Noise Monitoring, Audiometric Testing and OSHA Record Keeping: How They all Fit Together

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1910.95 Noise Exposure Standard
1904.10 Recording Hearing Loss
You Will Learn

- When is a hearing conservation program required?
- What is a Standard Threshold Shift and how is it calculated?
- When is a Standard Threshold Shift recordable?
- What is an employer required to do in after an Standard Threshold shift?
- When is an employer required to record a hearing loss on the OSHA 300 Log?
Hearing Conservation Program
When is a Hearing Conservation Program Required?

- Exposure monitoring: HCP is mandatory at 8 Hour TWA >85 dBA (AL)
- Notify Employees
- Audiometric testing
- Provide Hearing Protection
- Employee training
- Recordkeeping
When is Hearing Protection Required?

- Must first try to implement ‘feasible’ engineering controls.

### TABLE G-16 - PERMISSIBLE NOISE EXPOSURES (1)

<table>
<thead>
<tr>
<th>Duration per day, hours</th>
<th>Sound level dBA slow response</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>90</td>
</tr>
<tr>
<td>6</td>
<td>92</td>
</tr>
<tr>
<td>4</td>
<td>95</td>
</tr>
<tr>
<td>3</td>
<td>97</td>
</tr>
<tr>
<td>2</td>
<td>100</td>
</tr>
<tr>
<td>1 1/2</td>
<td>102</td>
</tr>
<tr>
<td>1</td>
<td>105</td>
</tr>
<tr>
<td>1/2</td>
<td>110</td>
</tr>
<tr>
<td>1/4 or less</td>
<td>115</td>
</tr>
</tbody>
</table>
Selecting Hearing Protection

- Noise Reduction Ratio (NRR) is calculated in C-Scale, Noise Exposure levels are calculated in A-Scale. To convert: NRR-7dB

- OSHA recommends reducing the NRR by an additional safety factor of 50%

- NRR must be sufficient to attenuate noise levels below 90 dBA, and below 85dBA for those with an STS

- Must provide a variety of hearing protection types to chose from.

- CMC uses the 3M verifit system to fit each individual employee to establish a Personal Attenuation Record (PAR)
3M Earfit System
Audiometric Testing
What Is An Audiogram?

- An audiogram is a picture or graph of a hearing test.
- It measures the quietest sounds (loudness-measured in dB) you can hear at different frequencies (pitch-measured in Hz)
What Is An Audiogram?

• Before being first exposed to excessive noise, an employer is required to provide hearing tests or audiograms to employees, which is called a “baseline”.

• Subsequent hearing tests are compared to the original baseline audiogram.
Baseline Audiogram Requirements

- **Off Site Testing**: Must done within 6 months of the employees first exposure at or above the action level.

- **Mobile Test Van Exception**: Must be done within 1 year of first exposure.

- In the time prior to the baseline, employees must be given training and hearing protection.

- Baseline testing shall be preceded by 14 hours without exposure to workplace noise, hearing protectors can be used as substitute for this requirement.

- Employers shall notify employees to avoid high levels of non-occupational noise during the 14 hours preceding audiometric examination (baseline & annual).
The graph, or audiogram, is laid out like a piano keyboard, with low to high frequencies (low to high pitches) going from left to right.
The soft sounds are on the top and the loud sounds are on the bottom.
When your graph is filled in, it shows your hearing sensitivity for different frequencies at different intensities (at different pitches and different volumes).
• Audiogram shows relatively normal hearing.

• Normal hearing is defined as a hearing threshold between 10 and 25 decibels.

• This person can hear the softest sounds.

• This graph only shows one ear.
- Audiogram shows high frequency loss.

- Commonly caused by workplace exposure.

- This person can only hear moderate & loud sounds at higher frequencies.

- “X” is for the left ear; “O” is for the right ear.
Hearing Loss Example
STS- OSHA’s Definition

- The Standard Threshold Shift definition in the Occupational Noise Exposure Standard 1910.95 (g)(10) is:
  - “A change in hearing threshold, relative to the baseline audiogram for that employee, of an average of 10 dB or more at 2000, 3000, and 4000 Hz in one or both ears.”
Audiograms and STS

• Audiograms can measure frequencies between 125 Hz and 8000 Hz (non-occupational)

• OSHA requires testing at 500, 1000, 2000, 3000, 4000, 6000 Hz

• Only 2000 Hz, 3000 Hz and 4000 Hz frequencies are used to calculate a Standard Threshold Shift (STS).
Calculation of STS

- The audiologist compares the results of the annual audiogram to the baseline test.
- The audiologist will evaluate your results at 2000, 3000 and 4000 Hz (frequencies).
- A change in these three frequencies that averages 10 db or more, in either ear, is called a Standard Threshold Shift (STS).
The STS is calculated by adding the “Shift in Hearing” results and averaging. Thus: 
\[(10+15+20)/3 = 45/3 = 15\]

Is this considered an STS? 
**YES >10dB**

The average shift is greater than 10 so the follow-up procedures to prevent further hearing loss must be followed.
Calculation-Hearing Threshold Level (HTL)

<table>
<thead>
<tr>
<th></th>
<th>2000 Hz</th>
<th>3000 Hz</th>
<th>4000 Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016 Annual Audiogram dB</td>
<td>15</td>
<td>15</td>
<td>30</td>
</tr>
<tr>
<td>Audiometric Zero dB</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Variance in Audiometric Zero dB</td>
<td>15</td>
<td>15</td>
<td>30</td>
</tr>
</tbody>
</table>

The hearing threshold level (HTL) is calculated by adding the variance above audiometric zero and averaging. Thus:

\[(15 + 15 + 30) / 3 = 60 / 3 = 20\]

This employee had an STS of 15 db and HTL shift of 20. Is this case OSHA recordable?

NO
<table>
<thead>
<tr>
<th>Years</th>
<th>1000</th>
<th>2000</th>
<th>3000</th>
<th>4000</th>
<th>6000</th>
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<tbody>
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<td>20 or younger</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>8</td>
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<td>7</td>
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<td>13</td>
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<tr>
<td>32 or older</td>
<td>6</td>
<td>5</td>
<td>7</td>
<td>10</td>
<td>14</td>
</tr>
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<td>33</td>
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<tr>
<td>60 or older</td>
<td>11</td>
<td>13</td>
<td>23</td>
<td>33</td>
<td>38</td>
</tr>
</tbody>
</table>
### Calculation-STS with Age Correction (Presbycusis)

<table>
<thead>
<tr>
<th></th>
<th>2000 Hz</th>
<th>3000 Hz</th>
<th>4000 Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age 32 (Current Age at Annual)</td>
<td>5</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>Age 27 (Age at Baseline)</td>
<td>-4</td>
<td>-6</td>
<td>-7</td>
</tr>
<tr>
<td>Difference dB</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
</tbody>
</table>

The age correction is calculated by subtracting the age correction value for the year of the baseline test from the age correction value for the year of the annual test.

<table>
<thead>
<tr>
<th></th>
<th>2000 Hz</th>
<th>3000 Hz</th>
<th>4000 Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016 Annual Audiogram dB</td>
<td>15</td>
<td>15</td>
<td>30</td>
</tr>
<tr>
<td>Difference for Age Correction dB</td>
<td>-1</td>
<td>-1</td>
<td>-3</td>
</tr>
<tr>
<td>2016 Annual Audiogram (Age Corrected) dB</td>
<td>14</td>
<td>14</td>
<td>27</td>
</tr>
</tbody>
</table>
Calculation-STS with Age Correction (Presbycusis)

<table>
<thead>
<tr>
<th></th>
<th>2000 Hz</th>
<th>3000 Hz</th>
<th>4000 Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009 Annual Audiogram dB</td>
<td>14</td>
<td>14</td>
<td>27</td>
</tr>
<tr>
<td>2004 Baseline Audiogram dB</td>
<td>5</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>Shift in hearing dB</td>
<td>9</td>
<td>14</td>
<td>17</td>
</tr>
</tbody>
</table>

The STS is calculated by adding the “Shift in Hearing” results and averaging. Thus:

\[
(9 + 14 + 17)/3 = 40/3 = 13.3
\]

Age Adjustment is not a requirement. It is done at the employer’s discretion.

The 10 dB STS can be age adjusted, the 25 dB HTL can not.
Follow-Up: OSHA Requirements

• If a STS has occurred:
  – The audiogram must be reviewed by an audiologist, otolaryngologist (ENT), or other qualified physician to determine if there is a need for further evaluation.
  – The employee must be informed of the STS, in writing, within 21 calendar days from the test date. 1910.95(g)(8)(i) LOI 6-25-86
  – Employee must be retrained and refitted with hearing protection.
Follow-Up: OSHA Requirements

- The audiogram reviewer (employer) must communicate to the employee any suspected medical conditions that are found that are unrelated to the workplace.

- This information is confidential between the reviewer and the employee.
Follow-Up: OSHA Requirements

• A re-test can be ordered, within 30 days of the test that showed a STS.

• The re-test can then be considered the annual audiogram.
Follow-up: OSHA Requirements

- The employer must keep the baseline audiogram without revision, unless a qualified reviewer determines:
  - The STS is persistent (recordable shift)
  - OR
  - The hearing shown in the annual audiogram indicates significant improvement over the baseline audiogram.
Follow-up : What is it?
(Further Evaluation)

• And.....what about follow-up
  – What is this really?
  – Retesting is **NOT** Follow-Up
  – Retesting is.....”Retesting”

• Confirmed retesting requires “Follow-up”
Follow-up: Who Should Do It?

• Can only be done by an Audiologist or ENT Specialist
  – Referral to a Physician or Industrial Clinic with no hearing science training is not adequate

• Provide the Hearing Professional with:
  – Detailed Employee Job Description
  – Employee Exposure Noise Levels
  – Audio Data Summary
  – Reason for referral
Follow-up: What to Assess?

- Hearing Professional must have an “unbiased” attitude.
  - Poor assumption that 20 years in a noisy place caused the loss without looking at all factors

- Look at all factors affecting hearing, not just work noise.

- Consider all noises: military, recreational, prior jobs, hunting or target shooting, lighting firecrackers etc.

- Threshold patterns relative to noise exposures, length of employment, use of hearing protection
Affects of Non-occupational Noise
Follow-Up: Who Pays For It?

• The employer must pay for any clinical audiological evaluation or otological exam required by the reviewer if:
  
  – Additional review is necessary to evaluate the cause of hearing loss
  
  **OR**
  
  – There is indication of a medical condition caused or aggravated by the use of hearing protectors.
Follow-up Requirements

- The most important part of your hearing conservation program is:

- Follow Up,
- Follow Up,
- Follow Up
- Follow Up
OSHA Record Keeping
Record Keeping Requirements

Audiometric test records must include:

- Name and job title of the employee
- Date of audiogram
- Examiner’s name
- Date of last calibration of audiometer
- Employee’s most recent noise exposure assessment
- Background sound levels in the audiometric test room.
- Retain noise exposure records for two years.
- Audiometric exposure records for the duration of the affected employees employment.
- CMC considers them medical records, maintained for duration of employment, plus 30 years.
Posting Requirement

- 1910.95(L) Requires employers to post a copy of the Occupational Noise Exposure standard in the workplace.
Determining OSHA Recordability

- Must be recorded on the Log 300:
  - If a 10 dB STS and a 25 dB HTL have both occurred
  - If there was no retest  \textbf{or}
  - The retest confirmed STS  \textbf{or}
  - Follow-up evaluation determined that at least part of the STS was due to workplace noise.
# OSHA 300 Log

## OSHA's Form 300 (Rev. 01/2004)

**Log of Work-Related Injuries and Illnesses**

You must record information about every work-related injury or illness that involves loss of consciousness, restricted work activity or job transfer, days away from work, or medical treatment beyond first aid. You must also record significant work-related injuries and illnesses that are diagnosed by a physician or licensed health care professional. You must also record work-related injuries and illnesses that meet any of the specific recording criteria listed in 29 CFR 1904.4 through 1904.12. Feel free to use two lines for a single case if you need to. You must complete an injury and illness incident report (OSHA Form 301) or equivalent form for each injury or illness recorded on this form. If you're unsure whether a case is recordable, call your local OSHA office for help.

### Identify the person
- **Case No.**
- **Employee's Name**
  - (A)
  - (B)
- **Job Title**
  - (C)
- **Date of injury or onset of illness**
  - (D)
- **Where the event occurred**
  - (E)
- **Describe injury or illness, parts of body affected, and object/substance that directly injured or made person ill**
  - (F)

### Describe the case
- **CHECK ONLY ONE box for each case based on the most serious outcome for that case:**
- **Enter the number of days the injured or ill worker was:**
- **Check the "Injury" column or choose one type of illness:**

### Classify the case
- **Death**
- **Days away from work**
- **Other recordable cases**
- **Away From Work (days)**
- **On job transfer or restriction (days)**
- **Job transfer or restriction (days)**
- **Skin Disorder**
- **Respiratory Condition**
- **Pneumoconiosis**
- **All other illnesses**

<table>
<thead>
<tr>
<th>Case No.</th>
<th>Employee's Name</th>
<th>Job Title</th>
<th>Date of injury or onset of illness</th>
<th>Where the event occurred</th>
<th>Describe injury or illness, parts of body affected, and object/substance that directly injured or made person ill</th>
<th>CHECK ONLY ONE box for each case based on the most serious outcome for that case</th>
<th>Enter the number of days the injured or ill worker was</th>
<th>Check the &quot;Injury&quot; column or choose one type of illness</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hardy Hearing</td>
<td>Mechanic</td>
<td>9-1-09</td>
<td>Maintenance Shop</td>
<td>Hearing STS in left ear</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Page totals
- 0
- 0
- 0
- 1
- 0
- 0
- 0
- 0
- 1
- 0

Be sure to transfer these totals to the Summary page (Form 300A) before you post it.

Public reporting burden for this collection of information is estimated to average 14 minutes per response, including time to review the instruction, search and gather the data needed, and complete and review the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments about these estimates or any aspects of this data collection, contact US Department of Labor, OSHA Office of Statistics, Room N-344, 200 Constitution Ave. NW, Washington, DC 20210. Do not send the completed forms to this office.
Frequently Asked Questions

• Do I have to record the hearing loss if I am going to retest the employee’s hearing within 30 days of the first test?

*No: 1904.10(b)(4)
Does the 30-day retest start on the day the initial hearing exam was completed, or on the date that the results are given to the employer?

*The 30-day retest begins from the date of the first test: (LOI 3-4-04)*
Frequently Asked Questions

• If the retest confirms a recordableSTS, how long do I have to record it?

*7 days: 1904.10(b)(4)
Can I correct my OSHA 300 log if on a subsequent (future) exam an employee’s hearing improves to a point that it is no longer recordable?

*Yes, you may erase or line out the recorded entry: (LOI 3-4-04)*
Frequently Asked Questions

• During an employee’s annual hearing test a STS is discovered. To rule out a testing error an immediate retest is performed. Is this the only retest that can be performed and do I have 7 days to record it at this point?

*No, the standard does not state that only one retest may be given. Additional testing may be needed to determine if other factors such as allergies or a recent noise exposure are causing a temporary shift. All retests must be done within 30 days of the initial test. (LOI 8-14-03)*
Frequently Asked Questions

• Are there any special rules for determining whether a hearing loss case is work-related?

*No, if an event or exposure in the work environment either caused or contributed to the hearing loss, or significantly aggravated a pre-existing hearing loss, you must consider the case to be work related. 1904.10(b)(5)
Frequently Asked Questions

• If a physician or other licensed health care professional determines the hearing loss is not work-related, do I still need to record the case?

*No: 1904.10(b)(6)
Age Related Hearing Loss