



What You Need To Hear

Proposed Changes to the EPA
Noise Reduction Rating

HOWARD
LEIGHT 

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Since 1974, the United States Environmental Protection Agency (EPA) has used the Noise Reduction Rating (NRR) as its yardstick to measure hearing protector effectiveness in reducing noise levels. But since it is based upon idealized laboratory testing, the NRR has been criticized for being too generous in its prediction of noise reduction (attenuation). Studies indicate that while many workers in real-world worksites achieve the NRR on the package, many workers do not. This has led to a variety of inappropriate de-rating methods for hearing protectors, and confusion in knowing how to accurately estimate a hearing protector's attenuation.

What changes are being considered?

EPA has received funding and approval to update the NRR in 2007. After studying the issues for several years, the EPA has expressed interest in an updated NRR with the following features:

- A new method of testing hearing protectors, possibly adopting a new ANSI standard in place of the experimenter-fit method of the previous ANSI standard.
- The new rating should require no de-rating for field use.
- Possibly a two-number range (perhaps called "Noise Reduction Range") that expresses the 20th and 80th percentile of attenuation among users.
- A rating that is designed to be subtracted from A-weighted noise levels, not C-weighted as the current NRR requires.
- The new rating should be able to accommodate non-standard hearing protectors, such as active noise reduction or level-dependent protectors, indicated by special icons on the label.
- Periodic retesting of hearing protectors by manufacturers.

How does changing the test method affect the rating?

The current EPA regulation uses idealized laboratory testing to generate the NRR. The proposals under consideration test the hearing protectors under conditions that are less-than-ideal, but more reflective of real-world usage. Although EPA is under no obligation to use an existing ANSI test standard (there is precedent for EPA to devise its own test method if it so desires), several existing test standards are receiving serious attention: ANSI S12.6 Method A and Method B, and ISO 4869-1 (perhaps with some modification). All of these methods require the test subjects to fit the hearing protector themselves (as opposed to the experimenter fitting the protector under the current standard). In Method A and ISO 4869-1, subjects are given brief training in the proper fit of the Hearing Protection Device (HPD); but once in the test room, they must fit the HPD with no physical assistance from the experimenter. In Method B, naïve subjects are used (subjects with no history of using hearing protectors), and must fit the HPD with no assistance of any kind from the experimenter, relying solely on instructions provided on the packaging.

In addition to adopting a new test standard for passive hearing protectors, the EPA is also considering new methods of testing non-standard hearing protectors, such as active noise reduction or level-dependent protectors. Under the current labeling requirements, these specialized protectors are rated with a low NRR simply because they are not tested in the higher noise ranges where their noise reduction circuitry is activated. EPA would like the new NRR label to accurately include these level-dependent protectors so that purchasers can make informed choices.

What is the difference between Method A and B, compared to the current method?

The following table compares the current test method with the proposed Method A and Method B. Earplugs are used as the example protector in this table, but comparable changes in the standard apply to earmuffs.

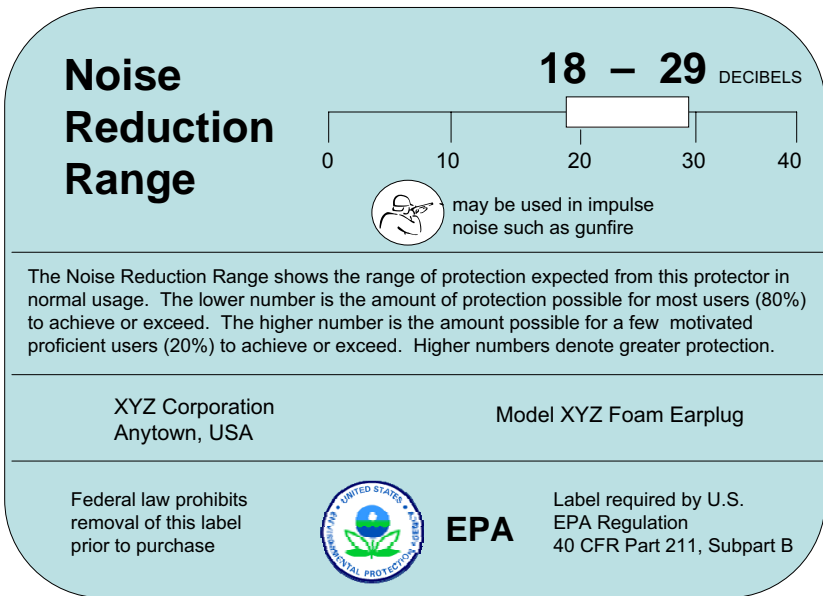
Comparison of Attenuation Test Protocol

	Current <i>Experimenter Fit</i> ANSI S3.19-1974	Method A <i>Supervised Subject Fit</i> ANSI S12.6-1997 "A"	Method B <i>Naïve Subject Fit</i> ANSI S12.6-1997 "B"
Subjects	<ul style="list-style-type: none"> Ten trained subjects are tested with each HPD. Subjects may be experienced HPD users. 	<ul style="list-style-type: none"> Twenty subjects are tested with each HPD. Subjects may be experienced HPD users. 	<ul style="list-style-type: none"> Twenty naïve subjects used. They are not allowed to have any previous training with earplugs, nor any experience using earplugs for any reason (including sleeping and swimming) more than 10 days in the past two years.
Fitting Method	<ul style="list-style-type: none"> The experimenter fits the earplug on the subject, but may not make any adjustments after the test has started. 	<ul style="list-style-type: none"> Subjects receive brief training in using earplugs, but then don the protector for testing without assistance. The experimenter may warn the subject verbally if the fit appears bad. Fitting noise may be used to check for a good fit. 	<ul style="list-style-type: none"> Subject is handed the hearing protector, along with instructions on the package, and has five minutes to insert the protector with no assistance or training of any kind. Fit of protector may not be checked visually or acoustically.
Pros	<ul style="list-style-type: none"> Good history (HPDs have been rated this way since 1974). It is controlled and relatively repeatable. 	<ul style="list-style-type: none"> Method A approximates the attenuation of trained users, such as those found in good OSHA-standard hearing conservation programs. Variation between subjects is lower than Method B. Similar supervised fit method is used in Europe. 	<ul style="list-style-type: none"> Method B approximates the average attenuation achieved by groups of untrained end-users. Variation between labs is lower than Method A.
Cons	<ul style="list-style-type: none"> Disconnected from real world. Experimenter fits. Protector regardless of user comfort or communication needs. Not internationally recognized. 	<ul style="list-style-type: none"> Method A yields attenuation results that may be idealized, since supervision of fit may or may not occur to this level in the real world. Method A skews attenuation values toward trained users, thus <i>underprotecting</i> the workers who do not fit the HPD properly. 	<ul style="list-style-type: none"> Method B uses an artificial and contrived pool of naïve subjects with no allowed training. Subjects are allowed to fit themselves with poorly-sized earplugs, a condition which would be avoided in OSHA-standard programs. Method B measures variables that go far beyond the making of a good earplug, like employee training and literacy. Method B skews attenuation values toward inexperienced users – thus driving employers to <i>overprotect</i> the workers who fit the HPD properly.

How would a two-number range be calculated?

A two-number range on the label diverts attention away from the minor differences between protectors with a difference of just one or two decibels in their rating numbers, and focuses attention on obtaining a proper fit: employees who do not achieve a proper fit will obtain attenuation nearer the low end of the range, while those employees who do achieve a proper fit will be nearer the high end of the range. The range can be calculated statistically, regardless of which test method (Method A or B, or their equivalents) is used to generate the attenuation data in the lab.

Although the EPA has not yet proposed a new NRR label for all hearing protectors (including active noise reduction and level-dependent devices), the revised label may look similar to the sample below:



What is the next step?

The EPA expects to publish in the Federal Register a proposed rule by mid-year in 2007, followed by a public comment period, hearings and internal review. EPA welcomes the input of hearing conservation professionals on this topic, and all are encouraged to contribute to the public comment process once a proposed rule is published. By the end of 2007, EPA hopes to have a final noise reduction regulation in place, with an effective date perhaps a few years following to allow manufacturers to retest their products and print new packaging.

How will the new EPA label affect OSHA compliance?

Although EPA and OSHA operate independently of each other, OSHA would presumably respond to a revised NRR label by issuing a field directive or technical memorandum, informing its compliance officers how to deal with the new NRR. If a two-number range is chosen for the NRR, OSHA will need to decide how employers should apply that range in determining adequate protection. For example, OSHA may advise employers to use the lower rating number, unless the employer can provide evidence that workers are achieving the higher attenuation in the range (by means of documented fitting checks or field verification of attenuation).

What can I do to prepare my noise-exposed workers?

As always, education of the end-user is vital. EPA recognizes that end-user training and motivation are critical in protecting from hazardous noise, both on the job and off the job. Noise-exposed workers need to understand that the published NRR is achieved only when a hearing protector is properly fit and maintained.

For more information, please visit:

U.S. Environmental Protection Agency • www.epa.gov

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