BEST PRACTICE BULLETIN:
Hearing Protection-Emerging Trends: Individual Fit Testing

Much has been learned on the efficacy of hearing protection for individual users since the Occupational Safety and Health Administration (OSHA) Hearing Conservation Standard (29 CFR 1910.95) was issued in 1983. The Standard requires employers to select one of the methods listed in Appendix B: to evaluate the adequacy of hearing protector attenuation (29 CFR 1910.95 (j)(1)). One of the methods for evaluating hearing protector attenuation is the Noise Reduction Rating (NRR) developed by the U.S. Environmental Protection Agency (EPA). The NRR is a single number intended to represent the amount of attenuation a given hearing protector will provide. The EPA requires the NRR to be listed as a label on the package of each hearing protector (40 CFR 211 Subpart B). The NRR is a laboratory based method for calculating the amount of attenuation provided by hearing protection.

While labeling hearing protectors provides one indicator of hearing protector performance, these methods rely on optimum fitting under laboratory conditions and group statistics to predict an individual wearers hearing protector performance in the field. The consequence of this approach is that an individual user may actually receive more but usually less attenuation than is stated on the hearing protector label. Since hearing protector performance is critical to the overall success of a hearing conservation program there has been an emergence of commercially available systems that offer the capability of individually fit testing hearing protectors to assess how much attenuation an individual user will receive.

Although the development of individual fit testing for hearing protection is a new trend, the concept of fit-testing of personal protective equipment is not, such as that for respirators. Likewise, the goal is to provide an individual user with feedback on whether he/she is properly wearing a given hearing protector and that it offers sufficient protection for the condition in which it is to be used. Once the appropriate attenuation is determined, fit testing enables the user to focus on how to fit earplugs to attain protection.

Research studies have suggested that when individuals are involved in the fitting process and receive positive feedback on the proper fit of their earplug, they will be more likely to have a positive attitude about protecting their hearing and will be more apt to use hearing protection correctly and consistently in the workplace. This positive outcome should result in reducing noise-induced hearing loss in the workplace.

To date field fit-test methods for use with hearing protectors include subjective real-ear attenuation at threshold (REAT) measurements, objective field microphone-in-real-ear (F-MIRE) measures, and loudness balance technologies to obtain a personal attenuation rating. The subjective procedures such as REAT and loudness balance involve employee response to sound stimuli, whereas the objective approaches such as F-MIRE involve a dual-microphone measurement of a test signal. Appendix B does not explore or discuss the various methods of testing hearing protector attenuation in the field, nor the advantages or disadvantages of each technique. Likewise, OSHA does not endorse any products, manufacturers or companies that offer fit testing.

No matter which test method is used, individual fit testing has the potential to serve several positive purposes in hearing conservation programs:

1. Can be a valuable training tool. OSHA's Hearing Conservation standard requires employers to train employees in the use and care of hearing protectors (29 CFR 1910.95(i)(4)), and requires employers to ensure proper initial fitting and supervise the correct use (29 CFR 1910.95 (i)(5)).

2. Can be used as a train-the-trainer tool to teach others how to train employees.

3. Can assist with the OSHA required audiometric testing follow-up procedures.
    a. Audiometric test follow-up procedures require that when the evaluation of an audiogram indicates an STS, employees already wearing hearing protectors must be refitted and retrained in their use and provided with hearing protectors offering greater attenuation if necessary (29 CFR 1910.95 (g)(8)(ii)(B)) and
    b. Individual fit testing protocols will validate the amount of attenuation afforded by the individual user's hearing protector and will enable the employer to better fulfill this requirement to provide a hearing protector with greater attenuation if necessary.

4. Can provide useful documentation regarding hearing protector adequacy and training. The software provides a written record of the attenuation achieved for the given hearing protector.

5. Can be used as a tool to assess the overall effectiveness of an employer's hearing conservation program.

6. Can enable the hearing conservationist to match the employee's hearing protector attenuation to his/her noise exposure level. This may be particularly useful in hearing-critical jobs or for those with hearing impairment.

7. Can aid in the selection of appropriate hearing protection for new hires. A variety of protectors can be tested, and the appropriate model can be selected for best protection.

It is important to reemphasize that regardless of how a hearing protector's performance is derived, the most important factor is to find the most comfortable hearing protector that an employee will wear correctly 100% of the time that he/she is in noise. Other factors to evaluate are the employee's communication needs, hearing ability, convenience, compatibility with other personal protective equipment and the environment in which they will be worn. *Again*, *the best hearing protector is the one that is worn properly whenever exposed to hazardous noise.*

Raising awareness to workplace issues and trends relating to hearing protector performance will have a positive impact on preventing noise-induced hearing loss in the workplace. For additional information on emerging technologies associated with hearing protector rating methods and variables associated with hearing protector performance, contact the National Institute for Occupational Safety and Health (NIOSH) at 1-800-CDC-INFO. Although NIOSH advocates the concept of individual field testing, it does not recommend any specific method.

Additional resources for information about fit-testing:

1. Berger, E.H (2007). “Fit testing hearing protectors,“ CAOHC Update 19(2), 5-8.
2. Hager, L. D. (2007). “Hearing Protector Evaluation: Current Standards and Pending Developments,” Hearing Rev. 14(3), 26-28.
3. Hager, L. D. (2006). “Fit Testing Ear Plugs,” Occupational Health and Safety 75(6), pages 38-42 and 135.
4. Berger, E.H. (1989). ”Exploring Procedures for Field Testing the Fit of Earplugs,” *Proceedings, 1989, Industrial Hearing Conservation Conference,* University of Kentucky, Lexington, KY, 7-10.
5. Witt, B. (2007). "Putting the Personal Back into PPE: Hearing Protector Effectiveness." Occupational Health and Safety 76(6), 90-94
6. Witt, B (2007). "Fit Testing of Hearing Protectors." Occupational Health and Safety 76(10), 118-122.

Through OSHA’s Alliance Program, this Best Practice Bulletin was developed as a product of the OSHA, NIOSH and NHCA Alliance for informational purposes only. It does not necessarily reflect the official views of OSHA or the U.S. Department of Labor. (May, 2008). *NOTE: NIOSH document approval pending 2008.07.01, an updated document will be provided when available.