



HEARING PROTECTION DEVICES

Approved Types of Hearing Protection

There are **4 main types of hearing protection devices** that are **approved by DOD**

- Earplugs – pre-formed and hand-formed
- Noise Muffs – all authorized (without radios)
- Ear Canal Caps
- Helmets

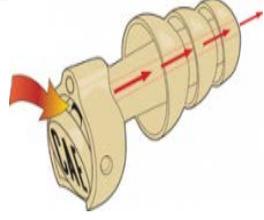
Pre-Formed Earplugs

- Pre-formed earplugs must be **fit** by medical department personnel. Technicians must fit both ears individually, as some people will wear different sizes and/or different types in each ear
- An **ear gauge** may be used to assist in determining the appropriate size earplug, but cannot be relied upon without fitting the actual earplugs in each ear.
- The earplug **carrying case** can be used to assist with the fitting process (using attachment).
- Patients with sharply **bending ear canals** will not do well with triple or quad flange earplugs because they do not seat well. Approximately 10 - 15% of patients should not use them for this reason.

Pre-formed Earplugs

Type	NRR*	Sizes	Fit	Example
Single Flange	25 dB	5 color coded Extra small to Extra large	Medical fit required. Tab points to back of ear	



Triple Flange	26 dB	3 color coded Small – Medium – Large	Medical fit required. Jiggle into ear canal. Stick should show slightly	
Quad Flange	25 dB	Universal fit One size fits most (except extra large)	Medical fit required. Jiggle into ear canal. Stick should show slightly	
Combat Arms	22+ dB steady noise	3 Sizes Small- Medium - Large	Medical fit required. Inserted color not visible	

*NRR = Noise Reduction Rating

Advantages of pre-formed earplugs

- **Effective** protection with proper insertion depth
- **Durable** - can be washed and re-used several times until dry and cracked.
- Easily **carried** on uniform or clothing in earplug carrying case
- **Less expensive** than ear muffs and hand-formed earplugs for frequent users (in the long run)
- Fairly **comfortable** although adaptation period may be needed.

Disadvantages of pre-formed earplugs

- Requires individual **medical fitting** of both ears
- Frequent insertion may cause **irritation** (minimized by proper fitting)
- Works loose with **jaw movement** (talking, chewing) which can require user to re-insert earplug often
- Improper fit **reduces effectiveness** or attenuation benefit



Hand Formed Earplugs

- Commonly called “foamies”, these soft pliable earplugs should be **used only one time** for good ear hygiene. Since the earplugs must be rolled tightly for proper insertion, **clean hands** are imperative.
- Personnel must be **trained** to insert hand formed earplugs correctly. **Proper insertion** and effectiveness are too often compromised because it is assumed that the plugs are easy to use and inserting any portion of the foam plug provides adequate protection. Not necessary to be medically fit by medical personnel.

TYPE	NRR	SIZES	FIT	EXAMPLE
Sound Guard EAR Classic	29 – 33 dB	Medium	No color should show when viewed directly in front	
EAR Classic 30	29 – 33 dB	Small	No color should show when viewed directly in front	
EAR Classic 33	29 – 33 dB	Large	No color should show when viewed directly in front	

Advantages of hand-formed earplugs:

- Effective **protection** when properly inserted into ear canal
- Most **comfortable** - generally half of employees prefer foamies as HPD
- **Universal fit** (Sound Guard or EAR Classic) -- regular size fits 70% of population; small (EAR Classic 30) & large (EAR Classic 33) sizes available for other 30%
- Individual medical fitting not required
- **One time use** – hygienic IF hands are clean when inserting



- **Least expensive** of all HPD's for full time or very infrequent use; **however**, cost goes up if multiple earplugs are used per day
- Good choice when hat or **helmet required** – nothing sticks out of canal to “catch” the helmet.

Disadvantages of hand-formed earplugs

- Must be **properly molded** into small smooth cylinder shape with no creases and inserted deeply into ear canal
- Easily **soiled** and absorbs dirt and oil that can be transferred into the ear canal
- Must be properly **inserted** – color of earplug should not be visible when viewed directly in front
- **One-time use** – so continual supply is needed; remind employees not to re-use
- Should use **clean hands** – Dangerous to use if working with corrosives or dangerous chemicals in work areas which require use of chemicals and gloves
- Do not use in presence of **corrosives** – disintegrate and can cause skin damage, hearing loss or dizziness (ototoxicity). See list of ototoxic chemicals in Appendix.

Noise Muffs or Circumaural Headset:

- Effective **protection** with a typical **NRR of 25-35dB.**
- Often used with earplugs for **double protection** (30 dB+)
- Some types may allow variety of **headband placement:** top of head, behind head, under chin. However, a good seal around the entire ear/pinna should never be comprised.
- **Initially expensive** but cost effective over time.



Advantages of noise muffs

- Effective **protection** or attenuation of noise
- **Universal fit** -- as long as headband adjusts
- Individual medical fit not required
- Can be worn with earplugs for **double protection** in extreme noise situations
- Can incorporate **communication equipment** and/or Active Noise Reduction (ANR) features

Disadvantages of noise muffs

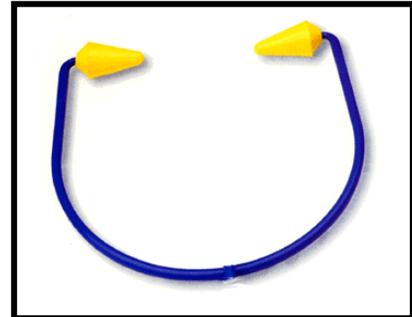
- Most **expensive** type of HPDs
- **Bulky and heavy**



- Uncomfortable in **heat** and humidity due to perspiration
- **Hair/eyeglasses/earrings** decrease fit effectiveness
- Not easily **carried**

Ear Canal Caps:

- Typical Noise Reduction Rating (**NRR**) is **18dB** but is extremely variable due to inconsistent sealing of ear canal
- **Universal fit** for ear canals; no medical fit required
- **Headband tension** varies with individual head size which may negatively affect proper insertion of caps in ear canals.



Advantages of ear canal caps

- **Quickly** inserted without soiling
- **Universal fit** - individual medical fit not required
- **Lightweight** and easily carried around neck for immediate use
- Best for **intermittent and modest noise** (95dB or less)

Disadvantages of canal caps

- More **expensive** than earplugs
- **Uncomfortable** after extended use
- **Limited** attenuation
- Poor **headband tension** greatly reduces effective attenuation/protection

Helmets for integrated and specialized HPDs

- Helmets are for **specific operational uses**, which typically incorporate **communication capability**
 - Aviators, Aviation Crew
 - Flight and Well Deck Personnel (“cranials”)
 - Tank crews
 - Amphibious Assault Vehicle Crew Members



Care and Maintenance of Hearing Protection

- **Pre-formed Earplugs**
 - **Clean** after each use with warm, soapy water; rinse and dry thoroughly before re-use.
 - Avoid insertion with soiled hands.
 - Check plugs or ear tips periodically for **deterioration** (dryness, stiffness, cracks) and correct size.



- When plugs are no longer serviceable, a **new pair** should be obtained.
- **Hand-formed earplugs**
 - These earplugs are ordinarily **disposed of after each use**.
 - Avoid rolling and inserting with soiled hands
 - Never use if contaminated with metal filings or corrosives
- **Noise Muffs**
 - Wipe down **ear-cup seals** with moist cloth (alcohol-free) after each use.
 - Replace **seals** when cracked or broken.
 - Replace **cushions** inside ear-cups when unserviceable (cracked or broken).
 - Check for **defects** (cracks or holes) in ear-cups.
 - Ensure there is adequate **headband tension**; replace headband when necessary.
 - **Modification** of noise muffs is **prohibited** (such as incorporating music).
- **Ear Canal Caps**
 - **Clean** after each use with warm, soapy water, rinse and dry thoroughly before re-use
 - Check **headband tension** to ensure a tight insertion in ear canals
 - Replace when **ear tips** become hard

Characteristics of a Good Earplug Fitting

- With both earplugs inserted, people's **voices sound muffled**
- There is a **vacuum effect** or feeling when tugging on the earplug
- The earplugs feel **comfortable** and do not irritate the ear canal skin over time
- Specific pre-formed earplugs can be **inserted** properly: tab of single flange plug is oriented toward the back of the head; largest flange possible (correlating with size of patient's ear canal) of a multi-flange plug is flush against the ear canal opening.
- Both ears are **medically fit**. Some people will wear two different sizes in each ear, and some may wear a combination of different types of earplugs
- None of the hand-formed earplug is visible ("**no color**") when looking directly at user.
- Earplug stays inserted properly in ear canal over time, regardless of talking (jaw movement)
- **Practical check** for proper insertion of earplugs or ear caps: Compare environmental sound with and without cupped hands covering ears. If both conditions sound the same, earplugs are inserted correctly.



Fitting Techniques and Proper Use Procedures

- **Pre-Formed Earplugs** Pull up and back on pinna. User should use **opposite hand** over head to pull on pinna, straightening ear canal
 - Insert earplug
 - Gently jiggle or slightly twist plug into ear canal
 - Single flange: tab is oriented toward back of the head
 - Triple or Quad flange: dependent upon size of ear canal, last flange should be flush against ear canal opening; with a small amount of stick showing
 - **Both ears** must be fitted as some people wear different sizes in each ear
 - Use a smaller or larger size if a good seal is not obtained
- **Hand-Formed Earplugs (“foamies”)**
 - **Roll earplug** between thumb and index finger into slender tube to the smallest size possible. Ensure there are **no creases** in the compacted “tube”.
 - Pull up and back on pinna. User should use **opposite hand** to pull pinna up and back
 - **Insert earplug deeply** into the ear canal. Very little of the plug should be extending outside of ear canal.
 - Push deeper 1-2X with either fingertip to reach maximum insertion depth
 - If insertion is difficult, try the larger or smaller size plug
 - **Practical tips** for proper insertion: when moving index finger from front to back across ear, a user should not feel any of the “foamie”; no color should be seen when user looks directly into mirror or a buddy looks at user directly in front.
- **Noise Muffs**
 - Noise muffs should **seal** around the entire ear/pinna (ear cushions should be replaced when cracked or worn).
 - With certain types of noise muffs, **headband placement** can be on top of the head, behind the head, or under the chin (sometimes referred to as Type II muffs, while straight over-the-head muffs are Type I).
- **Ear Canal Caps**
 - Canal caps should be **inserted as tightly** into the opening of the ear canal as possible to form a seal
 - **Headband placement** can be on top of the head, behind the head or under the chin
 - Users with very large or very small heads may receive **poor benefit**

