

Noise Exposure and Hearing Conservation Plan - Appendix B: Evaluating Noise Reduction Ratings (NRR) of Hearing Protectors

Scenario: Employee exposure to a lawnmower with a noise level of 100 dBA.

What offers better protection, earplugs with a NRR of 33 dB or earmuffs with a NRR of 25 dBA (over the ear)?



Used alone, and when fitted properly, the earplugs would result in a reduced noise exposure of 87 dBA.

$$\text{Noise reduction due to ear plugs} = (33 - 7)/2 = 13$$

$$\text{Exposure with ear plugs} = 100 \text{ dBA} - 13 = 87 \text{ dBA}$$

Effectively reduces noise levels below the OR OSHA PEL of 90 dBA

Used alone, and when fitted properly and worn over the ear, the earmuffs would result in a reduced noise exposure of 91 dBA.

$$\text{Noise reduction due to earmuffs} = (25 - 7)/2 = 9$$

$$\text{Exposure with earmuffs} = 100 \text{ dBA} - 9 = 91 \text{ dBA}$$

Note: the earmuffs are not effective at reducing noise levels below the OR OSHA PEL of 90 dBA

Using both ear muffs and plugs in combination, one adds 5 dB of protection to the higher NRR, i.e., 33 dB to yield a combined NRR of 38.

$$\text{Reduction due to combination of muffs and plugs} = (38 - 7)/2 = 15.5$$

$$\text{Exposure with both muffs and plugs} = 100 \text{ dBA} - 15.5 = 84.5 \text{ dBA}$$

The combination of ear muffs with earplugs effectively reduces noise levels below the OR OSHA PEL of 90 dBA and the OR OSHA Action Level of 85 dBA.