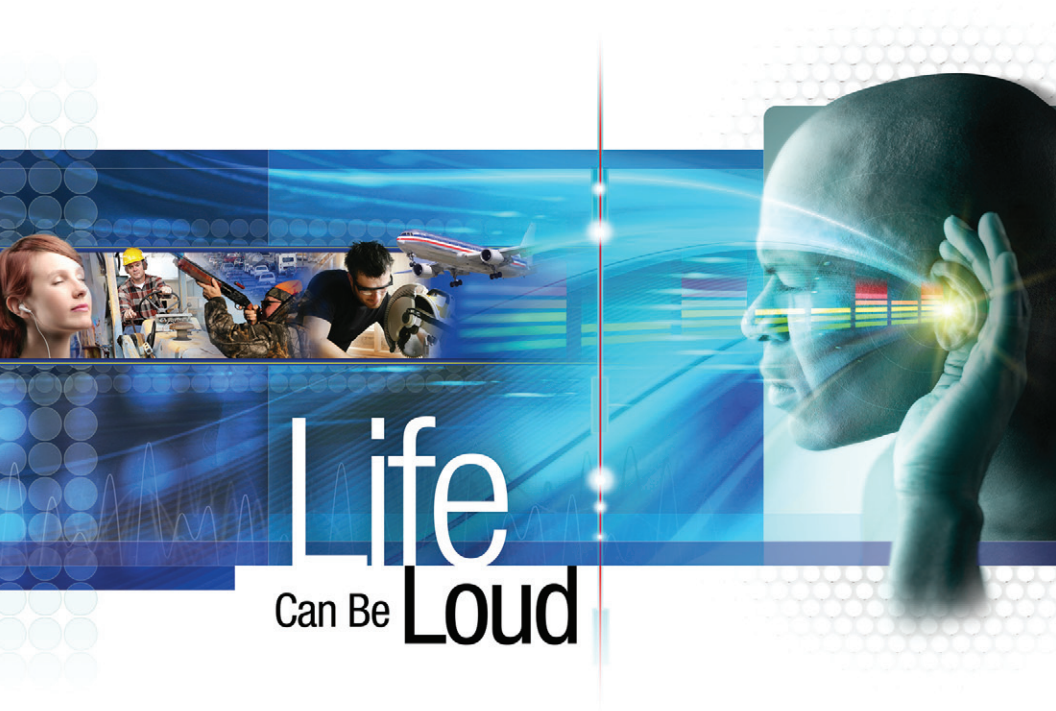


know your hearing protection

E·A·R PELTOR 3M

The Sound Around Us

Noise is everywhere. It is the most pervasive environmental pollutant on the planet. Virtually everything we do makes noise, and the more we do it, the faster we do it, and the more of us there are - the more noise is made. In fact, silence, by which we mean complete absolute quiet, is so rare that few of us have had the joy, or perhaps even the possibility to experience it. If we have, it is so unusual that we can likely cite the time and place of its last occurrence. The opportunities to savor such tranquility are rapidly vanishing.

Not only is noise present in our daily routines and recreational activities, but upwards of 5 million Americans, possibly as many as 30 million, work in hazardous noise on a daily basis. Estimates from the National Institutes of Health suggest that **hearing loss afflicts 28 million Americans**. About 1/3 of those cases are at least partially attributable to noise. Later in this booklet we'll tell you how the ear works and how noise can affect it, so you will understand why you should protect your ears from too much sound today in order for your hearing to serve you tomorrow.

In a world as noisy as ours we frequently tune out. Moreover, our culture is so visually dominant that often sight overwhelms the other senses such as audition (the hearing of sounds), which is habitually relegated to second-class status. The purpose of this pamphlet is to address these issues – to increase your appreciation and awareness of the sounds around you and to provide some tools to help you protect yourselves from loud, annoying and/or hazardous sound.

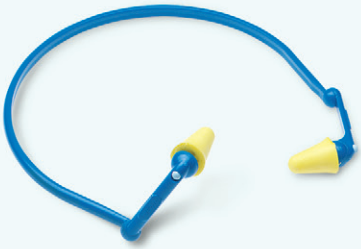
Hearing Protection

Hearing loss due to noise is almost entirely preventable by judicious use of hearing protection. To find what is best for you, try different devices from the wide variety available today. Be sure to carefully read the instructions because hearing protectors must **fit properly and be worn correctly** to do the job. Hearing protector effectiveness is specified by a Noise Reduction Rating (NRR), typically ranging from 15-35 decibels. In practice the protection that normally can be achieved is about 10-20 decibels. The more carefully you fit and wear hearing protectors, the higher your protection will be. Hearing protectors may feel uncomfortable at first, but give yourself a chance to get used to them, just as you do with a new pair of shoes or glasses.

PROTECTOR TYPE	DESCRIPTION
Foam Plugs 	Foam plugs, made from expandable slow-recovery foam, **provide the best combination of comfort and protection** for most users. They must be properly prepared for insertion. One size fits most. Once in the ear, foam plugs expand to provide a snug and secure custom fit. The two most common complaints about foam plugs ("not enough protection," and "they don't stay in") are almost always solved by greater practice and care in insertion.
Premolded Plugs 	Premolded plugs are made from flexible materials that are preformed to fit the ear. They are generally available with a joining cord to prevent loss. Although the version pictured at the left is a one-sized product, many premolded plugs are sold in two or more sizes and must be **individually sized for each ear**. If after a period of regular wear you've been unable to get used to your earplugs, try another size, type, or brand of hearing protector.

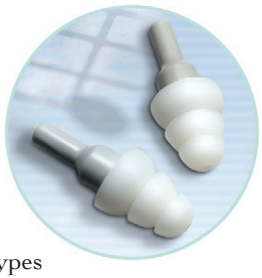
Hearing Protection

Initially you may be concerned that you'll be unable to hear while wearing protection. However, unless you already have a significant hearing loss you'll be surprised how well you can hear speech and many other sounds while protected in the noise. When you properly wear hearing protectors you'll be protected from temporary hearing shifts so that you are able to hear as well after a noise exposure as when it started. People with hearing loss also benefit, since without protection noise will continue to damage their hearing until it is difficult to distinguish sounds under even the best of conditions.

PROTECTOR TYPE	DESCRIPTION
Semi-Insert Device *Canal Caps* *Banded Hearing Protectors* 	Semi-inserts, also called canal caps, consist of pods or flexible tips on a lightweight headband. Because they are quick to put on and take off and easy to store around the neck, they are **ideal for intermittent use**. Those that just cap the canal entrance give rise to a larger occlusion effect (see above) which can be annoying to some wearers.
Earmuffs 	Earmuffs have rigid cups with soft plastic cushions that seal around the ears to block noise. Muffs come in one-position or multi-position bands, and are also sold in styles for attachment to hard hats. Cushions may be filled with foam, liquid, or a combination; let personal preference be your guide. For sustained exposures to very loud noises, or if you feel the need for more protection, wear muffs and plugs together **(dual protection)** for an additional 5-10 dB of noise reduction.

Specialized Hearing Protectors

Musician's Earplugs



Certain earplugs are designed for moderate noise reduction and better sound quality (more uniform attenuation across the range of frequencies). For many sound exposures such as live music, public events, and transportation, these devices provide the needed protection, while making listening easier and more enjoyable. The effect with these earplugs can be compared to wearing medium neutral-gray sunglasses instead of very dark color-tinted lenses that dramatically change one's perception. The Professional Musician E•A•R® Plug is one such product. Special types of custom earmolds also provide this feature.

Custom Molded Earplugs

Earplugs can be made by taking a custom impression of the earcanal using a material with the consistency of thick honey. These can be very comfortable and are suitable for use for hearing aids and some specialized earplugs. However, for the simple purpose of providing noise reduction, they offer little that other types of earplugs cannot provide at a lower cost. Although they are "customized," their acoustic seal can be compromised because they require a precise impression and must fit exactly. For maximum protection, and equivalent and sometimes better comfort, a foam earplug is usually preferred.

Electronic Earmuffs

Some earmuffs use a microphone embedded in the earcup to pickup sounds and transmit them through the earmuff to an earphone inside. This allows better hearing at low sound levels without the need to remove the device, while still providing sufficient protection at higher sound levels. Typically the electronics in the muff limit the amplified sound to a predetermined safe value such as less than 85 dBA. These muffs can be excellent for use while hunting or on the firing line, and for those with a mild hearing loss they can actually amplify sounds, thus making it easier to hear.

Active Noise Reduction (ANR)

Today it is possible to use sound to cancel sound. A microphone within the earmuff detects the sound passing through the cup walls and sends that signal through circuitry to generate an anti-phase version that is rebroadcast through a speaker in the cup. The result is sound cancellation, but due to physical limitations this process only works well in the lower frequencies, middle C and lower. This is effective in certain military situations, and in general aviation, especially when the devices also include communications. The principal consumer application is reduction of nuisance noise such as experienced while traveling. An ANR earmuff, which also plugs into an earphone jack on entertainment devices, can provide balanced noise reduction while simultaneously permitting listening to music or movies.

Do Yourself a Favor - Save Your Hearing!

Person-to-Person Communication

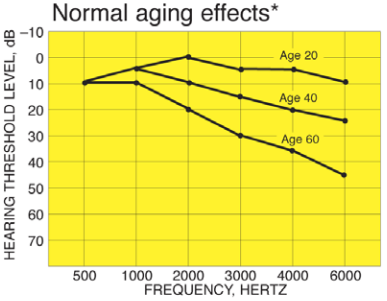
Inarguably, the most important function of our hearing is communication. A person with hearing loss may not hear or understand family members and friends, particularly women and children with high-pitched voices. Communication over the telephone for business or pleasure becomes more difficult. The individual will confuse similar-sounding words and mistake the message. Embarrassed to ask the speaker to repeat, the listener may just "tune out." Conversing in groups is most difficult, especially if there is background noise. People with hearing loss often become socially isolated as others find it too much trouble to speak to them. What's more, hearing aids can't completely correct the problem because louder sounds are not necessarily clearer to the damaged ear.

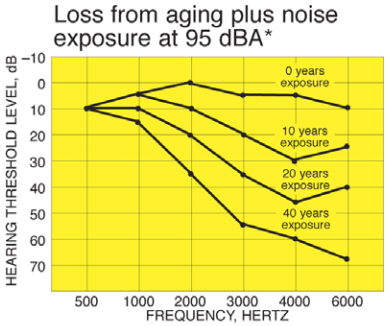
Often the message is as much in the sound of the voice as in the content of the speech. Poet Maya Angelou has observed, "Words mean more than what is set down on paper. It takes the human voice to infuse them with shades of deeper meaning."

Effects of Age and Noise on Hearing

Hearing loss from the natural aging process causes a gradual hearing decline, as shown in the figure to the right. It affects mainly the ability to clearly hear high-pitched sounds such as children's voices, rustling leaves, and some musical instruments.

Although age-effect hearing loss up through age 60 does not usually impair one's ability to hear and understand speech, problems occur when noise-induced loss is added to age loss. The noise-induced component can come from occupational exposures as well as the many loud recreational sounds we willingly expose our ears to on a daily basis. With noise damage, even a 30-year-old can have trouble listening in situations in which background sound is present, such as in restaurants and other social situations.





*The trends are less severe for females.

Noise Is All Around

Be aware of noisy situations such as the ones illustrated to the right, so you can protect yourself and enjoy a lifetime of good hearing.

Where to Buy

Hardware stores and home centers, pharmacies, sporting goods stores and gun dealers, music stores, on the web and industrial safety distributors.

For Additional Information

For additional discussion of hearing and its protection, for product information, or for an electronic copy of this pamphlet go to:
www.e-a-r.com/hearingconservation

Gunshots

Protection is needed when shooting at both indoor and outdoor ranges. For some people, exposure to one unprotected shot can spell permanent hearing loss.

Power Tools

Semi-insert devices or earmuffs can be effective and convenient protection for these intermittent exposures

Chain Saws & Leaf Blowers

Hearing protection is a must whenever operating these very loud tools. Not only will you protect your hearing, but you will feel more relaxed too.

Aircraft

When flying in small aircraft, foam earplugs or other hearing protectors are suggested. Pilots need protection too.

Music

If it's too loud, even music can be harmful to your hearing. Keep a safe distance from loudspeakers and if necessary, such as at concerts, wear hearing protection.

Radio Headphones

Be smart – keep the music turned to safe levels. As a rule of thumb, while listening to headphones you should still be able to hear others speaking to you from a few feet away.

Nuisance Noise

For these noises simply pick that plug or muff that is comfortable for you. For snoring the plug of choice will almost always be a foam plug for its combination of great noise reduction and nightlong comfort.

⚠ WARNING!

Hearing protectors help reduce exposure to hazardous noise and other loud sounds. **Misuse or failure to wear hearing protectors at all times that you are exposed to hazardous noise may result in hearing loss or injury.** For proper use, see user instructions, supervisor, or call 3M in U.S.A. at 1-800-243-4630. In Canada, call Technical Service at 1-800-267-4414. If there is any drainage from your ear or you have an ear infection, consult with your physician before wearing earplugs. Failure to do so may result in hearing loss or injury.

*Research suggests that many users will receive less noise reduction than indicated by the NRR due to variation in earplug fit and wearing time. It is recommended that the NRR be reduced by 50% for estimating the average amount of noise reduction provided.

3M

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