

# Hearing Protective Devices

(Updated 08 July 2003)

[\(08 July 2003 updates in blue\)](#)

## INTRODUCTION

NAVOSH and BUMED policy regarding authorized hearing protection is described in the Navy Medical Department Hearing Conservation Program Procedures Manual (NEHC Tech Manual TM 6260.51.99-1 of May 1999), which is available on the NEHC homepage. The basic “list” of approved hearing protective devices (HPDs) accompanies the hearing conservation chapters of NAVOSH Ashore and Afloat, and has been relatively constant for over 20 years. NEHC (acting on behalf of MED-M3F4) recommends very few additions to the list, as most hearing protection needs are readily met by the standard stock items. However, many new hearing protectors have come on the market in the last 20 years, and the current approval criteria offer needed flexibility.

Beginning with the 1999 NEHC HCP Tech Manual, personnel and organizations with unmet personal protective needs have been able to expand their selection of HPDs by considering for purchase hearing protectors that have previously been evaluated by DoD laboratories. A listing of those products follows later in this section. Decisions to purchase outside of standard stock should involve the following sequence:

- There is a need that is not being met by the standard “approved” list
- Industrial hygiene, safety, and/or occupational audiology are cognizant.
- Purchase any of these products in small quantities, initially,
- Field test them for comfort, durability, protectiveness, and user acceptance, and
- Spend your dollars accordingly

If the listing still does not have a product that meets your needs, submit to the NEHC Occupational/Operational Audiology Team an example of the desired product (yet untested by DoD), a description of your unmet needs and why you feel the particular product offers benefit, and any field or laboratory testing you have done to validate performance/benefit of the product. The Navy does NOT currently have the ability to conduct routine testing of hearing protective devices.

### **Current and Projected Methods for Determining and Labeling HPD Attenuation**

There are basically two ways in which HPD attenuation can be measured. The first is termed Real Ear Attenuation at Threshold (REAT), which involves human listeners whose sound field thresholds for octave bands of sound are recorded in both a protected and un-protected mode. As an example, if the listener’s threshold for an octave band with a center frequency of 500 Hz drops from 5dB unprotected to 25dB protected, then the product is said to provide 20dB of attenuation at 500 Hz. The second method is termed Microphone in Real Ear (MIRE) and involves placing a probe microphone in the

ear canal, medial to whatever protection is being tested, and measuring the intensity of octave bands of sound in the canal compared to just outside the hearing protector. REAT is the preferred method, due primarily to variables stemming from microphone placement (location) in MIRE.

While octave band REAT results are the most accurate way to assess HPD adequacy/desirability, a single-number value was desirable for convenience and marketing purposes – hence the Noise Reduction Rating or NRR. There have been half a dozen or more methods reported to calculate the NRR, and the Environmental Protection Agency is currently considering a major revision in the current NRR protocol.

### **Sound Guard Disposable Foam Earplugs**

There has been much discussion about the replacement in standard stock of the E.A.R. Classic disposable foam earplug plug by the Sound Guard foam plug. At one point the Sound Guard plug was authorized to be returned for credit due to questions about comfort and user preference. After extensive examination, discussion, and very high-level decision making, **the Sound Guard foam earplug is once again the only universal fit disposable foam earplug which is authorized for order by DoD organizations.** We are aware of no adverse health consequences associated with using this product. The attenuation provided is almost identical to the E.A.R. Classic plug.

### **New Sound Guard Plugs Entering Stock System**

The newest generation of Sound Guard PVC foam earplugs incorporates a fitting ring feature that visually indicates when proper insertion depth has been achieved. It was first shipped to Defense Supply Center Philadelphia in April 2003, under the same NSN as earlier configurations (6515-00-137-6345). You may recall from previous NEHC communications that the Sound Guard foam plug is congressionally mandated when ordering universal fit foam earplugs, as New Dynamics, the manufacturer, is a sheltered workshop activity.

These rather colorful orange and aqua green plugs have the value-added feature of indicating correct insertion. No orange should be visible if the necessary two-thirds insertion depth has been achieved.

Also noteworthy is use of "Method B" in labeling the NRR for these plugs as NRR 19(SF). The SF refers to "subject fit", also termed Method B or ANSI S12.6-1997, which involves naive subjects who fit themselves after reading instructions on the product package, with no examiner participation. The current industry standard is the "examiner fit" method, which yields a much higher NRR value that has been criticized as not being "real world." One examiner fit method is ANSI S12.6-1984, also referred to as Method A. The examiner fit value for Sound Guard plugs is about 28. **Do not interpret the NRR 19(SF) to mean these plugs are less effective than other PVC foam earplugs that were examiner fit, vice subject fit.** As mentioned earlier, EPA is currently



considering a change in NRR guidelines, with conversion to Method B under serious consideration.

You should start to see these 2-color plugs replacing the current green or yellow Sound Guard foam plugs as existing stocks are depleted. Be advised that these are essentially a "medium" size, despite the term "universal fit" and some users with either very small or large canals may benefit from the Aearo Superfit 30 or Superfit 33 foam plugs, respectively, as described below. This is currently the only permissible circumstance to purchase PVC foam earplugs elsewhere than the standard stocked foam plug. Sound Guard plugs are not currently available in different sizes, although that option is being investigated.

**SMALL AND LARGE SIZED FOAM EARPLUGS NOW AVAILABLE THROUGH GSA.**

**Are you tired of hearing complaints that the “universal fit” foam earplugs do not fit some users properly?** There is now a GSA contract in place to order disposable foam earplugs that are specifically tailored for persons with either small or large ear canals. Approximately a fourth to a third of all foam earplug users have ear canals that are either too small or too large to receive good benefit from the medium-sized earplugs, currently available as Sound Guard Earplugs under NSN 6515-00-137-6345. New Dynamics, the sheltered workshop industry that produces the Sound Guards, does not currently make this product in multiple sizes. **The sized foam earplugs are available from the GSA Advantage catalog, as described below.**

Under GSA Contract # GS-07F-9123D, Tactical & Survival Specialties, Inc., is an approved vendor. The plugs can be ordered from GSA Advantage on-line catalog at <http://www.GSAAdvantage.gov>. Once you have an account, go to the first SEARCH/BROWSE window and enter item 310-1009 for the SuperFit 30 plugs, equivalent to small size, or item 310-1008 for SuperFit 33, equivalent to large size. They are sold in cases of 10 boxes (total 2000 pairs) or at higher unit cost by ordering a box of 200 pairs. Specific catalog nomenclature appears below.

**Small ears:**

Part # 1241-310-1009 EAR Classic SuperFit 30, NRR 30dB, uncorded in pillow packs, 2000 pairs per case. \$240.00 per case

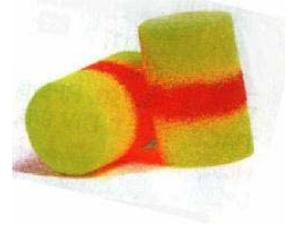
**Large ears:**

Part # 1241-310-1008 EAR Classic SuperFit 33, NRR 33 dB, uncorded in pillow packs, 2000 pairs per case \$252.80 per case

The SuperFit foam earplugs includes an orange-colored band in the center third of its length. Properly inserted, there will be no orange visible – confirming that the necessary two-thirds insertion depth has been achieved. Sound Guard universal fit foam earplugs are now being shipped with a similar fit-check capability, as described above. DoD hearing protector buyers are reminded that only the Sound Guard foam earplugs can be ordered for persons with average sized ear canals. A suggested distribution for stocking

foam earplugs for adult men and women users is 25% small (SuperFit 30), 65% medium (Sound Guard), and 10% large sizes (SuperFit 33).

**In accordance with NAVOSH policy, these earplugs are authorized for operational and industrial use within limitations posed by environmental noise levels, communication needs, and user ear canal size.**

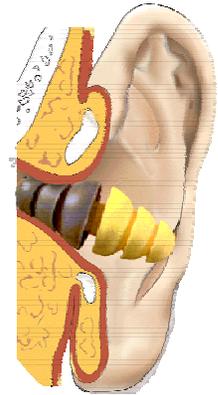


### **SINGLE FLANGE EARPLUGS ARE GOING AWAY.**

Defense Logistics Agency has informed the Chair, DoD Hearing Conservation Working Group, that single flange earplugs are being discontinued. The manufacturer has confirmed this. DoD HCWG is looking at alternative products, including two models of 4-flanged earplugs that are being identified to the Defense Logistics Agency for consideration of addition to standard stock. The single flange earplugs may continue to be used until existing stocks are depleted.

### **Combat Arms Ear Plugs**

The Army introduced the **Combat Arms Ear Plug** two years ago. It is a 2-sided protector based on the Aearo UltraFit triple flange plug and incorporating a baffle to reduce impact/impulse noise without significant attenuation of steady state (continuous) sounds. The plug carries NSN 6515-01-466-2710.



The basic attributes of this product are:

- 1) In a combat situation, impulse protection is provided without significant compromise of steady state environmental sounds
- 2) In garrison situations (secured perimeter, as on board ship), the non-baffled side of the plug provides good protection against all noise
- 3) The extruding portion of the plug (whichever side is NOT in use) is colored to be either highly visible (optic yellow when the non-baffled plug in use), or a dull olive drab when in combat and the baffled plug is inserted for weapons fire.

### **Active Noise Reduction (ANR)**

We are unaware of an industry standard to evaluate the protectiveness of Active Noise Cancellation (ANC) and Active Noise Reduction (ANR) products due to their dynamic attenuation properties. A good deal is known, however, about the types of environments and listener needs which lend themselves to this technology. Persons or commands considering such products are asked to contact the NEHC Audiology Team for discussion.

**Shooters' muffs** do not technically fit in this category, but are included in this discussion in a generic sense due to their electronic circuitry. The Remington R2000 shooters muffs were evaluated via focused medical surveillance and user survey at Recruit Training Center Great Lakes. As a result of this user trial, this product was approved for Navy use in a small arms noise environment. Rationale centered on the effectiveness of passive attenuation properties of most earmuffs for protection from impulse noise. We encourage supervised field trials of these products, and will gladly work with you in this regard.

### **DoD-Tested Hearing Protectors**

The appendix provides a compilation of products that have been tested by a DoD laboratory and may be considered for possible augmentation of standard stock items at Navy and Marine Corps activities. Octave band Real Ear Attenuation at Threshold (REAT) results are provided, where available, as well as a NRR value. **NRR is provided using examiner fit methodology, unless labeled “(sf)” for subject fit**, which is a more conservative estimate of a protector's attenuation. As a generalization, examiner fitted NRR values represent maximum available attenuation, while subject fitted protectors might be termed “real world”. In reviewing data for each protector, note that some provide significantly more protection than others, and that subject fit protectors will typically score several dB less than examiner fit, precluding direct comparison. While NIOSH recommends de-rating examiner fitted earplug NRRs by 50% to approximate real world benefit, subject fit NRRs should not be de-rated. While **MORE** is not always **BETTER** with respect to hearing protectors, both the octave band and single figure attenuation value (NRR) recorded for each product should be compared with the anticipated noise environment in estimating the adequacy of the product to protect exposed personnel. **Finally, appearance on this list is NOT an endorsement of better than average performance. Performance data has been extracted from both USAF data (Air Force Research Laboratory, Wright-Patterson AFB) and Army data from the Aeromedical Research Laboratory, Fort Rucker. The data do not constitute an endorsement of any product by any military Service. Be advised that as of this writing, Air Force no longer maintains a list of approved HPDs, and does not endorse hearing protectors that are not in the standard stock system.**

**One final note, in most cases, the standard stock single and triple flange earplugs, foam plugs, and earmuffs on our 20-year old Navy list are less expensive and at least as effective as whatever product some salesman is showing you.**

The NEHC Audiology/Hearing Conservation Team

Contact us at [audiology@nehc.mar.med.navy.mil](mailto:audiology@nehc.mar.med.navy.mil)







<b>MSA Economuff</b>	<b>125</b>	<b>250</b>	<b>500</b>	<b>1K</b>	<b>2K</b>	<b>3K</b>	<b>4K</b>	<b>6K</b>	<b>8K</b>	<b>NRR</b>
<i>Mean Attenuation</i>	9	13	18	24	31	32	32	33	31	<b>7 (sf)</b>
<i>Standard Deviation</i>	7	4	2	10	5	4	3	5	5	
<b>MSA Mark IV</b>										
<i>Mean Attenuation</i>	14	16	22	32	30	40	37	35	34	<b>15</b>
<i>Standard Deviation</i>	4.0	5.0	5.6	5.5	4.6	6.2	5.5	5.3	6.7	
<b>MSA SlimPro Plus</b>										
<i>Mean Attenuation</i>	14	17	24	33	32	34	33	32	31	<b>18 (sf)</b>
<i>Standard Deviation</i>	5	4	4	5	3	4	3	5	5	
<b>North 28-45-00</b>										
<i>Mean Attenuation</i>	4	9	17	25	29	30	22	25	24	<b>9 (sf)</b>
<i>Standard Deviation</i>	3.5	4.3	5.6	3.6	4.8	5.1	3.0	4.6	6.9	
<b>Peltor H10A</b>										
<i>Mean Attenuation</i>	12	18	27	34	35	36	40	37	35	<b>17</b>
<i>Standard Deviation</i>	4.9	2.9	5.8	6.7	5.2	5.1	5.4	4.3	8.8	
<b>Peltor H7A</b>										
<i>Mean Attenuation</i>	10	19	27	33	33	34	34	30	33	<b>19 (sf)</b>
<i>Standard Deviation</i>	4.5	3.1	2.9	4.2	3.5	3.0	2.2	2.8	2.8	
<b>Safety Direct RBW-71</b>										
<i>Mean Attenuation</i>	7	11	18	33	34	43	30	30	29	<b>9</b>
<i>Standard Deviation</i>	4.1	5.5	7.2	6.6	5.5	7.6	7.9	4.1	5.0	
<b>Safety Direct USN-86 "Flight Deck"</b>										
<i>Mean Attenuation</i>	17	24	30	39	32	32	32	31	32	<b>21</b>
<i>Standard Deviation</i>	4.4	3.5	5.7	4.1	3.5	4.0	4.7	3.6	4.4	
NSN 4240-00-759-3290										
<b>Tasco Golden Eagle 2950</b>										
<i>Mean Attenuation</i>	16	21	31	41	37	38	37	34	34	<b>23</b>
<i>Standard Deviation</i>	2.9	2.8	3.9	4.8	5.4	6.1	3.7	2.8	5.0	
<b>Tasco Sound Shield 2900</b>										
<i>Mean Attenuation</i>	14	20	28	38	35	39	38	36	35	<b>19</b>
<i>Standard Deviation</i>	3.0	3.6	6.7	3.9	5.5	5.2	6.1	4.0	3.4	





SPH-4B, Gentex	<u>125</u>	<u>250</u>	<u>500</u>	<u>1K</u>	<u>2K</u>	<u>3K</u>	<u>4K</u>	<u>6K</u>	<u>8K</u>	<b>NRR</b>
<i>Mean Attenuation</i>	14	13	24	37	38	40	40	45	43	<b>20</b>
<i>Standard Deviation</i>	2.8	2.2	2.2	5.4	2.6	4.0	4.3	5.0	4.8	

<b>Plug and Muff</b>	<b>Octave Band Attenuation</b>									<b>NRR</b>
	<u>125</u>	<u>250</u>	<u>500</u>	<u>1K</u>	<u>2K</u>	<u>3K</u>	<u>4K</u>	<u>6K</u>	<u>8K</u>	
<b>E-A-R Plugs/Blue Point GA-3000</b>										
<i>Mean Attenuation</i>	31	30	37	39	34	44	46	46	45	<b>20</b>
<i>Standard Deviation</i>	8.4	8.2	8.4	9.4	5.4	6.4	9.3	6.4	5.9	
<b>E-A-R Plugs/ H. Leight Thunder 29</b>										
<i>Mean Attenuation</i>	33	38	47	44	36	47	50	46	45	<b>27</b>
<i>Standard Deviation</i>	5.6	9.0	8.6	5.8	5.2	6.2	6.0	5.2	4.2	
<b>E-A-R Plugs/ Peltor Twin Cup Muff</b>										
<i>Mean Attenuation</i>	31	32	43	42	38	50	50	50	48	<b>26</b>
<i>Standard Deviation</i>	6.7	7.6	8.2	6.3	5.2	6.3	5.8	3.4	3.3	
<b>E-A-R Plugs/ Safety Direct RBW-71 Muff</b>										
<i>Mean Attenuation</i>	31	37	44	41	38	48	49	48	46	<b>28</b>
<i>Standard Deviation</i>	6.5	6.3	8.2	5.3	5.4	6.0	4.1	3.2	4.4	