Mobile hearing testing – the challenge to stay SABS compliant: Part 1 of a 3-part series

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How to ensure the noise levels of testing environments are according to SABS standards.

INTRODUCTION
When conducting hearing tests in a multitude of environments, e.g. factories and mines, it can, at times, be very challenging to confirm that the room or booth where the hearing tests will be conducted, is a quiet enough environment, according to SABS requirements. This article provides guidelines for this, as well as an approach to mobile hearing.

OCCUPATIONAL HEALTH AND SAFETY ACT
The Noise-Induced Hearing Loss Regulation of the Occupational Health and Safety Act requires hearing tests to be done in accordance with SANS 10083, and states that compensation be calculated in terms of Instruction 171. SANS 10083 makes reference to many important compliance criteria for the measurement and assessment of occupational noise for hearing conservation purposes, but only a few relate to mobile hearing tests.

There is confusion as to whether a hearing test can be done outside a booth. SANS 10083 stipulates that a hearing test can be conducted inside a booth, a room or a mobile unit.

STANDARDS FOR MEASURING AND ASSESSING ACOUSTIC ENVIRONMENTS FOR AUDIOMETRIC TESTS
SANS 10182 is the reference standard in terms of measurement and assessment of acoustic environments for audiometric tests. It is critical to have a clear understanding of this standard or you may adopt incorrect practices that could cost you that sought-after contract.

The SANS 10182 Standard requires that the environment for testing be quiet enough, but the Standard does not stop here. It also mentions two other important points to consider to ensure that the environment is quiet enough:

a. Each headset has different sound-blocking capabilities
b. The minimum threshold for testing as specified in Instruction 171. Instruction 171 is used to calculate the Percentage Loss of Hearing (PLH). The minimum PLH is 1.1, and can be calculated from the tables and formulae stipulated in Instruction 171. Whether you test to a minimum of -10 dBHL or 0 dBHL or 15 dBHL, the PLH calculation will remain the same. To test each patient to a minimum of say, 0 dBHL takes a lot of extra time, often for no real gain.

SANS 10182 lists the Maximum Permissible Ambient Sound Pressure Levels (MPASPL) for a supra-aural headset, if testing is conducted to a minimum of 0 dBHL (see column 2 in Table 1).

Column 3 indicates MPASPL for supra-aural headsets. If the minimum level for testing is 15 dBHL as Instruction 171 stipulates, the environment can be a lot noisier if compared to testing to 0 dBHL. Unfortunately, the ambient noise in a standard office is around 45 dBSPL and this is too noisy for compliance testing, using the supra-aural headset. In this instance, a sound booth is required.

SANS 10182 does not have MPASPL values for other headsets, but it specifies a method to manufacturers of headsets on how to determine the MPASPL for headsets.

The KUDUwave audiometer for instance, blocks ambient noise far better than a typical supra-aural headset. Column 4 lists the MPASPL of the KUDUwave. The lowest MPASPL is 55.3 dBSPL, 10 dB above the 45 dBSPL office noise level, allowing for testing inside an office, room or outside a booth. By selecting to test to a minimum of 15 dBHL, it is possible to test in an even noisier area, e.g. where people are speaking.

HOW MPASPLS ARE RECORDED
The MPASPLs are determined by measuring the sound levels annually with a type 1 sound level meter. An important point is that the MPASPL is done during the noisiest time of the day and not at 07:00 before all the machinery at a factory is started. If each octave frequency sound level is softer than the MPASPLs as tabulated, then a certificate can be issued for the room. Critical to note is that this is not a calibration certificate as it is impossible to calibrate a booth, a room or a mobile unit. It is a noise survey certificate to verify that the noise levels of the room are quiet enough for testing, depending on the headset that will be used and to which minimum threshold the testing will be conducted.

If an SPL meter is not available, a psychoacoustic verification test can be done. The audiometer tests the hearing of two normal hearing people to establish if they both have a PLH of 1.1. If 40% of the employees at a factory tested have PLHs of 1.1, then there is more than enough proof that the environmental noise is at an acceptable level for hearing tests to be performed. The problem with the electroacoustic MPASPL room certification is that it does not take into account new noisy machinery that could have been installed since the last MPASPL survey, deeming the test results inaccurate.

The hurdles to jump over as an audiometrist to ensure that tests comply to the SANS 10083, SANS 10182 and Instruction 171 are many, which will be covered in further articles.

In the next issue we will suggest ways to ensure that your equipment is always calibrated in the mobile environment.

1 http://www.emoyo.net/en/support-and-servicing/
2 http://www.emoyo.net/Downloads/EvaluationOfKUDUwaveComplianceWithStandardsForHearingConservationsPurposes.pdf

Table 1. MPASPLs for two well-known headsets used for hearing conservation testing

<table>
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<th>Frequency</th>
<th>MPASPL (dBSPL) for</th>
<th>MPASPL (dBSPL) for</th>
<th>MPASPL (dBSPL) for</th>
<th>MPASPL (dBSPL) for</th>
<th>MPASPL (dBSPL) for</th>
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</thead>
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<td>screening audiometry for a supra-aural headset to test to a minimum of 15 dBHL</td>
<td>KUDUwave headset to test to a minimum of 0 dBHL</td>
<td>KUDUwave headset to test to a minimum of 15 dBHL</td>
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<td>Hz</td>
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<td>250</td>
<td>500</td>
<td>1000</td>
<td>2000</td>
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