

[Insert Site Name]

WRITTEN
HEARING
CONSERVATION
PROGRAM

HEARING CONSERVATION PROGRAM

[SITE NAME]

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Foreword

This document has been developed as a program guideline for companies who are required to have a written Hearing Conservation Program. Decibel noise level references in this document that correlate to program elements may need to be customized to meet local legislative requirements that may be more stringent.

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1. PURPOSE

The purpose of this procedure is to prevent occupational noise induced hearing loss by providing requirements for evaluating and controlling workplace exposure to noise.

2. SCOPE

This procedure has been established for operations and employees working at the [SITE NAME].

3. DEFINITIONS

The following definitions are used in this document:

HTL-TWA: hearing threshold level (HTL) time weighted average (TWA) used for determining compliance with limits set forth by regulatory agencies. The HTL-TWA is an 8-hour time-weighted average sound level of 85 decibel measured on the A scale (slow response) or, equivalently, a dose of fifty percent.

HTL-Dose: accumulation of hearing threshold levels for employees exposed to different A-weighted sound levels during the day. A Dose of 1.0 (100%) is equivalent to a TWA of 85 dBA. The dose equaling 100% is dependent on the criterion level selected; therefore 100% dose can vary (e.g. TWA 85, TWA 90, etc).

HTL-Lavg: permissible average noise level, in dBA for steady and interrupted noise exposures during the sampling period.

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dB_A - Decibels measured on the A-Weighted Sound Level scale; unit of measure for sound level.

Sound Level Survey - Survey during which instantaneous sound levels are measured.

Noise Dosimetry Monitoring – Employee or area exposure monitoring that incorporates varying sound levels over the sampled period, resulting in an average sound level exposure.

Similar Exposure Group (SEG) – The placement of workers into groups with similar exposures to facilitate evaluation of results.

Noise – Sound that is unwanted sound by the listener because it is unpleasant. Noise interferes with the perception of wanted sound and may be physiologically harmful.

Sound- Displacement of pressure waves in the air.

Sound Pressure- Sound pressure is expressed in decibels. The level, in decibels, of a sound is 20 times the logarithm to the base 10 of the ratio of the pressure of this sound to the reference pressure. (Equation: 0 dB SPL = 20 uPa = 2×10^{-5} PA)

Frequencies- Rate (in hertz or Hz) at which pressure oscillations are produced. One hertz is equivalent to one cycle per second. A subjective characteristic of sound related to frequency is pitch.

Noise Reduction Rating (NRR): Consider adding the NRR definition, what it is and what it is used for. The NRR, is the rating used to indicate the level of hearing protection provided by a device. To calculate attenuation, use the NRR for the protector, subtract 7 and then multiply by 50% (0.50). The resulting number is then subtracted from the unattenuated noise exposure level to yield the noise exposure level in decibels when wearing the chosen hearing protector.

. In the European Union, the single number rating (SNR) is used as a parameter similar to NRR.

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4. RESPONSIBILITIES

Site Management

[SITE NAME] Management will:

- Ensure compliance with and local rules and regulations.
- Appoint and empower a Hearing Conservation Program Coordinator
 - Notify the Hearing Conservation Program Coordinator prior to any modifications to processes, machinery, structures or other changes that may expose additional employees to noise levels at or above the noise exposure limit of 85 dBA TWA or local limit if more stringent or changes that may reduce the noise levels and allow to take employees out of the hearing conservation program.
 - Ensure that risk based noise control measures are implemented. Ensure that feasible noise controls are implemented at new or modified equipment to control noise exposure to as low as reasonably achievable
- Provide employees with on-going supervision in the use of the hearing protection

Hearing Conservation Program Coordinator

The Hearing Conservation Program Coordinator [EMPLOYEE NAME] will:

- Attend training as needed to administer the program;
- Conduct risk assessment to determine employees and/or job functions to be included in the Hearing Conservation Program. Risk assessments are based on requirements unless local requirements are more restrictive.
- Using a sound level meter identify areas with noise levels greater than 82dBA and follow-up with noise dosimetry to identify personnel with exposures equal to or greater than 85dBA as a time-weighted average.
- Interpret risk assessment data and provide site management with results of interpretation along with recommendations for controlling exposures. Control measures should take into account the “Hierarchy of Exposure Controls”.

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- Notify all affected personnel of risk assessment results.
- Establish and maintain a Hearing Conservation Program that includes: annual training of affected personnel and; annual audiometric testing of affected personnel (coordinate thru Occupational Health Services or local resource).
- Establish a routine noise monitoring schedule (e.g., annually) to maintain an accurate profile of exposure levels. Additionally, conduct noise monitoring if equipment or process changes are likely to adversely or positively affect current noise exposure levels. Expand or reduce Hearing Conservation Program as appropriate.
- Partner with those responsible for purchase of new or modified equipment to ensure that feasible noise reduction controls are evaluated and installed prior to purchase or modification
- Ensure signs are posted where hearing protection is required.
- If PPE is used to control noise exposures, ensure that selected hearing protectors are suitable for the expected noise levels. Personnel must be allowed to choose from a variety of appropriate hearing protectors.
- When necessary, ensure that there are procedures for cleaning, maintenance and storage of hearing protection.
- Maintain oversight role for the selection and purchase of personal hearing protectors
- Ensure that all contractors adhere to the requirements of this program.

Employees

Each employee in the Hearing Conservation Program will:

- Receive training (i.e., frequency based on local legislative requirements) on the effects of noise and the steps employed at their site to control noise exposures.
- Ensure that they wear the appropriate level of hearing protection assigned to the task they are performing.
- Use, store, and maintain it in accordance with instructions and training received.

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- Receive annual audiometric testing. All tests are to be coordinated through Occupational Health Services.
- Communicate any questions or concerns regarding the use of hearing protection to their Supervisor or Program Coordinator.

Occupational Health Services or Local Resource

Occupational Health Services or the local resource will be responsible for:

- Administer initial and annual audiometric exams including otologic evaluation to employees participating in the Hearing Conservation Program
- Provide the employee with the results of the audiogram
- Performing trending on the audiometric results
- Maintain audiogram records in accordance with the records retention schedule.

5.0 ELEMENTS OF AN EFFECTIVE HEARING CONSERVATION PROGRAM

- **Controls** - Feasible, engineering controls shall be provided to reduce or eliminate employee exposure to occupational noise. However, when engineering controls are not sufficient to reduce noise to safe levels, administrative controls (i.e., reduction of total hours spent in noise area) or the appropriate level of personal protective equipment must be provided to and worn by affected employees.
- **Noise surveys** – Identify area noise levels 82dBA or greater and follow-up with Personal dosimetry and data analysis for comparison with (85dBA TWA) and/or local Hearing Conservation standards.
- **Survey recommendations** – Results are communicated to employees, their Supervisor and Occupational Health
- **Education and motivation** - Sessions are provided to employees and management on the work area noise levels and how the Hearing Conservation program prevents noise induced hearing loss.
- **PPE selection** -Supervisors and employees are instructed and trained in the selection and use of ear protective devices. Proper selection, fitting and use of hearing protection protect employees from overexposure to workplace noise.

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- **Annual audiometric testing** - Conducted to monitor shifts in hearing for those who are required to participate in the Hearing Conservation program.
- **Recordkeeping** - Includes noise surveys and data analysis, education and motivation, audiometric testing and documentation of employee notification.
- **Identify noise areas**-Display appropriate warning signs in areas and on equipment with sound level readings equal to or greater than 85 dB or greater than 140 dBC impact, or local legislative limit.

6.0 SOUND LEVEL SURVEYS

Preliminary Noise Survey

Conduct a general screening survey of all areas of the facility in order to identify areas that present possible over exposure to noise. Typically 82dBA is used as a trigger when conducting these surveys to indicate that personnel noise dosimetry should follow. This can be accomplished by identifying the activity and purpose of each area such as office areas, maintenance, operations, or warehouse. Walking through the facility and noting the ease or difficulty of carrying on a conversation can also serve as a Preliminary Noise Survey. It is generally accepted that conversation is difficult in areas where noise levels are near or exceed 85 dBA.

Basic Noise Survey

The next step will be to conduct a Basic Noise Survey in the areas that are categorized as a potential noise exposure area. The purpose of the Basic Noise Survey is to identify workers whose noise exposure may exceed 85 dBA for a Time Weighted Average (TWA) for an 8-hour period.

- With the help of the workers, supervisors and management of the area to be surveyed, determine the normal activities for the area, ensure that the equipment is in operations, and identify the work flow and worker stations.
- Using a Sound Level Meter (SLM) that has been calibrated in accordance with the manufacturer's recommendation (i.e., factory and field calibration) take sound level readings in the A scale on Slow Response.
 - Hold the SLM approximately 5 feet/1.5meters above the floor in the area where the worker would be.

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- Take a number of readings to reflect any fluctuations in the noise at that point.
- Record the location and the SLM readings on Attachment 1. If an engineering drawing of the layout of the work area is available, recording the SLM readings at the corresponding location on the drawing can be very helpful.
- Readings may be recorded as a single measurement if sound level is constant. Readings may also be recorded as a range, from lowest to highest levels observed for that specific location.
- Repeat this process throughout the work area.
- Basic noise surveys should be conducted periodically or if changes in equipment or processes (ie, added, deleted, moved or modified) could affect the noise levels
- Identify areas where SLM readings (set on the A scale, slow response) indicate levels equal to or greater than 82dBA. Personal noise dosimetry should be conducted of the similar exposure groups in these identified areas.

Interpreting the results of the Basic Noise Survey

- If the noise levels measured are stable with little or no variability and the worker remains in this area throughout the work shift, then the Basic Noise Survey may be an effective means to determine the workers full-shift time weighted average exposure.
- If the measured noise levels vary by several decibels at 80 dbA or greater and/or the workers tasks require them to move throughout the work area or to another work area, then it may be necessary to conduct a Detailed Noise Survey using the Personal Dosimetry Survey method.

7.0 PERSONAL DOSIMETRY SURVEY

Each operation and/or similar exposure group that has been assessed with a SLM equal to or greater than 82dBA or with potential noise levels equal to or exceeding 85 dBA shall be monitored using noise dosimetry to establish the full-shift, time-weighted average (TWA) exposure levels. The following requirements shall be established for personal dosimetry surveys:

- Set dosimeter settings for a threshold of 70 dB, doubling rate of 3 dB, and criterion level of 85 dBA,;
- Steady state and impact noise measurements should be made with a sound level meter conforming as a minimum to the requirements of the most current ANSI S1.4 standard or IEC 651, type 2 and set to an A-weighted slow response or with an audio dosimeter of equivalent accuracy and precision.

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- Dosimeters shall be calibrated in accordance with the manufacturer's recommendation (i.e., factory and field calibration).
- Equipment calibration shall be performed with an acoustical calibrator accurate according to the manufacturer's instructions to verify the before and after calibration of the sound measuring instruments. Calibration should be performed each time measurements are made.
- Dosimeter microphones should be positioned in accordance with the manufacturer's specifications. In general, microphones are connected to the shirt at the shoulders. If noise is coming from one location, connect the microphone to the shoulder closest to the noise source. Position the microphone upward so that it does not rub on clothing or the neck.
- Document the details and results of the personal dosimetry survey on Attachment 2.
- Operation/area noise levels that are equal to or exceed 85 dBA require a statistically valid comprehensive personal dosimeter survey to establish the time-weighted average (TWA) exposure levels (dose) for jobs (employees) in those areas.

8.0 DATA ANALYSIS

- All employees with daily or routine noise exposure equal to or greater than an 8-hour TWA of 85 dBA (dose of greater than 100%) or other more restrictive legislative limit shall be included in the Hearing Conservation Program.

9.0 COMMUNICATION OF RESULTS AND RECOMMENDATIONS

The Program Coordinator shall:

- Communicate personal dosimetry results to sampled employees;
- Communicate aggregate dosimetry result to SEG; and,
- Communicate results, interpretation, and recommendations to Occupational Health, line management and other appropriate functional groups.

10.0 ENGINEERING CONTROL PLAN

The following is the preferred hierarchy of controls used to manage noise exposures.

Engineering Controls
Administrative Controls (Rotation)
Personal Protective Equipment

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A written engineering control plan shall be developed, for work areas or operations in the Hearing Conservation program, with the goal of reducing reliance on administrative and PPE controls.

Where noise exposures are equal to or greater than 90 dBA 8-hr TWA, the feasibility of engineering controls shall be investigated by the respective department.

Under circumstances where feasible engineering controls cannot be identified by the department, an acoustical study shall be conducted to identify potential solutions and establish a control plan.

The engineering controls investigation and acoustical study should include a frequency analysis of the noise source so that the appropriate noise abatement materials (i.e., noise absorbent or damping) may be selected for the solution.

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11.0 USE OF HEARING PROTECTORS TO CONTROL EXPOSURE

- Hearing protectors shall be used when engineering controls are not feasible or sufficient in reducing or eliminating employee exposure to occupational noise to less than 85 dBA.
- Hearing protectors shall be provided in a variety of styles and at no cost to employees.
- Hearing protectors must attenuate the employee's noise exposure to less than 85 dBA TWA or the local limit if more stringent.

To calculate attenuation, use the NRR for the protector, subtract 7 and then multiply by 50% (0.50). The resulting number is then subtracted from the unattenuated noise exposure level to yield the noise exposure level in decibels when wearing the chosen hearing protector.

Example:

Occupational noise exposure at a manufacturing machine is 86 dBA TWA. Hearing protector used has a NRR of 29, reducing noise exposure to 75 dBA.

Sample Calculation:

$$29 - 7 = 22 \times 0.50 = 11 \qquad 86 \text{ dBA} - 11 \text{ dBA} = 75 \text{ dBA exposure}$$

The SNR is a single-number rating which is calculated in accordance with ISO 4869.2. "Estimation of Effective A-weighted Sound Pressure Levels When Hearing Protectors Are Worn."

12.0 TRAINING

Employees included in the Hearing Conservation Program shall be trained (i.e., classroom or computer based) at the time of hire and at a frequency that complies with local legislation.

The training should cover the following topics:

- Key elements of this Hearing Conservation Program.
- A discussion on why the use of the hearing protection is necessary. This should include:
 - The results of any applicable exposure risk assessments (e.g. the identification of any ototoxin chemical agents);
 - The extent of exposure to noise in their work area.
 - The potential health effects of such exposures.
 - Damaging effects of noise.
- Procedures for proper selection, maintenance and storage of hearing protection

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- Instruction on the use of hearing protection; including types and selection available, how to properly insert or wear, their limitations as hearing protection devices, proper care, and regulations regarding their use.
- A demonstration on how to properly insert and or wear
- Training shall be documented.

13.0 AUDIOMETRIC TESTING

Initial and annual audiometric testing for employees included in the Hearing Conservation Program shall be conducted as follows:

- The Program Coordinator shall coordinate audiometric testing when Occupational Health Services are not available on-site.
- Audiometric testing shall be provided using the most current Occupational Health Protocol for audiometric testing.
- Audiometric testing shall be conducted at no cost to affected employees.
- Employees shall be provided with the results of their audiometric tests.

14.0 RECORDKEEPING

- Recordkeeping pertaining to education and motivation, noise level surveys, dosimetry surveys, communication of results to affected employees and audiometric examinations shall be maintained according to established record retention schedules.
- In general, the Program Manager will maintain the records pertaining to noise level surveys and noise dosimetry and Occupational Health will maintain all audiometric examination results.

15.0 PROGRAM EVALUATION

- The Program Coordinator will evaluate at least annually, together with at least one experienced hearing protection wearer, the effectiveness of the program. The Coordinator will take corrective action where defects are found in the program.

The Program Coordinator will prepare and forward a written report to Site Management Team. The report will summarize findings and describe corrective actions, if any, to be carried out as a result of any deficiencies observed.

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16.0 ATTACHMENTS AND FORMS

- ATTACHMENT I – Noise Survey Field Data Sheet
- ATTACHMENT II – Dosimetry Field Data Sheet

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ATTACHMENT I – NOISE SURVEY FIELD DATA SHEET



Date: ____/____/____ IH/Tech.: _____
Building: _____ Room: _____ Floor: _____
Operation: _____
Process Description:



Sound Level Meter Make: _____

Sound Level Meter Model #: _____ Serial #: _____
Weighting Scale: A Scale (dBA) Meter Response: Slow

Sound Calibrator Make: _____

Sound Calibrator Model #: _____ Serial #: _____ Tone
Generated Decibel Level: _____ dB Frequency (Hz): _____ Hz

Calibration Date: ____/____/____ Calibration Before: _____ dB
Calibration After: _____ dB



SURVEY RESULTS:
SKETCH/DESCRIPTION:

AREA

<u>ID</u>	<u>dBA</u>		<u>ID</u>	<u>dBA</u>
1.			6.	
2.			7.	
3.			8.	
4.			9.	
5.			10.	

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ATTACHMENT II – Noise Dosimetry Field Data Sheet

Date: ____/____/____ IH/Tech.: _____

Building: _____ Room: _____ Floor: _____
Operation: _____

Employee Name: _____ WWID#: _____
Supervisor: _____

Noise Dosimeter Make: _____

Noise Dosimeter Model #: _____ Serial #: _____
Criterion Level: _____dB Exchange Rate: _____dB Threshold Level: _____dB

Noise Dosimeter Calibrator Make: _____
Noise Dosimeter Calibrator Model #: _____ Serial #: _____ Tone
Generated Decibel Level: _____dB Frequency (Hz): _____Hz

Calibration Date: ____/____/____ Calibration Before: _____dB
Calibration After: _____dB

RESULTS:

PEAK LEVEL	MAX LEVEL	HTL TWA	HTL DOSE	HTL L-AVG	RUN TIME