# Chapter 16: Noise Standards

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## OSHA Stds: 29 CFR 1910.95

- Protection SHALL be provided when sound levels >90 dBA for 8 hr TWA (PEL) as measured by a sound level meter on slow response
- Exposure to impulsive or impact noise should not exceed 140 dB peak SPL
- Based on Table G-16 (next slide)

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## G-16: (note: based on 5 dB exchange rate)

| Allowed Duration/Day hours | SPL dBA |
|---|---|
| 8 | 90 |
| 6 | 92 |
| 4 | 95 |
| 3 | 97 |
| 2 | 100 |
| 1 1/2 | 102 |
| 1 | 105 |
| 1/2 | 110 |
| 1/4 or less | 115 |

$$T_{allowed} = \frac{480}{2^{\left(\frac{SPL-90}{5}\right)}}$$

**Excludes all but 90-115 dBA**

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## Engineering Controls

- When the employee is subjected to **>PEL**, feasible administrative or engineering **controls shall be utilized**.
- If such controls fail to reduce sound levels <PEL, **PPE** shall be provided and used.

**Comment:**

- **PEL = 90 dBA TWA using 5 dBA doubling**
- **Only SPL ≤ 90 dBA included**

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## Hearing Conservation

Amended to OSHA standard in 1985

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## Action level for hearing conservation program

- Action level
  - 85 dBA, 8-hr TWA
  - Extends included range to 80-130 dBA
  - Threshold Dose = 50%
- Employer must:
  - Administer hearing conservation program
  - Implement a monitoring program

$$Dose = \left[\sum_{i=1}^{n} \frac{T_{Observed}}{T_{Allowed}}\right]$$

$$T_{allowed} = \frac{480}{2^{\left(\frac{SPL-90}{5}\right)}}$$

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## Time-Weighted Average Computed from Dose

OSHA

$$SPL_{8-hr\,TWA} = 90 + \left[\frac{5}{\log(2)}\right] \times \log\left(Dose_{obs}\right)$$

Since law-enforcement, count non-sampled period as zero.

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## Dose Calculations – OSHA vs ACGIH

| OSHA HCP | ACGIH TLV |
|---|---|
| $T_n = \frac{480}{2^{\left(\frac{SPL-90}{5}\right)}}$ | $T_n = \frac{480}{2^{\left(\frac{SPL-85}{3}\right)}}$ |
| $SPL_{TWA} = 90 + \left[\frac{5}{\log(2)}\right] \times \log\left(Dose_{obs}\left[\frac{480}{T_{obs}}\right]\right)$ | $SPL_{TWA} = 85 + \left[\frac{3}{\log(2)}\right] \times \log\left(ACGIH\ Dose_{obs}\left[\frac{480}{T_{obs}}\right]\right)$ |
| $SPL_{8-hr\,TWA} = 90 + \left[\frac{5}{\log(2)}\right] \times \log\left(Dose_{obs}\right)$ | $SPL_{8-hr\,TWA} = 85 + \left[\frac{3}{\log(2)}\right] \times \log\left(ACGIH\ Dose_{obs}\right)$ |
| Range: 80-130 dBA | Range: 80-130 dBA |
| Action Level: 85 dBA = 50% dose | Criteria: 85 dBA = 100% dose |

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## More on ACGIH

- The ACGIH recommends against using administrative controls (mainly employee rotation) to control worker exposures of 103 dBA or more, while OSHA allows it.
- The TLV, beginning in 1998, addresses concomitant exposure to noise and chemicals that may have the potential to cause hearing loss (e.g., toluene, lead, manganese, and butyl alcohol).
- The 1999 TLV includes a proposed addition which recommends abdominal exposure limits for pregnant workers, to protect the hearing of the developing fetus.
  - 8-hour TWA of 115 dBC and a ceiling limit of 155 dBC

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## MSHA's Key Numbers

- Exposures

  85 dBA TWA Action Level
  90 dBA TWA PEL

  115 dBA Slow Response Ceiling Limit
- Hearing Protection

  105 dBA TWA Dual Hearing Protection Required
- MSHA Audiometric Testing – Threshold Shift
  Standard: 10 dB Average of 2, 3, & 4 kHz
  Reportable: 25 dB Average of 2, 3, & 4 kHz

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## Monitoring Program

- Sampling strategy to ID exposed employees
- Personal sampling (i.e., dosimetry) for *mobile* employees, or if area sampling is infeasible
  - Comment: implies that area sampling preferred over dosimetry – because of technology of dosimeters at the time
- Include all continuous, impulsive, or intermittent noise of 80-130 dBA
  - i.e., noise < 80 dBA counts as zero]
- Noise instruments must be calibrated

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## Monitoring Program

- Monitoring shall be repeated if:
  - there is change in production, equipment, or controls
  - changes that may cause other employees to be overexposed
  - Noise may have increased to the point that PPE now inadequate

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## Monitoring Program

- Employees exposed to ≥85 dBA shall be notified of their monitoring results
- Must provide employees opportunity to observe noise measurements
  - e.g., union representative

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## Audiometric Testing

- Performed by:
  - Licensed or certified audiologist, otolaryngologist, or other physician,
  - Or by a technician
    - who is certified by the Council of Accreditation in Occupational Hearing Conservation,
    - or who has satisfactorily demonstrated competence in administering audiometric examinations, obtaining valid audiograms, and properly using, maintaining and checking calibration and proper functioning of the audiometers being used.
    - A technician who operates microprocessor audiometers does not need to be certified.
    - A technician who performs audiometric tests must be responsible to an audiologist, otolaryngologist or physician.

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## Audiometric Testing

- Establish an audiometric testing program at no cost to employees
- The employer shall maintain accurate records of the measurements of the background sound pressure levels in audiometric test rooms.
  - Must be posted on the booth

TABLE D-1 –
MAXIMUM ALLOWABLE OCTAVE-BAND SOUND PRESSURE LEVELS
FOR AUDIOMETRIC TEST ROOMS

| Octave-band center frequency (Hz) | 500 | 1000 | 2000 | 4000 | 8000 |
|---|---|---|---|---|---|
| Sound pressure level (dB) | 40 | 40 | 47 | 57 | 62 |

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## Audiometric Testing

- Testing to establish a baseline audiogram shall be
  - Preceded by at least 14 hours without exposure to workplace noise.
  - Or employee must wear hearing protectors that day before testing.
- Must be done:
  - Within 6 months of starting exposure
  - Within 12 months if mobile test van used
    - Employees shall wearing hearing protectors for any period exceeding six months after first exposure until the baseline audiogram is obtained.

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## Hearing Protection Devices (HPD)

- HPD must be worn by:
  - overexposed employees
  - employees who have not yet had baseline
  - employees who have experienced STS
- Note: HPD can be worn by employee who is not overexposed, but employer must insure that kept sanitary, etc.

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## HPD . . . 3

- Employer shall:
  - Provide appropriate PPE to employees
    - Reduce sound at ears to 8-hr TWA < 90 dBA
    - 8-hr TWA< 85 dBA, if have temporary threshold shift
  - Provide a variety of suitable PPE
  - Provide PPE at no cost to employees
  - Provide training on the use/care of PPE
  - Ensure initial fitting of PPE

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## Record-Keeping

- Employer shall post OSHA noise standard in the workplace
- Employer shall maintain records

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## Training Program

- Employer shall provide training
- Training shall be conducted **ANNUALLY**
- Training shall include:
  - Effects of noise on hearing
  - Information on PPE
  - Information on audiometric testing
- The employer shall provide, upon request, all materials related to the employer's training and education program pertaining to this standard to the Assistant Secretary and the Director.

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## Record-Keeping

- Noise exposure records:
  - 2 yrs
- Audiometric testing records:
  - Duration of Employment

My advice: Keep all exposure and audiometric testing data forever

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## Posting Requirement

- The employer shall make available to affected employees or their representatives copies of the noise standard and shall also post a copy in the workplace.
- The employer shall provide to affected employees any informational materials pertaining to the standard that are supplied to the employer by the Assistant Secretary.

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# The End

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