

HEARING PROTECTION GUIDELINE

1.0 When to use

If noise levels in your lab exceed 85 dB, engineering or administrative controls are required to reduce the risk of occupational noise-induced hearing loss. If you think your lab has harmful noise levels (e.g., if it is difficult to carry on a conversation), contact the Safety Office at ext. 33587 for an assessment. The Safety Office will do sound measurements, recommend the method and amount of attenuation required, and then recommend available types of hearing protection.

Engineering controls such as sound-absorbing panels or enclosure of the noise source can greatly reduce noise levels. Administrative controls such as limiting the amount of time workers are exposed to excessive noise are also effective.

2.0 Selection

The use of Hearing Protection Devices (HPDs) may be necessary to reduce personal exposure to excessive noise. This could be in the form of:

- Earplugs (including semi-inserts)
- Earmuffs
- Helmets, with or without electronic communication capabilities

2.1 Earplugs

Earplugs are placed in or against the entrance to the ear canal to form a seal and block sound. They can generally be categorized as foam, push-to-fit, pre-moulded, formable, custom-moulded, semi-insert or semi-aural styles.

- Foam, or “roll-down” earplugs need to be rolled-down between the forefinger and thumb and then inserted into the ear canal and allowed to expand. These are generally disposable and only get a few uses. Sanitation can be an issue as dirty hands can contaminate the plug.
- Push-to-fit earplugs are generally made of foam and have a flexible stem that is used to insert the plug using a twisting and pushing motion. These plugs have a somewhat longer life-span and are more sanitary because they do not need to be rolled-down.
- Pre-moulded earplugs are made of flexible materials and various shapes. They have a flexible stem for handling and insertion and they have a considerably longer life-span than foam plugs.

- Formable earplugs are made of malleable materials and are typically used once and sold to consumers for use in recreational settings (e.g., music concerts). They are not commonly used as part of a Hearing Loss Prevention Program.
- Custom-moulded plugs can be moulded in place and ready for use within 5 minutes or they can be “lab-produced” where the cast is sent to a lab for final manufacture. Both generally provide a good fit and last a long time if cared for properly.
- Semi-insert and semi-aural ear plugs are also known as banded plugs. They have soft tips that are held in place with a lightweight, spring-loaded band. These styles are ideal when earplugs are repeatedly removed and inserted.

2.2 Earmuffs

Most earmuffs are rigid moulded plastic earcups that seal around the ear. They generally provide the best protection but can be bulky, hot and uncomfortable to wear. There are models that attach to hardhats; if these are used, they need to be approved for use by both manufacturers.

2.3 Helmets

Helmets enclose a substantial portion of the head and are usually designed primarily for impact protection. They are not commonly worn in occupational settings; they are more likely to be found in recreational and military settings.

3.0 Modification of Hearing Protection DEvices

Modification of HPDs is not permitted. This seriously compromises their effectiveness. Modification includes, but is not limited to:

- Drilling holes in earcups
- Reducing headband tension of muffs
- Trimming or removing flanges

3.1 Double Protection

For sound exposure levels above 105dB, the use of a single HPD will likely be insufficient to reduce the exposure to below 85dB. In these cases, double protection (or dual protection) can be used. Typically, this is wearing earplugs and earmuffs together. When calculating how much to derate the NRR of both devices, use the device with the higher NRR to calculate the derating value using the following formula:

$$L - [(NRR+5)(0.65)-3] = XXdB$$

L=measured background noise in dBA

For example, background noise is 105 dBA, earplug NRR is 33, earmuff NRR is 26. We use the earplug NRR of 33 because it is higher.

$$105 - [(33 + 5)(0.65) - 3] = 105 - [24.7 - 3] = 83.3$$

83.3 rounds to 83 dBA

4.0 Care and Maintenance

Disposable earplugs should be disposed of after each use. Reusable earplugs should be cleaned at the end of each shift or use and when they become dirty. Earmuffs generally only need spot cleaning as needed.

Hearing protection should be stored in the case they came with or in a clean container that protects from physical damage, chemicals and vermin.

When inserting earplugs, hands should be clean. Soiled hands can transfer contamination directly in the ear canal increasing the risk of infection or other complications.

Earplugs should never be shared between individuals. Earmuffs can be shared but this requires procedures to be developed to ensure that the devices are properly cleaned and sanitized.

5.0 Limitations

Every HPD has a Noise Reduction Rating (NRR) typically ranging from about 20-30dB. Due to variability and improper insertion, when looking at the NRR of a HPD, you should derate the value by about 50% for earplugs and about 30% for earmuffs. Use the following formulas to determine the actual de-rating of the devices:

Earmuffs: $(70\% \times \text{NRR}) - 3\text{dB}$

Earplugs: $(50\% \times \text{NRR}) - 3\text{dB}$

6.0 Training

Hearing protection must be worn correctly to provide any protection. Improperly inserted earplugs will not offer adequate protection. Proper insertion depends on the type of earplug. Foam plugs should be rolled between thumb and forefinger until they are compressed to about half original thickness then inserted into the ear canal until flush with the ear's cartilage. Earmuffs should fit snugly and cover the ears with the headband resting on the top of the head.

Refer to the manufacturer's instructions for proper insertion or fit.

7.0 Record of Revisions

Date	Author/Editor	Change	Version
January 2025	Doug Dye	<ul style="list-style-type: none">Removed reference to SafetyHub	Hearing Protection Guidleine v1.3 JAN2025
June 2024	Doug Dye	<ul style="list-style-type: none">Update Section 5 with newer de-rating calculation for HPD	Hearing Protection Guidleine v1.2 JUN2024
February 2022	Doug Dye	<ul style="list-style-type: none">Added link to safety video in training section	Hearing Protection Guidleine v.1.1 FEB2022
October 2020	Doug Dye	<ul style="list-style-type: none">Guideline creation	Hearing Protection Guidleine v.1.0 OCT2020