

**Occupational Noise Control & Hearing Conservation Program**

**June 2002**

**Revised May 2010**

**Revised September 2010**

**Revised August 2018**

BCMSA

Occupational Noise Control & Hearing Conservation Program

Contents

PURPOSE 1

POLICY 1

SCOPE 1

DEFINITIONS 1

OVERVIEW OF REGULATION 2

WORKSAFEBC OHS Regulation Parts 7.1 to 7.9 2

Exemption 3

General Equipment Requirements 3

Noise Dosimeters 3

Records 3

Education and Training 3

Noise Control 4

Hearing Protection 4

Hearing Tests 4

Program Review 5

RESPONSIBILITIES 5

[[Organization]] 5

Supervisors 6

Workers 6

JOHS Committee or Worker Health and Safety Representative 6

Industrial Audiometric Technician (Hearing Tester) 7

PROGRAM DETAILS 7

Noise Exposure Limits 7

Collecting Noise Exposure Data 7

Expressing Noise Values 8

Exemption 8

Conducting an Occupational Noise Exposure Survey 8

Recording Noise Exposure Results 9

Guidelines for Personnel Conducting Noise Surveys 9

Noise Measurement Instrumentation 9

Integrating Sound Level Meter Specifications 10

Noise Dosimeter Specifications 10

Worker Education and Training 10

Noise Control 11

Posting of Noise Hazard Areas 12

Hearing Protection 13

Selection of Hearing Protection 13

Hearing Protection Device Options 14

Audiometric Evaluation (Hearing Tests) 16

Hearing Test Administration 16

Guidelines for Personnel Conducting Hearing Tests 17

Recording Medical History 17

Hearing Test Results 17

Record Keeping for Hearing Tests 17

Noise Control and Hearing Conservation Program Review 18

TRAINING REQUIREMENTS 18

Goal 18

Objectives 18

Summary of Training 19

PROGRAM MAINTENANCE 19

DOCUMENTATION 20

APPENDICES 20

Appendix A – Effects of the Environment upon Noise Measurement Accuracy 21

Appendix B – Record of Initial Walkthrough Survey 22

Appendix C – Results of Noise Exposure Measurements 23

Appendix D - Checklist for a Detailed Written Report 24

Appendix E - Selection of Noise Measuring Instruments 25

Appendix F – Guidelines for the Use of Integrating Sound Level Meters 26

Appendix G – Guidelines for the Use of Noise Dosimeters 27

Appendix H – Record of Worker Education on Noise 28

Appendix I– Evaluation Form for Annual Review of Noise Control & Hearing Conservation Program 29

# PURPOSE

The intent of this program is to help prevent and reduce noise induced hearing loss to workers due to occupational noise.

# POLICY

**[[Organization]]** will maintain an Occupational Noise Control and Hearing Conservation Program to prevent noise induced hearing loss in workers while they are performing their duties in the work environment.

# SCOPE

This program applies to all workers, supervisors and other personnel in the workplace.

# DEFINITIONS

(For purposes of this program)

|  |  |
| --- | --- |
| **A-Weighted Filter** | An A-weighted filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the response of the human ear. It is a numerical method of rating human judgment of loudness. |
| **Audiogram** | Graph of hearing threshold level |
| **Criterion Level** | The steady sound level at which a noise dosimeter will read 100% noise dose after an 8-hour exposure |
| **Daily Exposure** | The amount of noise, stated in dBA LEX or Pa2 h, to which a worker is exposed during the workday |
| **dBA** | Decibels of noise: the noise level is measured with an A-weighted filter |
| **dBA LEX** | The level of a worker’s total exposure to noise in dBA, averaged over the entire workday and adjusted to an equivalent 8 hour exposure |
| **Dosimeter** | A device used to measure noise levels over a specified interval, store the measures and calculate the sound as a function of sound level and sound duration |
| **Engineered Noise Controls** | Any modification or replacement of equipment or related physical change at the noise source or along the transmission path (with the exception of hearing protectors) that reduces the noise level at the worker’s ear |
| **3dB Exchange Rate** | When the sound energy doubles, the decibel (dB) level increases by 3 |
| **Hazardous Noise** | Any sound for which any combination of frequency, intensity or duration is capable of causing permanent hearing loss in a specified population |
| **HPD (Hearing Protector Device)** | A device that is worn to reduce the effect of noise on the hearing (auditory) system |
| **Integrating sound level meter** | Captures all sound and averages it over the period recorded |
| **LEQ** | The equivalent steady sound level of a noise energy averaged over time |
| **Non-Integrating sound level meter** | Measures sound instantaneously as it is recorded |
| **Occupational Noise** | Sound energy in the workplace |
| **Peak Sound Level** | The maximum instantaneous sound level measured in dBA |
| **Practicable** | That which is reasonably capable of being done |
| **Sound Level Meter** | A device that measures sounds and provides a readout of the resulting measurement |
| **Threshold Level** | The sound level above which the noise dosimeter will accumulate noise |
| **Weighted Measurements** | Two weighting curves are commonly applied to measures of sound levels to account for the way the ear perceives the “loudness” of sounds |
|  | *Definitions pertaining to “WorkSafeBC Hearing Conservation Annual Reports”* |
| **AC (Abnormal change)** | Test shows significant change form the previous test requiring medical follow-up |
| **EWC (Early warning change)** | Test shows there has been a high frequency deterioration in hearing, likely due to noise exposure |
| **NC (Normal Change)** | Test shows no significant change from previous test; hearing has remained stable. |

# OVERVIEW OF REGULATION

### WorkSafeBC OHS Regulation Parts 7.1 to 7.9

A worker must not be exposed to noise levels above either of the exposure limits of 85dBA LEX daily exposure or 140 dBA peak sound level.

Where workplace noise exposure exceeds 85dBA LEX daily exposure or 140 peak sound level, effective noise control and a hearing conservation program must be developed and implemented.

Where there is the potential for a worker to be exposed to potentially harmful levels of noise, or where information indicates (i.e. previous noise measure results) that a worker may be exposed to levels above 82dBA LEX, noise exposure levels must be measured.

Noise exposure measurement must be performed in accordance with CSA Standard Z107.56-94, *Procedures for the Measurement of Occupational Noise Exposure*, or other standard acceptable to the WorkSafeBC.

### Exemption

An exemption from the requirements to measure noise exceeding 85dBA LEX or 140 peak sound level is permitted if the worker is identified as being exposed to noise, based on other information, such as over-exposure database kept by the WorkSafeBC Hearing Conservation Section. Although a noise measurement exemption may be in place, there must be an established effective Noise Control and Hearing Conservation Program.

### Noise Dosimeters and Sound Level Meters

Except as otherwise determined by WorkSafeBC, noise dosimeters and sound level meters used for measuring noise exposure must meet the requirements of *ANSI Standard S1.25-1991, Specification for Personal Noise Dosimeters*.

### Records

Noise measurement results must be recorded and detailed according to WorkSafeBC specifications.

Current noise measurement results must be available to a WorkSafeBC Officer/Joint Health and Safety Committee and/or Worker Health and Safety Representative

### Education and Training

If a worker’s daily noise exposure is between 82dBA LEX and 85dBA LEX the employer must inform workers of the results of any noise exposure measurement, the significance of those noise results to the risk of hearing loss and, at the request of the worker, the purpose of hearing protection and testing.

If a worker’s daily noise exposure is above 85dBA LEX or 140 dBA peak sound level the employer must inform workers of the results of any noise exposure measurement, the effects of noise on hearing, the proper use and maintenance of hearing protection and the purpose of hearing testing.

### Noise Control

Noise control must be investigated where workers are exposed to noise exceeding 85dBA LEX or 140 peak sound level.

Engineered noise control options must be implemented where practicable.

Hearing protection will be provided and maintained so that it functions effectively when it is not possible to reduce levels of noise exposure below 85dBA LEX or 140 peak sound level.

### Hearing Protection

When it is not practicable to reduce levels of noise exposure, noise hazard areas must be identified with warning signs.

Hearing protection must be supplied to all workers entering a noise hazard area and its use must be enforced.

### Hearing Tests

An initial hearing test must be provided for workers exposed to noise above exposure limits of 85dBA LEX and 140dBA peak sound level as soon as practicable but not later than 6 months after the start of employment. Annual hearing tests must be provided thereafter.

Persons authorized by the WorkSafeBC must administer hearing tests.

During an initial hearing test, a worker must provide the tester with relevant medical history information using a format acceptable to the WorkSafeBC.

A worker’s medical history record must be neither duplicated nor kept by the employer.

The authorized hearing tester must ensure that hearing tests are recorded in a manner required by the WorkSafeBC.

The authorized hearing tester must advise workers of the test results and the use and maintenance of hearing protection.

The authorized hearing tester must, on request, provide a copy of the test results to the worker.

Workers’ test results must be submitted to the WorkSafeBC.

Records of hearing tests must be kept for the duration of the worker’s employment with the Organization and be treated as confidential and not released to anyone without the written permission of the worker.

### Program Review

An annual review of the Noise Control and Hearing Conservation Program must be conducted to ensure its effectiveness.

# RESPONSIBILITIES

## [[Organization]]

* Ensure that a worker is not exposed to noise levels above 85dBA LEX daily exposure or 140dBA peak sound level unless the worker is wearing hearing protection
* Ensure that an effective Noise Control and Hearing Conservation Program is developed and implemented if noise in the workplace exceeds either 85dBA LEX daily exposure or 140dBA peak sound level

**[[Organization]]** must also delegate the following responsibilities:

* Measure exposure levels if information indicates that a worker may be exposed to noise above 82dBA LEX
* Ensure that current noise measurement results are readily available for reference by a WorkSafeBC officer and/or member of the JOHS committee or Worker Health and Safety Representative
* Ensure that workers are informed of the results of noise exposure measurements where levels exceed 85dBA LEX or 140dBA peak sound level, the significance of the results, proper use and maintenance of hearing protection and the purpose of hearing testing
* Investigate and implement, where practicable, options for engineered noise control when exposure levels exceed 85dBA LEX or 140dBA peak sound level
* Where noise reduction to below limits is not practicable, reduce noise to the lowest level possible and post signs in the affected work area
* Provide hearing tests in accordance with WorkSafeBC OHS Regulation for workers exposed to noise levels above 85dBA LEX or 140dBA peak sound level and provide the results to WorkSafeBC
* Select, provide and maintain hearing protection to affected workers
* Designate an authorized person to conduct hearing tests
* Ensure that a record of the hearing tests for each worker is maintained in a manner acceptable to the WorkSafeBC
* Review the noise control and hearing conservation program annually to ensure its effectiveness in accordance with the WorkSafeBC requirements
* Consult and cooperate with members of the JOHS Committee or Worker Health and Safety Representative for the workplace with regard to noise control and hearing conservation

## Supervisors

* Ensure that workers under their supervision are aware of noise hazards in their workplace
* Ensure hearing protection complies with the relevant CSA Standard
* Ensure hearing protection is worn effectively and maintained in good condition

## Workers

* Wear hearing protection in all posted noise hazard areas and in accordance with instructions provided by the employer
* Participate in annual hearing tests when required by this program
* Provide hearing protection device feedback to **[[Organization]]** that has been recommended by the hearing tester

## JOHS Committee or Worker Health and Safety Representative

* Advise **[[Organization]]** on the Noise Control and Hearing Conservation Program , procedures and effective systems to correct unsafe situations with regard to noise levels
* Participate in the annual review of the Noise Control and Hearing Conservation Program
* Deal with worker complaints regarding noise control and hearing conservation

## Industrial Audiometric Technician (Hearing Tester)

* Provide feedback on hearing protection device (HPD) selection to **[[Organization]]** and to the worker
* Evaluate worker’s hearing protection device (HPD) at the time of the hearing test
* During the hearing test, check condition and fit of HPD and advise whether it needs replacement or repair
* Discuss care and maintenance of HPD with the worker at the time of the hearing test
* Recommend a medical referral if results of the hearing test show this is necessary
* Take workers’ medical history during the first hearing test
* During the initial fitting of the HPD, counsel workers on possible effects of not wearing hearing protection

# PROGRAM DETAILS

## Noise Exposure Limits

**[[Organization]]** will conduct occupational noise measurements for the purpose of identifying harmful noise levels if it is likely that a worker will be exposed to noise levels in excess of 82dBA**lex**. Data that is gathered will help to determine corrective actions that may be required, including the implementation of noise control strategies and development of a hearing conservation program.

### Collecting Noise Exposure Data

An initial walkthrough of the premises will provide an impression of the noise to be assessed, the types of noise generated (steady, intermittent, impulse, range of levels) and identify quiet areas which can be eliminated from further consideration e.g. offices. Other information will include the numbers of workers, work patterns, break times, shift changes and unusual conditions (i.e. productional, seasonal, environmental) which could affect results. Environmental effects will be noted when conducting noise measurements. Refer to **Appendix A (Effects of the Environment upon Noise Measurement Accuracy)** for information on environmental effects. (Refer to **Appendix E** for examples of steady intermediate range levels)

**[[Insert name or job position]]** will conduct the walkthrough survey and will record noise exposure measurements on the form in **Appendix B (Record of Initial Walkthrough Survey)**.

### 

### Expressing Noise Values

In compliance with the WorkSafeBC OHS Regulation, workers’ noise exposure levels will be expressed in the following manner:

1. The energy-averaged sound level (LEX in dBA) i.e. 85dBAlex , or
2. The energy-averaged noise exposure dose, in Pascal squared hours (Pa2h) i.e. 1 Pa2h, or
3. Peak sound level in dBA i.e. 140dBA

[**Note**: There are two ways of expressing noise exposure, Leq and LEX. When it is required to convert Leq into LEX for the purpose of obtaining workers’ exposure over an 8-hour period, a correction factor must be used in the conversion calculation. The data obtained from occupational noise measurements should represent an 8-hr exposure level (dBALEX) for comparison with the screening level of 82dBALEX.

Refer to the WorkSafeBC Booklet “Occupational Noise Surveys” for assistance on conversion calculations].

### Exemption

**[[Organization]]** will not be required to undertake a noise exposure measurement program if it can be shown that a worker is exposed to noise in excess of the limits regulated by WorkSafeBC because:

1. The noise level limit of 85dBALEX is exceeded daily
2. A database of worker’ noise exposures indicates most members of a trade/occupation class to be over-exposed on a daily basis. (WorkSafeBC maintains a database for this purpose.)
3. Noise emission labels of tools or equipment indicates there is a strong chance that over-exposure will be incurred as a result of their use

If a noise measurement exemption applies, **[[Organization]]** will implement a Hearing Conservation Program meeting occupational noise regulatory requirements, excluding those for noise measurements.

## Conducting an Occupational Noise Exposure Survey

When the initial walk through survey shows a worker’s exposure to sound levels of 82dBA LEX or more is likely to last over the entire shift of 8 hours **[[Organization]]** will conduct a noise exposure survey. The survey will show whether the following actions are required:

**Noise Exposure below 82dBAlex:**

No further action required.

**Noise Exposure between 82 to 85dBAlex:**

Inform the worker of the noise monitoring results, the minimal risk of hearing loss, and at the request of the worker, the purpose of hearing protection and audiometric testing.

**Noise Exposure above 85dBAlex:**

Implement a Noise Control and Hearing Conservation Program.

### Recording Noise Exposure Results

**[[Insert name or job position]]** will record noise exposure data in accordance with CSA Standard Z107.56-94. The forms in **Appendix B** **(Record of Initial Walkthrough Survey**) and **Appendix C (Results of Noise Exposure Measurements)** will be used to record noise exposure data/measurements.

In cases where workers rotate unpredictably among particular jobs or activities, noise exposure levels will be listed by job and the noise exposure level of these workers will be calculated as a single group.

**[[Insert name or job position of surveyor]]** will refer to the WorkSafeBC booklet “Occupational Noise Surveys” for step-by-step instructions/calculations required for conducting a noise survey.

Where a change in equipment/process or duration of exposure changes, **[[insert name or job position]]** will re-survey the affected workers within one month of the change being brought to his/her attention.

If requested by the WorkSafeBC a more detailed written report on the noise survey may be written. Refer to **Appendix D (Checklist for a Detailed Written Report)** that may be used as an aid when compiling a written report.

### Guidelines for Personnel Conducting Noise Surveys

The surveyor conducting surveys will be competent in the use and calibration of appropriate noise measurement instruments and be able to interpret and report upon the findings obtained in the survey. The surveyor should refer to the WorkSafeBC document “Occupational Noise Surveys” for the information required for conducting noise surveys.

## Noise Measurement Instrumentation

For guidelines on selecting noise measure instruments according to the type of noise found in the workplace, refer to **Appendix E (Selection of Noise Measuring Instruments)**.

### Integrating Sound Level Meter Specifications

Integrating noise-measuring equipment will be set to the 3dB exchange rate.

For guidelines on the use of an integrating sound level meter refer to **Appendix F (Guidelines for the Use of Integrating Sound Level Meters)**.

### Noise Dosimeter Specifications

Noise regulations specify noise-measuring instruments to be Type 2 or better. The selected noise dosimeter will comply with the requirements of ANSI Standard S1.25-1991, Specification for Personal Noise Dosimeters or other standard acceptable to the WorkSafeBC and will have the following minimum specifications:

* Type 2 Classification
* A-Weighting
* Dynamic Range: 50dB
* Crest Factor: 30dB

Noise dosimeters will be set as follows:

* Criterion Level: Lc = 85dBA
* Threshold Level: LE = 80dBA or lower
* Exchange Rate: q = 3dB
* Time Constant = “slow”

For guidelines on the use of a noise dosimeter refer to **Appendix G (Guidelines for the Use of Noise Dosimeters)**.

## Worker Education and Training

If noise exposure levels exceed 85dBALEX or 140 dBA peak sound level, **[[Organization]]** will ensure that all newly hired workers will receive information on the effects of noise on hearing, proper use and maintenance of hearing protection and the purpose of hearing testing during their orientation program. This will be delivered by **[[insert name or job position]]**.

For noise exposure levels between 82dBALEX and 85dBALEX, **[[Organization]]** will ensure that all newly hired workers will receive information on the effect of noise exposure on hearing, and procedures and controls that will be implemented if noise exposure exceeds 85dBALEX.

For noise exposure levels between 82dBALEX and 85dBALEX, **[[Organization]]** will ensure that all employees already on staff, receive information on:

* Results of any noise exposure measurements
* The significance of those results to the risk of hearing loss
* The purpose of hearing protection and testing if the worker requests it

For noise exposure levels exceeding 85dBALEX or 140 dBA peak sound level, **[[Organization]]** will ensure that all employees already on staff, receive information on:

* Effects of noise on hearing
* Proper use and maintenance of hearing protection
* Purpose of hearing testing
* Results of any noise exposure measurements

**[[Insert name or job position]]** will review this information with the worker at the time of his/her annual hearing test and record on the worker noise education form (**Appendix H – Record of Worker Education on Noise).**

## Noise Control

Where a worker is exposed to noise above 85dBAlex or 140 dBA peak sound level, **[[Organization]]** will investigate options for noise control to reduce worker’s exposure. Noise sources and their contribution to the overall noise problem will be identified and analyzed to establish the areas on which to focus for noise reduction controls. Options for noise control will be considered using the model of the “Hierarchy of Control”.

**Note:** Options for risk control must start with trying to eliminate the task, working down to the final option of using PPE.

**[[Organization]]** may consult with workers who operate, service and maintain equipment, health and safety representatives and when necessary, an acoustical engineering consultant, to determine appropriate engineered noise control options.

1. **Elimination:** Some tasks may be redundant or may duplicate work. Consider whether the task can be avoided, whether the task needs to be done to achieve the desired result or whether it can be done in a way so that workers are not exposed to the noise hazard.
2. **Substitution:** If the task cannot be avoided, can part of the process employ other work practices to reduce exposure to noise hazard, i.e. using quieter machines/tools/processes such as hydraulic over pneumatic power or impact force?
3. **Engineering:** Engineered controls may include but are not limited to:

* Enclosure of the noise source
* Installation of absorbent panels on walls/ceiling near noisy tools, absorbent ceiling baffles
* Reducing reverberation
* Reducing structure-borne vibration through modification of the acoustical design and treatment of the work area
* Fitting compressed air exhaust mufflers, air jet noise silencer nozzles
* Replacing “screaming” saw blades for quieter blades

1. **Administrative Controls:** Provision, use and scheduling of work activities and resources in the workplace, including planning, organizing, staffing and coordinating. This will help to reduce workers’ exposure to hazardous noise. The following will be considered to help reduce exposure:

* Can the work be scheduled to provide regular breaks away from the noise?
* Can the job be expanded to provide greater range of duties/time away from the noise?
* Can the task be planned and organized to reduce risk i.e. working shifts/shift rotation?

1. **Personal Protective Equipment**: PPE, i.e. ear muffs and ear plugs, may only be used as a substitute to reduce noise when all other methods of eliminating, reducing or controlling noise are either not practicable or are insufficient to reduce noise exposure. Where controls are insufficient PPE can be used in combination with those controls to reduce noise.

## Posting of Noise Hazard Areas

Where circumstances exist that it is not practicable to reduce noise levels to or below the exposure limits of 85dBA LEX or 140dBA peak sound levels**, [[insert name or position here]]** will post warning signs indicating that hearing protection is required. **[[Insert name or job position]]** will check the condition of these signs during site inspections. Replacement of signs will be undertaken as necessary.

**[[Insert name or position here]]** will supply hearing protection to all workers required to enter the hazardous area and ensure that protection devices are worn by any person working in the hazardous area.

The wearing of hearing protection is not required in the Noise Hazard Area when the source of noise that makes the area hazardous is shut down.

## Hearing Protection

**[[Organization]]** will take every reasonable step possible to reduce noise levels to or below the exposure limits. Where this is not practicable, **[[Organization]]** will reduce noise exposure to the lowest level practicable. In addition, when applicable, **[[Organization]]** will select and provide hearing protection to affected workers.

### Selection of Hearing Protection

**[[Insert name or job position]]** will selecthearing protection according to the amount of noise reduction the hearing protector provides. In addition to the daily noise exposure (i.e. Leq measurement obtained during the noise survey), other criteria, listed in CSA Standard Z94.2-02 (rev. 2007), will also be included in the decision process of determining correct HPD. The criteria for HPD selection are listed below:

* Daily noise exposure of worker: the recommended protection for an 8-hour noise exposure is listed in Table 1 below
* Extremes in temperature/climate in which worker is operating
* Worker hearing ability: beyond conventional Class A or Class B earmuffs or earplugs, workers with very significant hearing losses may need more specialized hearing protection. **[[Insert name or job position]]** will consult with the WorkSafeBC Hearing Conservation Section to explore appropriate options
* Communication demands on the worker: the choice of HPD will be influenced if the reception and understanding of speech and other auditory signals are impeded when wearing HPDs
* Use of other personal protective equipment other than hearing protection i.e. hardhats, goggles, eyeglasses, respirators
* Physical constraints of the worker i.e. size of worker’s ear canal, shape of head and jaw: 5 to 15dB of the noise protection capability of a HPD may be lost if earplugs or earmuffs do not fit the contours of the earcanal or the head correctly
* Physical constraints of work activity

|  |  |
| --- | --- |
| **Table 1 – Selection of Hearing Protection Devices Based upon Grade and Noise Exposure in dBA** | |
| **Lex,8(dBA)** | **Recommended Class of Hearing Protector** |
| ≤ 90 | Class C |
| ≤ 95 | Class B |
| ≤ 105 | Class A |
| ≤ 110 | Class A plug + Class A or Class B muff |
| > 110 | Class A plug + Class A or Class B muff and limited exposure |

### Hearing Protection Device Options

When hearing protectors are first issued to workers, **[[insert name or job position]]** will provide instructions for their use.

#### Initial Fitting of Earmuffs

**[[Insert name or job position]]** will:

* Ensure earpieces fit snugly over the entire ear
* Ensure that the cuffs are not resting on a hard-hat suspension band, hat scarf, barrette or anything that will prevent it from keeping out noise
* Ensure that earmuffs fit over eyeglasses where applicable. If eyeglasses are worn, try the type of glasses with thin wire temple pieces. Foam pads are available for the temple pieces that cushion the place where the eyeglass temple pieces pass under the earmuffs
* Check the tension of the headband. If it is not holding the muffs snugly either replace the band or the entire muff.
* Ensure correct earmuffs are selected for work in cold conditions. If working in cold conditions the fluid-filled cuffs may freeze, reducing their effectiveness .
* Ensure that the earmuff does not *over protect* the worker i.e. wearing a protector that reduces so much sound that it is difficult to hear machinery, warning signals or verbal instruction
* Discuss use, care and maintenance of the earmuff with the worker
* Ensure workers are counseled on the possible effects of not wearing hearing protection and the importance of wearing it properly throughout the duration of the workers’ noise exposure
* Check the fit and condition of earmuffs for all workers at the time of the annual hearing test

(Note: Workers should not rely on just reading the manufacturers’ instructions on hearing protection fit, care and use).

#### Use, Care and Maintenance of Earmuffs

Workers will:

* Push back hair so that the cuffs of the earpieces fit snugly
* Wear the hearing protection throughout the duration of the noise exposure
* Check the cuffs and replace them if hardness or cracks are found. This may need to be done every 3 or 4 months.
* Ensure cuffs are cleaned with soap and water. Do not use alcohol or solvent that may crack the material or irritate the skin.
* Refrain from drilling a hole in the earmuff or reducing headband tension of earmuffs to reduce pressure on the ears. This will let in sound. If there is too much pressure around the head, replace with a set of muffs that fits more comfortably. It may be necessary to learn to tolerate muffs gradually, at first wearing them for short periods until worker feels comfortable.
* Replace entire earmuff every 2 years

#### Initial Fitting of Earplugs

There are three types of earplugs currently available:

Re-usable Plugs: These are made of soft rubber or plastic and may be custom molded or have flanges to seal off the ear canal. They should be washed for re-use.

Disposable Plugs: They may be self-moulding foam plastic or glass down. These are thrown out when they get dirty. Dirty plugs may cause external ear infections.

Canal Caps: these are earplugs held together with a headband. Some simply cover the ear canal opening while others insert into the ear canal. They are re-usable.

**[[Insert name or job position]]** will use the following guidelines when fitting earplugs:

* The flanged part of the reusable plug goes into the ear canal, with the tab end staying outside the ear
* Roll the foam or sponge types firmly with thumb and forefinger before inserting
* Using the other hand, lift the ear up and back
* Insert the plug well into the ear canal, using a twisting motion
* If using the foam or sponge type, hold the plug in the ear for at least a few seconds to allow the material to expand
* If the plug feels tight at first, this is probably a good fit. If it feels loose, it is too small.
* When a plug is properly fitted, voices sound lower and slightly muffled to the wearer
* If worker feels pain when the earplug is inserted into the ear, recommend medical referral
* Discuss use, care and maintenance of the earplug with the worker

#### Use, Care and Maintenance of Earplugs

Workers will:

* Refit earplugs several times during the day as head movements, talking and chewing can all loosen the plugs
* Wash re-usable plugs with soap and water and keep them in a case when not in use
* Replace non-custom molded re-usable plugs when they become hard or cracked and at least annually
* Discard disposable plugs when they become dirty, either from use or from contact with some chemical in the workplace
* Replace disposable plugs daily
* Replace custom molded plugs as per manufactures instructions
* Refrain from cutting up or tampering with the plug in any way to make it comfortable. If it feels wrong, try a different size or type of plug

## Audiometric Evaluation (Hearing Tests)

**[[Organization]]** will provide hearing tests for workers exposed to noise above the exposure limits of 85dBA LEX or 140 dBA peak sound level. The hearing test will warn workers of possible hearing loss.

### Hearing Test Administration

**[[Insert name or position]]** will ensure initial hearing tests will be conducted as soon as practicable and in any case, no later than 6 months after the start of the worker’s employment. Annual tests will be provided thereafter.

### Guidelines for Personnel Conducting Hearing Tests

Personnel who are conducting hearing tests must be authorized to do so by the WorkSafeBC. The **[[Organization]]** will hire an external contractor who is approved by the WorkSafeBC.

### Recording Medical History

A medical history will be taken during the worker’s initial hearing test. This will identify medical reasons that may predispose the worker to hearing loss. **[[Organization]]** will not retain a worker’s medical history information. Such information will be forwarded to **[[insert location of appropriate WorkSafeBC office]].**

### Hearing Test Results

**[[Insert name or job position]]** will explain the results to the worker and may recommend further consultation with a physician if the test shows significant hearing loss. The technician is not qualified to determine the cause of a worker’s hearing loss.

**[[Organization]]** will ensure that **[[insert authorized audiometric technician]]** will deal with the results expeditiously and in accordance with WorkSafeBC requirements with reference to the following:

* Record the hearing tests in the manner required by the WorkSafeBC
* Advise the worker of the results
* Counsel the worker on the use and maintenance of hearing protection
* Provide a copy of the test results to the worker when requested
* Submit the test results to the WorkSafeBC. Records are kept on file in a central registry to ensure that a worker’s hearing history is not lost if he/she changes job.

### Record Keeping for Hearing Tests

**[[Organization]]** will maintain a record of the hearing tests for each worker in a manner acceptable to the WorkSafeBC. Records will be kept for the duration that the worker remains in employment with **[[Organization]]** and will be treated sensitively and confidentially.

Reports kept by **[[Organization]]** will serve as a basis for comparison to document a worker’s hearing changes occurring from year to year. Results will not be released to anyone except the WorkSafeBC without the written permission of the worker.

## Noise Control and Hearing Conservation Program Review

**[[Organization]]** will review the Noise Control and Hearing Conservation Program annually to ensure its effectiveness. **[[Insert name or job positions]]** and the Joint Health and Safety Committee will be involved in the review process. The review will address the following components:

* The need for further noise measurement
* The education and training of workers regarding noise exposure
* The adequacy of noise control measures
* The selection and use of hearing protection
* Hearing testing and information on the rate and extent of early warning hearing changes and occupational hearing loss

Refer to **Appendix I (Evaluation Form for Annual Review of Noise Control & Hearing Conservation Program)** for the form to be used when reviewing the Noise Control and Hearing Conservation Program. A summary report of the program review will be prepared annually by **[[insert name or job position]]** and submitted to **[[insert name or job position]]**.

# TRAINING REQUIREMENTS

## Goal

To ensure that all workers are aware of the Occupational Noise Control and Hearing Conservation Program and the policy and procedures that accompany it.

## Objectives

As a result of this training all workers and their supervisors will:

* Understand the effects of noise on hearing
* Be knowledgeable of noise exposure limits and understand the hazards of working in an environment where noise exceeds 85dBAlex or 140 peak sound level
* Know the requirements for noise measurements and the procedures to be followed (Supervisors only)
* Understand the designated hearing protection areas, the tools and equipment at the site and how they affect hearing
* Know the purpose of hearing tests and the meaning of the results
* Know how to select appropriate hearing protection and understand its importance
* Be aware of the effects of off-the-job hearing loss and its implications when working in industrial noise requiring the use of HPDs

## Summary of Training

* Definition of occupational noise and terms used in the program
* Regulations that apply to Occupational Noise Control and Hearing Conservation
* Responsibilities of **[[Organization]]**, supervisors, workers, JOHS Committee and audiometric technician (hearing tester)
* Requirements for noise measurements
* Requirements for worker education and training
* Requirements for noise controls
* Selection of hearing protection
* Procedures for establishing noise hazard areas
* Requirements for hearing tests
* Requirements for Noise Control and Hearing Conservation Program review

# PROGRAM MAINTENANCE

This program requires:

* Inspection and calibration of noise measuring devices
* Noise measurements if conditions change
* Provision of information on noise levels in the workplace
* Annual hearing tests for exposed workers
* Annual review of rate and extent of hearing loss in the workplace

# DOCUMENTATION

Documentation for this program includes:

* Records of Noise Exposure Survey
* Results of Noise Exposure Measurements
* Manuals for hearing protection worn by workers
* Records of Worker Education on Noise
* Records of Hearing Test Results
* Occupational Noise Control and Hearing Conservation Program Evaluations

# APPENDICES

Appendix A – Effects of the Environment on Noise Measurement Accuracy

Appendix B - Record of Initial Walkthrough Survey

Appendix C – Results of Noise Exposure Measurements

Appendix D – Checklist for a Detailed Written Report

Appendix E – Selection of Noise Measuring Instruments

Appendix F – Guidelines for the Use of Integrating Sound Level Meters

Appendix G – Guidelines for the Use of Noise Dosimeters

Appendix H – Record of Worker Education on Noise

Appendix I – Evaluation Form for Noise Control & Hearing Conservation Program

## Appendix A – Effects of the Environment upon Noise Measurement Accuracy

###### Temperature

Sound measuring equipment should perform within design specifications over an ambient temperature range of -20°F to 140°F (-29°C to 60°C). If the temperature at the measurement site is outside this range, refer to the manufacturer’s specifications to determine if the sound level meter or dosimeter is capable of performing properly.

###### Humidity

Noise instruments will perform accurately as long as moisture does not condense or deposit on the microphone diaphragm. If excessive moisture or rain is a problem in a given exposure situation, technical support should be sought.

###### Atmospheric Pressure

Both atmospheric pressure and temperature affect the output of sound level calibrators; atmospheric pressure is the more important of these two factors. When checking an acoustical calibrator, always apply the corrections for atmospheric pressure that are specified in the manufacturer’s instruction manual.

###### Wind or Dust

Wind or dust blowing across the microphone of the dosimeter or sound level meter produces turbulence that may cause a positive error in the measurement. A windscreen should be used for all outdoor measurements and whenever there is significant air movement or dust inside a building (e.g. when cooling fans are in use or wind is gusting through open windows).

###### Magnetic Fields

Certain equipment and operations, such as heat sealers, induction furnaces, generators, transformers, electromagnets, arc welding, and radio transmitters generate electromagnetic fields that can induce current in the electronic circuitry of sound level meters and noise dosimeters and cause erratic readings. If sound level meters or dosimeters must be used near such devices or operations, the extent of the field’s interference should be determined by consulting the manufacturer’s instructions.

###### Effects of Sound

For sound level meters and noise dosimeters equipped with omnidirectional microphones, the effects of microphone placement and orientation are negligible in a typically reverberant environment. If the measurement site is nonreverberant and/or the noise source is highly directional, the manufacturer’s literature should be consulted to determine proper microphone placement and orientation.

## Appendix B – Record of Initial Walkthrough Survey

|  |  |  |  |
| --- | --- | --- | --- |
| **Location of Survey:** | | **Date/Time of Survey:** | |
| **Name of Surveyor:**  **Signature of Surveyor:** | | **Workers or Occupation being Evaluated:** | |
| **Factors to be Considered** | **Remarks/Examples** | | **Findings** |
| Source of noise to be assessed | What is the source of the noise? | |  |
| Types of noise being generated | Steady, intermittent, impulse | |  |
| Range of noise levels | If using sound level meter or interim sound level meter results | |  |
| Identification of quiet areas | Eliminate identified areas from further consideration in the survey | |  |
| Numbers of workers in the noise affected workplace |  | | |
| Description of work patterns |  | | |
| Break times | Length of break, location of break area | |  |
| Shift patterns | Length of shift in noise affected area | |  |
| Any adverse effects/ conditions affecting noise measurement? | E.g. environmental | |  |

|  |
| --- |
| **Additional Comments:** |

## Appendix C – Results of Noise Exposure Measurements

|  |  |  |
| --- | --- | --- |
| **Facility:** | **Department:** | **Address:** |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Worker’s Name or Job** | **Source of Noise** | **LAeq,T**  **dBA** | **Shift Duration (hours)** | **LEX**  **dBA** | **Peak Level dBA** | **Comments** | **Result In Compliance with Regs?**  **Y/N** | **Recommendations** |
|  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |

**Name of Surveyor: Signature of Surveyor:**

**Type of Noise Meter: Model: Serial Number:**

**Calibrator: Model: Serial Number:**

## Appendix D - Checklist for a Detailed Written Report

The following checklist may be used as an aid when compiling a comprehensive report on a detailed noise survey. Check the boxes as you write the report to ensure that the item of information has been included in your report.

* Identification of jobs that are over-exposed according to the Noise Control & Hearing Conservation regulation. The descriptors are either LEX or noise exposure dose, EA in Pa2h
* Final results rounded up to two significant figures
* Identification of the workers or job position requiring hearing protection and the recommended class of hearing protection
* Training and education to be given to workers on the effects of noise on hearing and hearing conservation techniques
* Identification of areas to be posted with signs warning about high noise levels and the requirements to wear hearing protection
* A statement to the effect that the measurements were taken under typical noise conditions (or otherwise) at the survey time(s)
* “Corrections” to the noise measurements to account for unusual or different levels of occupational activity (must be indicated and justified where used)
* An explanation of the sampling process and a justification of the statistical methodology adopted where noise exposure samples from a “population” of workers have been used to represent all individual workers

## Appendix E - Selection of Noise Measuring Instruments

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Characteristics** | **Type of Source** | **Type of Measurement** | **Type of Instrument** | **Remarks** |
| Steady continuous noise  Small variations allowed | Ventilation systems, pumps, electric motors, gearboxes, conveyors | Direct reading of dB(A) | Sound Level Meter |  |
| Steady but intermittent noise | Air compressor during charging, automatic machinery during a work cycle | dB(A) value and exposure time or Leq | Sound level meter.  Integrating sound level meter | Basic meter can be used.  Calculated Leq using time and level |
| Noise fluctuating in a regular pattern | Mass production, surface grinding | dB(A) value, or noise dose | Sound level meter.  Integrating sound level meter | Integrating for 3 or 4 complete cycles, usually enough to give good estimate of Leq |
| Randomly fluctuating noise | Manual work, grinding, welding, component assembly | Leq or noise dose.  Check “peak” value | Noise dosimeter.  Integrating sound level meter | Long term measurement usually required |
| Repeated impulses | Automatic press, guillotines, pneumatic drill, riveting, bottling lines | Leq or noise dose.  Check “peak” value. | Noise dosimeter.  Integrating sound level meter with “peak” hold | Difficult to assess.  More harmful to hearing than it sounds |
| Single impulse at irregular intervals. | Hammer blow, material handling, brake press, shooting at gun range | Leq and “peak” value. | Noise dosimeter.  Integrating sound level meter with “peak” hold | Difficult to assess.  Very harmful to hearing especially close |

**Definitions:** “Steady”: noise remains within ±3dB of its mean level. Steady noise that goes off and on is “intermittent”. “Fluctuating” noise varies widely but has a steady long term average (Leq ). Impulse noise lasts for less than a second.

## Appendix F – Guidelines for the Use of Integrating Sound Level Meters

When integrating sound level meters are being used to measure noise, **[[Organization]]** will use the following guidelines prior to, and when recording data:

* Ensure the noise meter is calibrated according to manufacturer’s instructions
* Examine the range of sound levels to be measured/integrated
* Adjust the meter range switch to get the Leq in the upper half of the display range without overloading the instrument
* If overload occurs, adjust the range switch setting and restart the measurement
* See if the noise is directional and ensure the microphone will not be “shaded”
* Watch for sudden movements of the worker or product
* Place microphone in the worker’s “hearing zone” or close to where the worker’s ear would normally be during work, even when impracticable for the worker to be in position
* Follow the manufacturer’s instructions for microphone orientation
* Ensure the bodies of non-participants do not affect the noise at the microphone. Stand well back and hold the instrument at arm’s length.
* Avoid measuring within one meter of large noise-emitting surfaces
* Record Noise Measurement Results on the form provided in Appendix C (Results of Noise Exposure Measurements)

## Appendix G – Guidelines for the Use of Noise Dosimeters

**[Organization]]** will use the following guidelines when noise dosimeters are used to measure noise levels:

* Ensure the dosimeter is calibrated according to manufacturer’s instructions
* Inform the monitored worker that the dosimeter should not interfere with his/her normal duties, and emphasize that the worker should continue to work in a routine manner
* Explain the purpose of the dosimeter, to each worker being sampled
* Instruct the workers being sampled not to remove the dosimeter unless absolutely necessary and not to cover the microphone with a coat or outer garment or move the microphone from its installed position
* Inform the worker when and where the dosimeter will be removed
* When the dosimeter is positioned (generally in the shirt pocket or at the waist), clip the microphone to the employee’s shirt collar at the shoulder, close to the worker’s ear. Clips should be placed in accordance with the manufacturer’s instructions
* Position and secure any excess microphone cable to avoid snagging or inconveniencing the worker. If practicable, the cord should be run under the worker’s shirt or coat
* Check the dosimeter periodically to ensure that the microphone is oriented properly
* Obtain and note sound level meter readings during different phases of the work performed by the worker during the shift. The measurement duration should be sufficiently long for the resulting noise exposure level to be representative of the daily activities performed by the worker
* Measurement of the worker’s noise exposure will be performed on two separate occasions. This will be sufficient if the results of the first two measurements are within 2dB. Otherwise, more measurements will be taken until the standard deviation of all the measurements is less then 3 dB.

(Note: the specified limits of 2dB and 3dB may not be appropriate for all applications. The noise surveyor will be responsible for deciding whether acceptable measurements have been recorded.)

* Record the noise measurement results on the form provided in Appendix C (Results of Noise Exposure Measurements)

## Appendix H – Record of Worker Education on Noise

This form must be completed for each worker who is at risk of hazardous noise exposure. The worker should initial Column 4 to verify that education and training has been provided and that it has been understood.

|  |  |
| --- | --- |
| **Name of Worker:** | **Job Position & Work Location:** |
| **Name of Education Provider:** | **Job Position:** |

|  |  |  |  |
| --- | --- | --- | --- |
| **1. Content of Education/Training** | **2. Date of Completion** | **3. Educator’s Signature** | **4. Initials of Worker** |
| Effects of noise on hearing |  |  |  |
| Proper use and care of hearing protection |  |  |  |
| Purpose of hearing testing |  |  |  |

## Appendix I– Evaluation Form for Annual Review of Noise Control & Hearing Conservation Program

|  |  |
| --- | --- |
| **Date Reviewed by JOHS Committee or Safety Rep:**  **Name of JOHS Rep:**  **Signature of JOHS Rep:** | **Name of Evaluator:**  **Signature of Evaluator:** |

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | **Yes** | **No** |
| 1. | Have noise measurements been conducted when worker exposure to noise has been above 82dBAlex? |  |  |
| 2. | Does the exemption from noise measurement apply in this facility? |  |  |
| 3. | When worker noise exposure has exceeded 85dBAlex, have noise controls been implemented? |  |  |
| 4. | Are the noise controls that have been implemented successful in reducing workers’ exposure? |  |  |
| 5. | Is there a need for further noise measurements before the next annual review? If yes, when and for what reason? |  |  |
| 6. | When the workplace noise levels exceed 82dBAlex have affected workers received education and training regarding noise exposure? |  |  |
| 7. | Are hearing protective devices selected appropriate to the levels of noise exposure? |  |  |

Appendix J – Evaluation Form for Annual Review of Noise Control & Hearing Conservation Program (continued)

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | Yes | No |
| 8. | Is hearing protection used by workers who are exposed to noise levels greater than 85dBAlex/140dBA peak sound level? |  |  |
| 9. | Are hearing tests provided to workers at the start of their employment with **[[Organization]]** or at least not later than 6 months after the start of their employment? |  |  |
| 10. | Are hearing tests conducted in a manner acceptable to WorkSafeBC? |  |  |
| 11. | Are hearing tests records maintained according to WorkSafeBC requirements? |  |  |
| 12. | Are hearing test results submitted to the WorkSafeBC? |  |  |
| 13. | Has a review been conducted on the extent of occupational hearing loss suffered by workers  during the past twelve months? Give brief details on the findings of the review i.e. numbers of workers suffering loss, occupations involved, comparison to previous 12 months etc. |  |  |
| 14. | Is any corrective action required as a result of conducting this evaluation? If yes, what? |  |  |
|  | Additional comments/recommendations: |  |  |