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Keeping noise at bay

Question: What type of hearing protection blocks out the most noise?

Responding to this month's question is Elliott H. Berger, senior scientist for Auditory Research, E-A-R/Aearo Co., Indianapolis.

Answer: One of the most important factors is how the worker uses the hearing protection device, rather than which device you buy. The ability of a hearing protection device to block noise depends largely upon the noise-blocking seal the user achieves when he or she dons the device. That seal, in turn, is influenced by fit and comfort, as well as the ability to manipulate the device in the ear canal, or position it on the head.

One answer to the question, therefore, is that the device that blocks the most noise is the one the individual can and does wear properly and consistently at all times when exposed to noise. Wearers should try different types of devices to find what works best for them.

Another part of the answer pertains to the noise-attenuating characteristics of the device itself. In that regard, foam earplugs and the larger-volume earmuffs block the most sound. Well-designed and fitted foam earplugs offer the higher attenuation in the lower frequencies — 250 Hz and below — and the very highest frequencies — 6000 Hz and above — whereas large earmuffs are usually a bit more protective — around 1000 Hz. At other frequencies foam earplugs and large earmuffs perform similarly. Many times users will think of custom earmolds as a high-attenuation option, but beyond the good comfort they often provide, the levels of protection they offer are no higher than — and often not as much as — well-fitted foam earplugs.

One of the most important concepts discussed is the importance of pulling the pinna outward and upward while inserting earplugs, as shown in the figure. The pinna

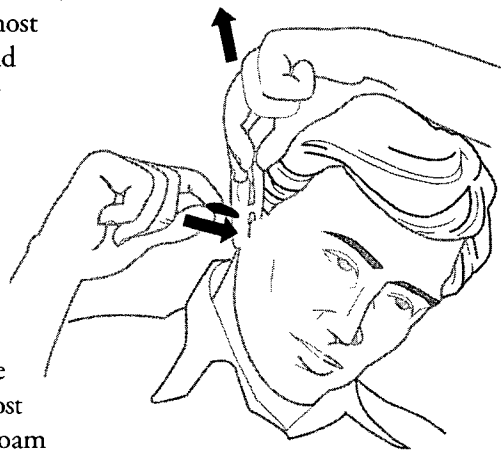
is the fleshy part of your ear on the side of your head. This straightens and enlarges the ear canal, and is critical as all users learn to wear protection. Depending upon the skills the wearer develops and the shape of the ear canals, a pinna-pull may or may not be required later. The key with all earplugs is to seat the device well into the ear canal rather than just capping the entrance. This is especially important for high attenuation in the low frequencies.

An essential concept in fitting earmuffs is that the cups must completely enclose the ears and seal against the side of the head to exert equal pressure around the ears. Caps, head-worn safety gear such as glasses or respirators, or excess hair can interfere with the seal and diminish attenuation.

When the absolute maximum attenuation is necessary, wearers can use both an earplug and earmuff. The combined attenuation is difficult to predict, but some manufactures provide data for their products tested in concert.

When worn together earmuff selection is of little importance; however, the total low-frequency attenuation of the combination will be influenced substantially by the choice of earplug and its quality of fit. At and above 2000 Hz, all dual-protection combinations provide attenuation essentially equal to the limitations imposed by the bone-conduction pathways of the human skull, approximately 40-50 dB, depending upon frequency.

Whatever your choice in hearing protection, remember: Wear hearing protection at all times in hazardous noise situations. Hearing loss due to noise exposure is a cumulative process. Even small amounts of exposure can degrade substantially the protection you receive. **S+H**



Editor's Note

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