

# 3M Hearing Protection Update

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*News and information about noise exposure and hearing protection*

## How Much Noise Reduction Is Enough?

### Comfort Most Important

For nearly all noise exposures, the comfort of the hearing protector is a far more important factor than the NRR in predicting how much protection a device will provide. This is because HPD comfort has a greater influence on how long the device will be worn and whether it is worn properly.<sup>(3)</sup> Ultimately, those two factors, wear time and proper fit, play a much greater role in determining the protection provided.<sup>(4)</sup>

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The answer depends on how loud the noise is and how long the person is exposed to the noise. Generally, more noise reduction is needed at high sound levels and for long exposure times. More protection is also required for workers who have a work-related hearing loss known as a Standard Threshold Shift (STS).

Hearing protector ratings, such as the Noise Reduction Rating (NRR), were developed to help inform the buyer about the capability of the hearing protection device (HPD) to reduce noise exposure when worn correctly. The NRR of HPDs on the market today varies widely; from as little as 10 decibels (dB) to as much as 33 dB. How much is enough?

The most convenient and commonly used method to evaluate the noise reduction (attenuation) of hearing protectors is to subtract the NRR of the device from the measured noise exposure level of the wearer. This method provides a rough estimate of the wearer's noise exposure under the HPD, when it is worn correctly.

According to the OSHA Noise Regulation, 29 CFR 1910.95, hearing protectors used in the workplace must provide enough attenuation to reduce the 8-hour Time Weighted Average (TWA) noise exposure of the employee to 90 dB or less.<sup>(1)</sup> Several methods

for evaluating whether or not a hearing protector provides enough noise reduction are described in Appendix B of 1910.95.

### 7 dB Correction Factor

To estimate the TWA exposure under the hearing protector, an employer may subtract the NRR from the employee's C-weighted workplace TWA. However, when the NRR is used with A-weighted noise values, as is most often the case, OSHA requires the employer to reduce the NRR by 7 dB *before* subtracting the NRR from the workplace TWA. This 7 dB correction factor is necessary to account for the possibility that A-weighted noise measurements may underestimate low frequency noise levels in the work place. Employers who have conducted more comprehensive, octave-band noise exposure assessments, may choose to use one of several other methods described in Appendix B of 1910.95, to calculate the attenuation of a hearing protector across a range of sound frequencies. To learn more, visit the OSHA web site at: [www.osha.gov/SLTC/noisehearingconservation/index.html](http://www.osha.gov/SLTC/noisehearingconservation/index.html)



## 90% of Workers Don't Need High NRR Hearing Protectors

OSHA has estimated that approximately 90% of workers in the United States have average daily noise exposures of 95 dB or less.<sup>(2)</sup> This suggests that 9 out of 10 workers need only about 10 dB of protection to bring their noise exposures down to 85 dB or below. Virtually any model or brand of hearing protector, if worn properly, is capable of providing 10 dB of protection, *regardless of the NRR.*

### Overprotection

Wearing hearing protectors with an NRR of 33 dB for noise exposures between 85 and 95 dB is like wearing shade 12 welding goggles at the beach. They will block a lot of sunlight but they may

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actually provide less protection than a lighter shade. Why? Because the wearer is more likely to take them off in order to see more easily. Likewise, workers who are asked to wear high NRR hearing protectors in low noise or moderately noisy situations may be tempted to take the devices off part of the time or wear them improperly in order to communicate more easily. When that happens, the effective protection drops quickly. At the end of

the day, the hearing protector that is worn more of the time you are exposed to loud noise is the one that provides the most protection.



## Noise Exposure Limits

In the United States, employers are required by OSHA to limit the 8-hour TWA daily noise exposure of most employees to 90 dBA or less. For workers who have already experienced a work-related STS, the OSHA 8-hour TWA noise exposure limit is 85 dBA. OSHA Table G-16 provides the noise exposure limits for various exposure times from 15 minutes up to 8 hours. The American Conference of Governmental Industrial Hygienists (ACGIH) has established 85 dBA as the 8-hour Threshold Limit Value (TLV) for noise.

Hours per Day	Sound Level
8	90 dBA
6	92 dBA
4	95 dBA
3	97 dBA
2	100 dBA
1 1/2	102 dBA
1	105 dBA
1/2	110 dBA
1/4 or less	115 dBA

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### References

1. "Occupational Noise Exposure," Occ. Safety and Health Admin., Code of Federal Reg., Title 29, part 1910.95, 2003
2. "Occupational Noise Exposure; Hearing Conservation Amendment," Occ. Safety and Health Admin., Federal Register., Vol. 46, No. 11, p. 4109, January 16, 1981.
3. Arezes, P. M. and Miguel, A. S. (2002). "Hearing Protectors Acceptability in Noisy Environments," *Ann. Occup. Hyg.* 46(6), 531-536.
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