

The Importance of Ongoing Audiometric Ambient Noise Compliance—Especially With “Quiet-Room” Testing!

This White Paper looks at why ambient noise can be an issue with audiometric testing within both test booths and “quiet-room” environments, and what you can do about it.

Noise Is Always Present!

On-again, off-again ambient noise can be just enough to throw off your audiogram results. What can you do to guarantee a “quiet-room” test when it isn’t cost-effective or physically feasible to bring in a 600-lb. sound room? And if you do have an on-site test booth, how do you guarantee that it remains quiet inside—even when there’s noise outside, or subjects cough, sneeze, or talk?

It is well documented that this is an area of ongoing concern. Just read the opening paragraph of a recent article on the issue of ambient noise in audiometric testing, entitled **“Options in Defining Background Noise During Audiometric Testing,”** by Elliott H. Berger, M.S., *UPDATE (The Newsletter of the Council of Accreditation in Occupational Hearing Conservation)*, Volume 18, Issue 1, Winter/Spring 2006:

“*Background noise in audiometric testing continues to be a concern in the regulatory and audiological communities, despite the fact that an accepted and validated American National Standard (ANSI S3.1-1999) exists that clearly defines acceptable ambient noise levels and the associated errors in threshold measurement that they create. The ANSI standard is based on objective measurements and includes options to adjust its tabled values, depending upon the amount of masking that the experimenter is willing to tolerate. This article reviews the data and theory behind the standard, clarifies the proper interpretation of the standard and the options that it provides, compares its specifications to the values proposed by the National Hearing Conservation Association (NHCA) and the American Speech- Language Hearing Association (ASHA) (NHCA, 1994), and summarizes actual room noise measurements reported in the literature.***”**

Note: Link to complete article accessed below:

<http://www.caohc.org/updatearticles/spring06.pdf>

Positively Addressing the Issue of Ambient Noise

Yet knowing that something is an issue does nothing to solve the problem of delivering straightforward steps for dealing with it. And the Letters of Intent issued by OSHA to further clarify ambient noise parameters have shed light on certain areas (highlighted below), but have not given clear-cut answers for achieving documented compliance.

We will begin by exploring the intent of the ambient noise level requirements as put forth by **OSHA's Occupational Noise Standard, 29 CFR 1910.95**.


A [Letter of Intent](#) (link below) issued on February 14, 2005, by Richard E. Fairfax, Director, Directorate of Enforcement Programs, makes the following points:

http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=INTERPRETATIONS&p_id=25072

Ambient Noise Parameters: "...every audiometric test must be performed in rooms meeting the requirement listed in Appendix D so that measured thresholds between tests reflect real hearing change rather than measurement error."

Appendix D:

Regulations (Standards - 29 CFR) Audiometric test rooms - 1910.95 App D

 [Regulations \(Standards - 29 CFR\) - Table of Contents](#)

- **Part Number:** 1910
 - **Part Title:** Occupational Safety and Health Standards
 - **Subpart:** G
 - **Subpart Title:** Occupational Health and Environment Control
 - **Standard Number:** [1910.95 App D](#)
 - **Title:** Audiometric test rooms
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This Appendix is Mandatory

Rooms used for audiometric testing shall not have background sound pressure levels exceeding those in Table D-1 when measured by equipment conforming at least to the Type 2 requirements of American National Standard Specification for Sound Level Meters, S1.4-1971 (R1976), and to the Class II requirements of American National Standard Specification for Octave, Half-Octave, and Third-Octave Band Filter Sets, S1.11-1971 (R1976).

TABLE D-1 - MAXIMUM ALLOWABLE OCTAVE-BAND SOUND PRESSURE LEVELS FOR AUDIOMETRIC TEST ROOMS

Octave-band center frequency (Hz).....	500	1000	2000	4000	8000
Sound pressure level (dB).....	40	40	47	57	62

Recommended Frequency of Ambient Noise Level Measurements:

Note: Notice how there are no specific time intervals for ambient noise measurement!

- **Sound booth** that is not moved once it is stationed: "...typically at the time of the annual and/or exhaustive calibration [annually]. **However, an evaluation should also be done if there are changes in the outside environment that could have changed the internal ambient background levels** [this could be at any time!]." Also, this is outside the OHC's control; building management could place new machinery in service or make modifications to existing equipment or HVAC systems that could affect ambient noise.
- **Mobile Van:** "...**it may be necessary to do ambient testing whenever the van is relocated to a new location at a minimum.**" Note that 'at a minimum' is in addition to the concerns for a sound booth, above.
- **Open room environment and/or "Quiet Room" testing:** "Noise levels can change constantly depending on what is going on in the immediate surrounding area (i.e., outside traffic, air conditioning going on and off, disturbing noise from the clanking of shoes, phones ringing, etc.). **In this situation, background levels may need to be monitored whenever an audiometric test is administered.**

Suggestions for Monitoring of Ambient Noise Levels:

Note: These are recommendations only and are not compared or analyzed.

“Equipment is available that performs ambient noise level monitoring continuously during hearing testing.”

“...newer computerized audiometers frequently incorporate the ambient noise level monitoring into the hearing test itself and will only accept responses to test signals when the ambient noise is within acceptable limits.”

Completion of information taken from the 2/14/05 **OSHA Letter of Interpretation** entitled “**Frequency of evaluating audiometric testing rooms to meet the specifications in Appendix D of the Occupational Noise standard.**”

Interpretation Requirements are Enforcement Guidelines Only

The guidelines above give no definitive answers concerning how often to measure ambient noise levels, nor how to do this best. Yet clearly the onus is on the test-giver—YOU—to make sure that each hearing test response is compliant with OSHA-mandated “ambient noise level” parameters. And yet these are only guidelines; the final approach to take is up to you. Following is a brief review of different ambient noise test-taking approaches so that you might make the best choice for your hearing conservation program.

Monitoring Ambient Noise Does Not Guarantee Compliance!

An **octave band monitor** is designed with a series of red lights that turn on when the ambient noise exceeds an acceptable level. This approach demands that the test operator be consciously aware (at all times) of this bank of lights and when one comes on s/he must manually stop the test and then resume when the ambient noise no longer triggers the light. The risk is that the operator will miss the light, or will fail to intervene for short periods of high ambient noise. A **sound level monitor** goes one step further and automatically stops the test when the ambient noise is excessive. However, the test operator must again manually resume testing. Neither the **octave band monitor nor the sound level monitor** is designed to automatically stop and restart the hearing test based on OSHA-mandated ambient noise levels. Additionally, both sound level and octave band monitors do not meet ANSI sound level meter standards! Since Appendix D requires that the metering instruments comply with ANSI sound level meter standards as well as octave-band filter standards, this is a serious shortcoming in regulatory compliance.

Automatic, Ongoing Compliance Documentation

As the OSHA Interpretation Letter noted, “there are newer computerized audiometers that can incorporate the ambient noise level monitoring into the hearing test itself and will only accept responses to test signals when the ambient noise is within acceptable limits.”

The question then becomes: How do these systems work?...

A Bio-Acoustic Simulator/Sound Level Meter (described below) will continuously monitor the test booth or “quiet room,” only accepting user responses to test signals when the ambient noise is in the acceptable range. Each test record can then show the ambient noise for each octave band at test time and document that the test was performed within acceptable noise levels. This makes it possible to produce automatic, ongoing documentation of OSHA-mandated ambient noise compliance and ANSI compliance as well.

This is how an integrated system works...

There is a built-in screen that displays, in real time, ambient noise levels that automatically turn red when they are too high. If the ambient noise is not in compliance, the audiometer automatically adapts, re-presenting test tones until the noise returns to an acceptable level. This seamless integration works only with select computerized audiometers because there has to be an already existing functionality that allows for:

1. an interactive database storing values and allowing these to be readily accessed
2. a testing process that can be completely organized around established criteria (e.g., stopping the test if the ambient noise exceeds a given level)
3. the ability to do real-time, ongoing monitoring of data (e.g., ambient noise levels, the actual hearing test)

Computerized Integration with Simulator/Sound Level Meter

A Bio-Acoustic Simulator/Sound Level Meter is a dual-function instrument that creates a legal record of the daily calibration check along with automatically monitoring and documenting ambient noise throughout each test by:

- Meeting ANSI standards for both sound level meters and octave band filters
- Documenting compliance with OSHA ambient noise regulation 29 CFR 1910.95
- Demonstrating in each report that ambient noise levels were within range
- Storing ambient noise levels with audiogram data
- Supporting OSHA, ANSI, or user-defined maximum permissible ambient noise levels

Fulfilling OSHA Compliance Parameters

In conclusion, a strong **Hearing Conservation Testing System** includes the ability to automatically document compliance with OSHA-mandated ambient noise parameters. A fully integrated (computerized) audiometric testing system will allow you to do just that—automatically, regardless of whether or not you have access to a sound booth or just a “quiet room.” The key to ongoing OSHA compliance is creating a hearing test report each time that legally documents ambient noise compliance. You can only prove that which you can actually point to. These reports also make it possible to truly assess a shift in hearing so that you can make the changes you might need to make (on the factory floor) in order to guarantee that your employees’ hearing is actually being adequately safeguarded.

Flash Presentation for Automatic OSHA Compliance—link below

<http://www.bensonmedical.com/downloads/slm.swf>

For further information, please contact:



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