHA's hierarchy of controls prioritizes engineering solutions — eliminating or reducing noise at the source — over administrative controls and personal protective equipment. Common engineering controls include enclosing noisy machines, installing sound-absorbing materials, replacing worn bearings and gears, using vibration isolation mounts, and upgrading to quieter equipment. Administrative controls include rotating workers through noisy areas to limit individual exposure time and scheduling the noisiest tasks during periods when fewer workers are present.

Step 4: Monitor, Document, and Review

Noise compliance is not a one-time project. You need to re-measure whenever you introduce new equipment, change processes, or rearrange the facility layout. Establish a regular monitoring schedule — quarterly is a good cadence for most facilities — and keep records organized and accessible. OSHA can request your noise exposure records during an inspection, and having clean, well-organized documentation demonstrates a good-faith compliance effort.

Step 5: Train Your Employees

Training must cover why noise is hazardous, what the exposure limits are, how to properly use hearing protection, and what to do if they notice a change in noise levels or experience

symptoms of hearing loss (tinnitus, muffled hearing, difficulty understanding speech). Effective training is interactive and practical, not just a slide deck.

Download NoiseLedger free on iOS

Whether you are conducting your first baseline survey or building out a comprehensive noise monitoring program, NoiseLedger gives you session-based recording with CSV export and PNG reports — the kind of documentation that supports a professional compliance effort.

Frequently Asked Questions

What is the OSHA 8-hour noise limit?

OSHA's Permissible Exposure Limit (PEL) is 90 dBA as an 8-hour time-weighted average. However, the Action Level is 85 dBA, and reaching it triggers mandatory hearing conservation program requirements including audiometric testing, hearing protection, and annual worker training. Many safety professionals recommend targeting the NIOSH REL of 85 dBA as the effective maximum to better protect workers.

How often should workplace noise be measured?

OSHA does not specify a fixed schedule for noise monitoring, but measurements must be repeated whenever changes in operations, equipment, or processes might increase noise exposure. Best practice is to conduct formal noise surveys at least annually, with spot checks quarterly or after any significant operational change. If you are introducing new machinery, modifying the facility layout, or changing production schedules, you should re-measure promptly.

Can employees use phone apps for noise monitoring?

Yes, for preliminary screening and ongoing awareness. NIOSH research has shown that calibrated iOS apps can measure within ±2 dBA of professional-grade sound level meters. Phone apps like NoiseLedger are excellent for area surveys, spot checks, and building a noise-aware culture. They should not replace ANSI-certified instruments for official compliance documentation, but they fill a valuable role in a layered monitoring strategy. You can learn more about phone dB meter accuracy and how measurement apps compare to professional equipment.

What is the TWA noise exposure formula?

The time-weighted average (TWA) using the OSHA 5 dB exchange rate is calculated with: $TWA = 16.61 \times \log10(D/100) + 90$, where D is the noise dose in percent. The noise dose itself is calculated by dividing the actual exposure time at each noise level by the allowable time at that level, summing the fractions, and multiplying by 100. For the NIOSH 3 dB exchange rate, the formula uses: $TWA = 10 \times \log10(D/100) + 85$. Understanding the difference between these formulas is important because the same raw noise data will produce different TWA values depending on which exchange rate you apply. Understanding A-weighting vs Z-weighting is also essential for accurate noise measurements.

Cite as: Lubor Šimůnek (2026). *OSHA & NIOSH Noise Exposure Limits: A Complete Guide (+ How to Measure)*. AppStoryo, lapnito.cz s.r.o.. https://appstoryo.com/en/blog/osha-niosh-noise-exposure-limits
© 2026 lapnito.cz s.r.o.