



SOUNDSOURCE™

NO.2-NA-US



Earmuffs and Safety Eyewear

In our facility, several noisy work areas require safety eyewear as well as hearing protection. Can earmuffs be worn over safety eyewear without affecting attenuation?

For an earmuff to block noise effectively, a tight seal between the ear cushion and the head is critical. Gaps provide an easy path for sound to penetrate the earcup, thus reducing the amount of attenuation provided by the earmuff.

Several factors contribute to the size of those gaps:

- Band pressure of the earmuff
- Head shape and head size
- Compliance of the ear cushion material (stiffer material creates more gaps)
- Thickness of the eyewear frames
- Compliance of the eyewear frames



In a study conducted at the Howard Leight Acoustical Laboratory, five models of safety eyewear were tested in combination with two popular earmuff models, Howard Leight® Thunder® T3 and Lightning® L3. Hearing tests were administered to listeners while they wore the earmuffs alone, and then in combination with the safety eyewear, to determine if there was any change in earmuff attenuation with the addition of the eyewear frames.

The results show that for safety eyewear with a thin frame (a width of 2mm or less at the temples where the earmuff cushion meets the frame), the eyewear caused no significant decline in attenuation—the mean attenuation was nearly equivalent to the earmuff alone, or within one standard deviation. However, safety eyewear with wider frames caused noticeable gaps in the cushion seal, resulting in lower attenuation, particularly in the low frequencies. One pair of safety eyewear with an unusually wide frame of 6mm at the temples caused a drop of 9 to 12 dB in the low and high frequencies. A gap in the earmuff cushion can occasionally even cause some frequencies to be slightly amplified due to resonance. The typical mean reduction in attenuation for each frame style is shown in Table 1.

If we apply these corrections to the Noise Reduction Rating (NRR), we find that the effective NRR for earmuffs in this example remains the same when worn with a thin frame (2mm), but is reduced by about 2 dB when worn with a medium-width frame (3mm), and is reduced by about 5 dB when worn with a thick frame (6mm).

These results highlight that with the right selection of safety eyewear, the attenuation value of an earmuff is not compromised. This information is valuable for those environments where earmuffs are preferred over earplugs, or for earmuff users who wear prescription eyeglasses or safety eyewear in hazardous noise.

Table 1. Reduction in Mean Attenuation When Safety Eyewear is Worn with Earmuffs (in dB)

FREQUENCY IN HZ	125	250	500	1000	2000	3150	4000	6300	8000
Thin Frame (2mm)	1	0	0	0	1	1	0	2	1
Medium Frame (3mm)	5	3	2	1	2	2	2	3	3
Thick Frame (6mm)	12	9	5	4	3	4	6	10	12

Sound Source is a periodic publication of the Hearing Conservation team of Honeywell Safety Products USA, Inc., addressing questions and topics relating to hearing conservation and hearing protection.

WARNING: This document does not provide important product warnings and instructions. Honeywell recommends all users of its products undergo thorough training and that all warnings and instructions provided with the products be thoroughly read and understood prior to use. It is necessary to assess hazards in the work environment and to match the appropriate personal protective equipment to particular hazards that may exist. At a minimum, a complete and thorough hazard assessment must be conducted to properly identify the appropriate personal protective equipment to be used in a particular work environment. FAILURE TO READ AND FOLLOW ALL PRODUCT WARNINGS AND INSTRUCTIONS AND TO PROPERLY PERFORM A HAZARD ASSESSMENT MAY RESULT IN SERIOUS PERSONAL INJURY.

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