Hearing Conservation Program

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PURPOSE
The University of Illinois at Urbana-Champaign (UIUC), through the Division of Safety and Compliance (S&C), has established the Hearing Conservation Program to protect the health and safety of university employees (based on Occupational Safety and Health Administration (OSHA) 29 CFR 1910.95 and 1926.52, and the Illinois Department of Labor (IDOL), which has adopted the OSHA regulations).

The Hearing Conservation Program includes UIUC policy on administration, noise assessment, medical surveillance, personal protective equipment, and recordkeeping. In addition, responsibilities of S&C, Deans and Directors, Unit Heads, Supervisors, Employees and the designated medical care provider are established. It is expected that the units utilizing hearing protection will develop site specific written standard operating procedures to complement the general program.

POLICY
It is the policy of UIUC to provide its employees with a safe and healthful working environment. This is accomplished as far as feasible with accepted engineering controls and administrative controls to reduce ambient noise exposure to safe levels. Where these methods are not feasible or adequate, hearing protection is provided at no cost to the employees to reduce employee exposure to harmful levels of ambient noise.

SCOPE
The provisions of this Hearing Conservation Program shall apply to all employees in any University workplace:

1. Where hearing protectors are necessary to protect the health of University employees;
2. Wherever the University of Illinois requires hearing protectors to be worn; and
3. Where employees for comfort and other reasons voluntarily wear hearing protectors.

RESPONSIBILITIES
The UIUC Division of Safety and Compliance shall:

1. Develop a written hearing conservation program and review it on an annual basis.
2. Conduct noise surveys and noise dosimetry upon request and as needed to assure adequate protection of employees.
3. Assist supervisors in the selection of appropriate hearing protection and provide recommendations for appropriate engineering controls.
4. Provide or arrange for training on hearing conservation and audiometric testing for supervisors and employees.
5. Conduct or arrange for the appropriate selection and fitting of hearing protection.
6. Maintain training and hearing protection records as outlined in the HEARING PROTECTION and TRAINING sections of this document.

Deans, Directors of Academic and Administrative Units and Department Heads shall:

1. Demonstrate a commitment, both fiscal and philosophical, towards the implementation of the Hearing Conservation Program.
2. Establish budget support for this program for his/her unit.
Supervisors of employees who may require hearing protection shall:
   A. Contact S&C when they suspect that hearing protection may be required for a task.
   B. Attend training on the proper selection, storage, use and maintenance of hearing protective equipment when employees they supervise are required to use such equipment.
   C. Supply the appropriate hearing protection at no cost to the employee and ensure that it is worn according to the training received.
   D. Assure that the requirements of this program are observed with respect to noise surveys, noise dosimetry, and audiometric testing, training and record keeping.
   E. Develop a standard operating procedure (SOP), such as the one found in Appendix I of the document. The purpose of the written SOPs is to delegate responsibilities to specific personnel and to record the selection of hearing protection for specific tasks/hazards.

The employee shall:
   1. Report to the supervisor any operation or job for which they suspect that hearing protective equipment may be needed.
   2. Attend training on the hearing protection as required by this program.
   3. Use hearing protection in accordance with instruction and training received.
   4. Not use hearing protection with any deficiencies and report any deficiencies or malfunctions to a supervisor.
   5. Notify the supervisor of a noticeable change in hearing, or potential problem with the hearing protection.

The medical provider reviewing the employee’s ability to wear hearing protection shall:
   1. Conduct or supervise qualified persons to conduct an audiometric testing per the OSHA Noise standard.
   2. Provide the Hearing Protection wearer and S&C with written results of the medical evaluation as it applies to the employee’s ability to hear.

HAZARD EVALUATION/NOISE ASSESSMENT
The selection of appropriate hearing protection is made only after a determination has been made as to the real and/or potential exposure of the University’s employees to high levels of noise. A noise assessment of the work place will be conducted; including sound level surveys and/or noise dosimetry (see Appendix III and Appendix IV). S&C or their designated representative will conduct the noise survey.

Area Survey
The first step in conducting a noise assessment for the hearing conservation program is to identify those areas of operation of the facility where the employee’s exposure may exceed an 8-hour time-weighted average (TWA) of 85 dBA or 50 percent dose. This is accomplished using an instrument called a sound level meter (SLM) or a noise dosimeter having a SLM function. In cases of high worker mobility, significant variations in sound level, or a significant component of impulse noise make area monitoring generally inappropriate, UIUC shall use representative personal sampling to comply with the monitoring requirements of this paragraph, unless the health and safety professional can show that area sampling produces equivalent results.

Noise levels are defined in terms of decibel (dB). The SLM must meet requirements specified in ANSI S1.4, type 2, with operating parameters that are set at A-weighted (dBA) and slow response for monitoring. The SLM must be calibrated to ensure measurement accuracy. Noise surveys should be completed annually, or when conditions change substantially.
Noise Dosimetry (Personal Exposure)
The purpose of noise dosimetry is to quantify an employee’s exposure to noise throughout the day. The noise dosimeter is worn by the employee and computes noise measurements such as dose, average dBA, and duration of monitoring. The dosimeter must meet requirements of ANSI SI.25-1978, which are: integration of noise measurements in the 80-140 dB range; impulse and A-weighting capabilities; and a 5 dBA exchange rate.

MEDICAL SURVEILLANCE
Audiometric Testing
Audiometric testing is conducted to evaluate effective employee hearing at various frequencies. All employees who are enrolled in the hearing conservation program will receive audiometric testing at least on an annual basis, or more frequently if the medical provider deems it necessary. The testing will be provided at no cost to the employee.

Audiometric testing shall be conducted within 6 months of enrollment in the hearing conservation program to determine a baseline, and annually thereafter if exposure is above 85 dBA for an 8-hour TWA or 50 percent dose (OSHA action level). If a baseline has not been determined, then the first audiometric test will become the baseline. The audiometric testing will be conducted by a UIUC designated medical facility.

Before an audiometric test is completed, the employee must spend at least 14 hours without exposure to high noise levels (workplace or personal). Hearing protectors may be used to accomplish this. After the audiometric test, the employee will be informed of the results by S&C.

Each employee’s annual audiogram shall be compared to that employee’s baseline audiogram to determine if the audiogram is valid and if a standard threshold shift, as defined in the following paragraph, has occurred. This comparison may be done by a technician.

If an employee has a standard threshold shift (STS) of 10 dB or more averaged at 2000, 3000 and 4000 Hz in either ear, then he or she must be retested within 30 days and the retest will be considered the annual audiogram. Hearing protection will also be used during the 30-day period, to attenuate any noise exposure to an 8 hour time-weighted average of 85 dB or below. In determining whether a standard threshold shift has occurred, allowance may be made for the contribution of aging (presbycusis) to the change in hearing level by correcting the audiogram according to the procedure described in Appendix F of the Occupational Safety and Health Administration Noise Standard 29 CFR 1910.95: “Calculation and Application of Age Correction to Audiograms.”

The medical examiner shall review the problem audiograms and determine whether there is a need for further evaluation. The UIUC shall provide to the person performing this evaluation the following information:
1. A copy of the requirements for the hearing conservation program;
2. The baseline audiogram and most recent audiogram of the employee to be evaluated;
3. Measurements of background sound pressure levels in the audiometric test room; and
4. Records of audiometer calibrations.

After retesting, if the medical examiner determines that the threshold shift is not permanent, then the employee will be notified by his/her supervisor of the corrected audiometric results. If the medical provider determines that the employee’s STS is work-related or aggravated by occupational noise exposure, then the employee (if not using hearing protectors) will be fitted with hearing protectors (see HEARING PROTECTION and
Appendix VI), trained in their use and care, and required to use them. If the employee is already using hearing protection he/she will be refitted and retrained in the use of hearing protection and provided with hearing protectors offering greater attenuation if necessary. The employee who has an STS must be notified in writing within 21 days of the determination by his/her supervisor.

The employee shall be referred for a clinical audiological evaluation or an otological examination, as appropriate, if additional testing is necessary or if the employer suspects that a medical pathology of the ear is caused or aggravated by the wearing of hearing protectors. The employee is also informed of the need for an otological examination if a medical pathology of the ear that is unrelated to the use of hearing protectors is suspected.

All employees who are in the hearing conservation program will be responsible for notifying their supervisor if they notice a change in their hearing ability or if the hearing protection becomes uncomfortable or non-effective. This is to assure that any substantial change in the employee’s hearing or hearing protection can be re-evaluated.

If an employee is exposed to noise less than an 8-hour TWA of 85 decibels, and subsequent audiometric testing indicates that a standard threshold shift is not persistent:

1. S&C shall inform the employee of the new audiometric interpretation; and
2. The employee may discontinue the required use of hearing protectors.

**Audiometric Test Requirements**

Audiometric tests shall be pure tone, air conduction, hearing threshold examinations, with test frequencies including as a minimum 500, 1000, 2000, 3000, 4000, and 6000 Hz. Tests at each frequency shall be taken separately for each year.

Audiometric tests shall be conducted with audiometers (including microprocessor audiometers) that meet the specifications of, and are maintained and used in accordance with, American National Standard Specification for Audiometers S3.6-1969. Pulsed-tone and self-recording audiometers, if used, shall meet the requirements specified in Appendix C of OSHA Noise Standard 29 CFR 1910.95: “Audiometric Measuring Instruments.” Audiometric examinations shall be administered in a room meeting the requirements listed in Appendix D of OSHA Noise Standard 29 CFR 1910.95: “Audiometric Test Rooms.”

**Audiometric Calibration**

The functional operation of the audiometer shall be checked before each day’s use by testing a person with known, stable hearing thresholds, and by listening to the audiometer’s output to make sure that the output is free from distorted or unwanted sounds. Deviations of 10 decibels or greater require an acoustic calibration.

Audiometer calibration shall be checked acoustically at least annually in accordance with Appendix E of OSHA Noise Standard 29 CFR 1910.95: “Acoustic Calibration of Audiometers.” Test frequencies below 500 Hz and above 6000 Hz may be omitted from this check. Deviations of 15 decibels or greater require an exhaustive calibration.

An exhaustive calibration shall be performed at least every two years in accordance with sections 4.1.2; 4.1.3; 4.1.4.3; 4.2; 4.4.1; 4.4.2; 4.4.3; and 4.5 of the American National Standard Specification for Audiometers, S3.6-1969. Test frequencies below 500 Hz and above 6000 Hz may be omitted from this calibration.
HEARING PROTECTION

Hearing protector selection shall be made by the employee’s supervisor in consultation with S&C. The hearing protection will be made available to all workers exposed at or above the action level 85 dBA as an 8-hour TWA or 50 percent dose and at no cost to the employees.

Hearing protectors must be worn:
1. When employees are exposed to noise levels that equal or exceed 85 dBA as an 8-hour TWA or 50 percent dose.
2. By any employee who is exposed as an 85 dBA 8-hour TWA or 50 percent dose and who has not had a baseline audiogram established.
3. By any employee who has experienced a STS.

Hearing protectors must attenuate employee exposure at least to an 8-hour TWA of 90 dBA or below. For those employees who have experienced STS, hearing protection must attenuate an employee’s exposure to an 8-hour TWA of 85 dBA or below.

The employer shall evaluate hearing protector attenuation for the specific noise environments in which the protector will be used. The UIUC shall use one of the evaluation methods described in Appendix B OSHA Noise Standard 29 CFR 1910.95: “Methods for Estimating the Adequacy of Hearing Protection Attenuation.”

The adequacy of hearing protector attenuation shall be re-evaluated whenever employee noise exposures increase to the extent that the hearing protectors provided may no longer provide adequate attenuation. The UIUC shall provide more effective hearing protectors where necessary.

Hearing protection devices include:
1. **Earplugs**, which consist primarily of formable plugs made of various materials such as expandable foam, glass fiber, Swedish wool, mineral down encased in polyethylene cover to prevent shredding, and wax impregnated cotton. Most of these plugs are disposable.
2. **Canal Caps** seal the external opening of the ear canal. They do not plug the ear canal as earplugs do, but block the entrance of sound at the opening of the canal. The canal caps are held in place by a light band or head suspension.
3. **Ear Muffs** consist of two dome-shaped cups that cover the entire external ear and seal against the side of the head with a suitable cushion or pad. The earmuff consists of four parts: the earcup (encloses the ear and is designed to deflect as much noise as possible), the sound absorbent earcup insert, the cushion (contacts the area around the ear), and the headband. See Appendix VI for additional information

TRAINING

All employees that are enrolled in the hearing conservation program will be trained by a manufacturer’s representative, S&C, or their designee.

Training shall be conducted prior to the initial use of hearing protection and refresher training will be given at least annually, or on an as need basis. When job tasks and hazards change, additional training commensurate with the new conditions must be provided to the employee.
Training must be specific for the type of hearing protection the user shall be wearing (i.e. foam plugs, canal caps, muffs, etc). Training shall include:

1. The effects of noise on hearing;
2. The purpose of hearing protectors; the advantages, disadvantages, and attenuation of various types of hearing protector devices; and instructions on the selection, fitting use and care.
3. The purpose of audiometric testing and an explanation of the test procedures.
4. Areas of the facility where noise levels are greater than or equal to 85 dBA.

The annual training must be updated to be consistent with changes in protective equipment and work processes. The training will be documented by providing a written summary of the information presented and the employees will sign and date the training documentation.

Access to information and training materials:

1. The UIUC shall make available to affected employees or their representatives copies of this standard.
2. The UIUC shall provide to affected employees any informational materials pertaining to the standard that are supplied to the UIUC by OSHA.
3. The UIUC shall provide all materials related to the employer’s training and education program pertaining to this standard to OSHA or IDOL upon request.

RECORD-KEEPING

The employing department is responsible for the primary recordkeeping of the hearing conservation program, according to the specific requirements listed below:

The UIUC shall establish and maintain accurate records according to the OSHA Access to Employee Exposure and Medical Records Standard (29 CFR 1910.1020) and the OSHA Noise Standard (29 CFR 1910.95 or 29 CFR 1926.53) for each employee required to be in the UIUC hearing conservation program. The record shall include the following:

1. Exposure measurements.
2. Audiometric test results, including:
   a. Name and job title of the employee in the hearing conservation program.
   b. A copy of all the latest noise exposure assessments.
   c. Audiometric testing results (baseline and all related correspondence) and date performed.
   d. The examiner’s name and the physician’s written opinion on any special medical examination related to the hearing conservation program.

The UIUC shall maintain accurate records of the measurements of background sound pressure levels in audiometric test rooms.

Records shall be retained as follows:

1. Noise exposure assessment – 2 years.

All records required by this section shall be provided upon request to employees, former employees, representatives designated by the individual employee, and OSHA or IDOL. The provisions of 29 CFR 1910.1020 (a)-(e) and (g)-(l) apply to access to records under this section.
Appendix I

Sample Unit Standard Operating Procedures

Hearing Conservation Program Standard Operating Procedures for:

_____________________________________

[Department]

It is the policy of [the above mentioned unit] to comply with the University of Illinois at Urbana-Champaign (UIUC) hearing conservation program. The purpose of this document is to complement the UIUC hearing conservation program with site-specific written standard operating procedures.

Program Administration
The UIUC recognizes the fact that employee supervisors are not necessarily experts in the area of hearing protection. However, as outlined in Section V/B-1.3 of the Campus Administrative Manual, it is the Supervisor’s responsibility to assure that required equipment and personal protective devices are provided, maintained and used by those they supervise. S&C and other qualified personnel will assist supervisors and employees in fulfilling these obligations upon request.

The following individual has complete responsibility for the administration of hearing protection in the above mentioned unit. It is the responsibility of this person to supervise the use of hearing protection and to ensure that it is used when required and in the manner in which the wearer has been trained.

________________________________________________

[name]

________________________________________________

[title]

Hearing Protector Selection
The hearing protectors selected for use by this unit are indicated below. [Types of Hearing Protection include: Earplugs, Canal Caps, and Ear Muffs – see Appendix VI]

<table>
<thead>
<tr>
<th>(Hearing Protection Type)</th>
<th>Area that exceeds 85 dBA for which hearing protection is required</th>
</tr>
</thead>
<tbody>
<tr>
<td>________________________</td>
<td>____________________________________________________________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(Hearing Protection Type)</th>
<th>Area that exceeds 85 dBA for which hearing protection is required</th>
</tr>
</thead>
<tbody>
<tr>
<td>________________________</td>
<td>____________________________________________________________</td>
</tr>
</tbody>
</table>
(Hearing Protection Type) __________________________ Area that exceeds 85 dBA for which hearing protection is required

(Hearing Protection Type) __________________________ Area that exceeds 85 dBA for which hearing protection is required

**Audiometric Testing/Medical Evaluations**
A determination of the capability of each individual to hear appropriately will be conducted by a licensed or certified audiologist, otolaryngologist, or other physician or by a technician who is certified by the Council of Accreditation in Occupational Hearing Conservation. The provider is:

________________________________________________________________________

Copies of the Audiometric Test for the employees are found in the employees’ personnel file in the following location:

________________________________________________________________________

**Hearing Conservation Training and Fitting Instructions for Hearing Protection**
Records of training and fitting instructions for the individuals in this unit who will be wearing protectors can be found in the following location:

________________________________________________________________________
Appendix II

29 CFR 1910.95 OCCUPATIONAL NOISE EXPOSURE CHECKLIST

**Noise Assessment**

☐ Yes  ☐ No  1. Has an area survey (using a Sound Level Meter, SLM) been conducted to identify areas where a worker 8-hour (time-weighted-average, TWA) exposure may equal or exceed 85 dBA?

☐ Yes  ☐ No  2. Has noise dosimetry (using a dosimeter) been conducted on employees in these areas?

☐ Yes  ☐ No  3. When employee’s noise exposure equals or exceeds 85 dBA are they included in the hearing conservation program, which includes:
   A. Annual audiometric testing
   B. Written standard operating procedures
   C. Annual training
   D. Record keeping procedures
   E. Noise monitoring at least every 2 years

☐ Yes  ☐ No  4. Has each employee exposed at or above an 8-hour TWA of 85 decibels (85 dBA) been notified of the monitoring results?

**Written Standard Operating Procedures**

☐ Yes  ☐ No  5. Does the unit have written SOPs?

**Audiometric Testing/Medical Surveillance**

☐ Yes  ☐ No  6. Has an audiometric testing program been established/maintained and provided at no cost to all employees who are enrolled in the Hearing Conservation Program?

☐ Yes  ☐ No  7. Do employees have at least 14 hours without exposure to workplace noise prior to a baseline audiogram? Hearing protection may be used to accomplish this.

☐ Yes  ☐ No  8. When an employee’s audiogram indicates there has been a STS between the annual and baseline audiogram:
   A. Has the employee been notified within 21 days?
   B. Has the retest been scheduled within 30 days?

☐ Yes  ☐ No  9. When a physical determines that the STS is work related or aggravated by occupational noise exposure, are the following steps completed?
A. Are employees who are not wearing hearing protectors fitted with hearing protection, trained in use and care, and required to wear them?
B. Are employees who already use hearing protection refitted with protectors with greater attenuation (at least to 85 dBA) and trained in their care and use?

**Hearing Protection**

- [ ] Yes  [ ] No  
  10. Is hearing protection made available to all employees exposed to an 8-hour TWA of 85 dB or greater at no cost to the employee?

- [ ] Yes  [ ] No  
  11. Is hearing protection required and the use enforced for area’s operations that exceed 85 dBA as an 8-hour TWA?

- [ ] Yes  [ ] No  
  12. Are hearing protectors replaced as necessary?

- [ ] Yes  [ ] No  
  13. Is training provided in the use and care of the hearing protectors provided to the employees?

**Training Program**

- [ ] Yes  [ ] No  
  14. Is a training program given for all employees who are exposed at or above the action level and repeated annually?

- [ ] Yes  [ ] No  
  15. Is it assured that each employee is informed of the following:
     A. The effects of noise on hearing?
     B. The purpose, advantage, disadvantage, and attenuation of various types of hearing protection and instructions on selection, fitting, use, and care?
     C. The purpose of audiometric testing and an explanation of the test procedures?

**Access to Information and Training Materials**

- [ ] Yes  [ ] No  
  16. Is a copy of the noise standard posted and available to affected employees?

**Record-Keeping**

- [ ] Yes  [ ] No  
  17. Are accurate records of all employee exposures, training, and audiometric testing data maintained?
Appendix III

Noise Dosimetry Results Notification Form

Name__________________  Bldg ____________________  Date________

UIN___________________  Job Description ________________________________

From: The Division of Safety and Compliance

The noise dosimetry for ____________________ indicates that noise exposure is

\[ \text{[name]} \] \[ \text{[dBA]} \]

\[ \text{[dBA]} \]

\[ \text{[name]} \]

\[ \text{[name]} \]

\[ \text{[name]} \]

If you have any questions, please call (217) 265-9828 for additional information.
Appendix IV

Noise Dosimetry Survey Form

Employee name:                      Date:  

Job Title:                           UIN:  

Dosimeter:                          Time on:  

Time off:  

Hearing protection worn:           Yes   No   

Bldg/Location:                      

Job activities/comments:            

Results of noise dosimetry:         

Noise dosages:                      

Employees are required to be enrolled in the Hearing Conservation Program if their noise dosage is 50% or greater (which is equivalent to 85 dBA for an 8-hour exposure).

Conclusion:

☐ Employee needs to be enrolled in the UIUC Hearing Conservation Program (HCP).

☐ Further sampling needs to be conducted to determine if employee needs to be in HCP.

☐ Employee does not need to be enrolled in the HCP at this time. No further action required.

If the employee needs to be enrolled in the UIUC Hearing Conservation Program, the following steps need to be taken.

1. Audiometric testing must be made available to the employee through the UIUC Medical Surveillance program initially and annually as long as the employee is performing the same basic job functions. The appointment for audiometric testing should be scheduled through the Department of Speech and Hearing Science. The fee for services is departmental responsibility.

2. The employee must attend a training session initially and annually thereafter. The Department of Speech and Hearing Science conducts this training; the cost is included in the fee for services.

3. Employees must wear suitable hearing protection which will be provided at no charge to the employee. The supervisor must enforce the wearing of hearing protection devices.
Appendix V

Standard Threshold Shift Notification

University of Illinois at Urbana Champaign
Hearing Conservation Program

From: __________________________________    Date:_____________________
To: _______________________________________

The audiometric test performed for you on [date] has been carefully reviewed and compared to your baseline audiogram of [date] done by the medical consultants of the testing firm [firm's name]. The examination results indicate that there has been an OSHA-defined Standard Threshold Shift in your [right/ left/ both ears] (an average shift of 10 dB or more at 2000, 3000, and 4000 HZ). As a result, the following corrective action(s) may be implemented:

A. If you are not currently wearing hearing protectors, you will be fitted, trained in their use and care, and required to use them.

B. If you are currently wearing hearing protectors, you will be refitted, retrained in their use, and provided with hearing protectors that attenuate noise exposure to 85 dBA or below.

C. You are strongly encouraged to wear hearing protection in high noise areas outside of work.

Noise monitoring data for you indicates that noise exposures are [exposure data in dBA] as a time weighted average for an eight hour day.

Please see your supervisor to arrange a meeting to review and sign your audiogram as well as discuss possible corrective actions.

If you have any other questions, please contact me at (217)265-9828.

[signed]
Appendix VI

Hearing Protector Information

Expandable foam plugs
These plugs are made of a formable material designed to expand and conform to the shape of each person’s ear canal. Roll the expandable plugs into a thin, crease-free cylinder. Whether you roll plugs with thumb and fingers or both hands does not matter, but do not roll between your palms as this cause’s distortion and creases. What is critical is the final result – a smooth tube thin enough so that about half the length will fit easily into your ear canal. Some individuals, especially people with small ear canals, have difficulty rolling typical plugs small enough to make them fit. A few manufacturers now offer a small-size expandable plug.

Pre-molded, reusable plugs
Pre-molded plugs are made from silicone, plastic or rubber and are manufactured as either “one-size-fits-most” or are available in several sizes. Many pre-molded plugs are available in sizes for small, medium, or large ear canals.

A critical tip about pre-molded plugs is that a person may need a different size plug for each ear. The plugs should seal the ear canal without being uncomfortable. This takes trial and error of the various sizes. Directions for fitting each model of pre-molded plug may differ slightly depending on how many flanges they have and how the tip is shaped. Insert this type of plug by reaching over your head with one hand to pull up on your ear. Then use your other hand to insert the plug with a gentle rocking motion until you have sealed the ear canal.

Advantages of pre-molded plugs are that they are relatively inexpensive, reusable, washable, convenient to carry, and come in a variety of sizes. Nearly everyone can find a plug that will be comfortable and effective. In dirty or dusty environments, you do not need to handle or roll the tips.

Canal caps
Canal caps often resemble earplugs on a flexible plastic or metal band. The earplug tips of a canal cap may be a formable or pre-molded material. Some have headbands that can be worn over the head, behind the neck, or under the chin. Newer models have jointed bands, increasing the ability to properly seal the earplug.

The main advantage canal caps offer is convenience. When it is quiet, employees can leave the band hanging around their necks. They can quickly insert the plug tips when hazardous noise starts again. Some people find the pressure from the bands uncomfortable. Not all canal caps have tips that adequately block all types of noise. Generally, the canal cap tips that resemble stand-alone earplugs seem to block the most noise.
Earmuffs
Earmuffs come in many models designed to fit most people. They work to block out noise by completely covering the outer ear. Muffs can be “low profile” with small ear cups, or large to hold extra materials for use in extreme noise. Some muffs also include electronic components to help users communicate or to block impulse noises.

Workers who have heavy beards or sideburns or who wear glasses may find it difficult to get good protection from earmuffs. The hair and the temples of the glasses break the seal that the earmuff cushions make around the ear. For these workers, earplugs are best. Other potential drawbacks of earmuffs are that some people feel they can be hot and heavy in some environments.

Miscellaneous devices
Manufacturers are receptive to comments from hearing protection users. This has led to the development of new devices that are hybrids of the traditional types of hearing protectors. (Visit NIOSH searchable compendium of hearing protectors) Because many people like the comfort of foam plugs, but do not want to roll them in dirty environments, a plug is now available that is essentially a foam tip on a stem. You insert this plug much like a pre-molded plug without rolling the foam.

Scientists are developing earmuffs using high-tech materials to reduce weight and bulk, but still effectively block noise. On the horizon may be earplugs with built-in two-way communication capability.

Still, the best hearing protector is the one that is comfortable and convenient and that you will wear every time you are in an environment with hazardous noise.