

# Audiometric Testing in Saskatchewan



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## Table of contents

<b>Introduction</b> .....	1
<b>Application</b> .....	1
<b>Testing criteria and costs</b> .....	2
Testing frequency .....	2
Testing to be conducted during normal working hours .....	3
Workers to be reimbursed for audiometric testing costs .....	3
<b>Preparation for testing</b> .....	3
Avoidance of noise exposure before baseline audiometric testing .....	3
Periodic audiometric testing .....	4
Workers should bring their hearing protection to the audiometric test .....	4
<b>Qualifications of persons providing audiometric testing</b> .....	5
Supervising health professional .....	5
Audiometric technician .....	5
<b>Audiometric test location</b> .....	5
<b>Audiometers</b> .....	6
Standards .....	6
Calibration .....	6
<b>Protocol for audiometric testing and counselling</b> .....	7
Information to workers .....	7
Testing and counselling .....	8

<b>Results of testing</b> .....	8
Providing test results to the worker .....	8
Abnormal test results and referrals .....	9
Repeat audiometric tests .....	9
<b>Record keeping and maintenance</b> .....	9
Health records to be kept confidential .....	9
Records to be maintained .....	10
<b>Hearing conservation plan</b> .....	10
<b>Summary reports</b> .....	10
<b>Appendix 1: Definitions</b> .....	11
<b>Appendix 2: <i>The Occupational Health and Safety Regulations, 1996</i></b> .....	12
General duty .....	12
Noise reduction through design, construction of buildings .....	12
Measurement of noise levels .....	12
Daily noise exposure between 80dBA $L_{ex}$ and 85 dBA $L_{ex}$ .....	13
Daily noise exposure greater than 85 dBA $L_{ex}$ .....	13
Hearing conservation plan .....	14
<b>Appendix 3: <math>L_{ex}</math> values</b> .....	15
$L_{ex}$ Values Table .....	17
How to use the $L_{ex}$ Values Table .....	18
<b>Appendix 4: Hearing protection devices</b> .....	19
<b>Appendix 5: Minimum requirements for persons conducting audiometric testing</b> .....	19
General .....	19
Requirements for course content .....	19
<b>Acknowledgement</b> .....	20

## PLEASE NOTE

This publication is not designed to interpret the legislation. It is not intended to be used in court. Please use the original legislation whenever you wish to interpret or apply the law.

To purchase copies of *The Saskatchewan Employment Act* or *The Occupational Health and Safety Regulations, 1996*, contact Publications Saskatchewan in Regina at 306.787.6894. The fax number is 306.787.9779.

Industries under federal jurisdiction, such as transportation, broadcasting and telecommunications, are governed by *The Canada Labour Code*. If you work in a federally regulated industry, please contact the appropriate agency for information.

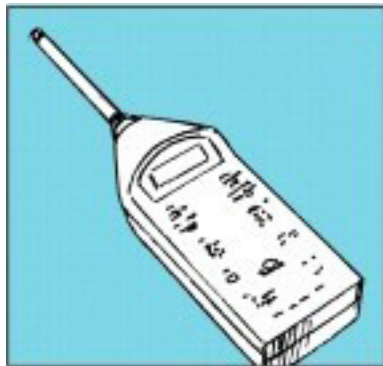
## Introduction

This guide will help employers comply with the requirements of *The Saskatchewan Employment Act* and *The Occupational Health and Safety Regulations, 1996*, related to audiometric (hearing) testing and counselling, confidentiality and the handling of information.

The guide also contains recommendations for audiometric testing equipment, background noise levels in testing areas, calibration of audiometers and the handling and keeping of test results.

## Application

The information in this guide applies where the regulations require hearing tests be available for workers. The regulations state what action must be taken for different levels of noise exposure in the workplace. Appendix 2 of this guide contains the noise regulation sections.



Subsection 113(3)(c) of the regulations requires employers to arrange for audiometric (hearing) testing and counselling at least once every 24 months for workers who:

- are regularly exposed, at work, to a daily noise level equal to, or greater than, 85 dBA  $L_{ex}^1$  or
- regularly work in areas where noise levels are equal to or greater than 90 dBA

In situations where the employer/employee relationship is permanent (even if the worker is classified as part time, casual, temporary or seasonal) for a combined total of 24 months then subsection 113(3)(c) applies.

If a worker is hired by the same employer for several months each year to perform a job which exposes the worker to loud noise, it is in the best interests of both the employer and the employee, for the employer to arrange for the worker to have audiometric testing.

<sup>1</sup>See the definitions of “dBA Lex” in Appendix 1.

Following the advice in this guide will ensure that the requirements and intent of the Act and the regulations respecting hearing tests are met. It will also ensure that:

- audiometric test results are valid
- test results are consistent (whoever performs the tests)
- follow-up actions are adequate
- record keeping is appropriate
- workers' right to know about things which effect their health and safety at work is protected and
- the confidentiality of medical records is protected

## Testing criteria and costs

Before an employer arranges for a company, person or organization to conduct audiometric testing and counselling, the employer should ensure this testing and counselling will be done in accordance with this publication. The names of organizations providing audiometric testing are listed in the yellow pages under "Hearing Assessment".

## Testing frequency

The most important requirement of *The Occupational Health and Safety Regulations, 1996* with regards to hearing conservation is for the employer to try to change the work or workplace so the noise workers are exposed to is below 85 dBA Lex, and the noise level is below 90 dBA in the overall work area. If this is not reasonably practicable, the employer must, among other things, arrange an audiometric (hearing) test and appropriate counselling at least once every 24 months for each worker required or permitted to work in that area.

The regulations do not require a worker to undergo this testing, but employers should encourage all workers who work in the conditions described above to receive audiometric testing and counselling.

<sup>2</sup>See Appendix 3 for an explanation of dBA Lex.

<sup>3</sup>See the definition of "reasonably practicable" in Appendix 1.

## Testing to be conducted during normal working hours

Wherever possible, an employer must arrange for audiometric testing and appropriate counselling to be conducted during a worker's normal work time. Where this is not possible, the employer must credit the time the worker spends attending testing and counselling as time at work and must ensure that the worker does not lose any pay or other benefits.

## Workers to be reimbursed for audiometric testing costs

Where a worker incurs any cost because of undergoing audiometric testing required by the regulations, the employer must reimburse the worker for this cost, unless in the opinion of the director, the cost is unreasonable.

To encourage workers to have audiometric tests, employers should arrange testing as close as possible to the worker's workplace or residence. Employers should assist with expenses in situations where an employee incurs travel costs associated with the testing.

## Preparation for testing

### Avoidance of noise exposure before baseline audiometric testing

The employer should make arrangements to ensure that:

- The worker is advised to avoid exposure to loud noise (either on or off the job) for 14 hours before taking audiometric tests.
- The worker does not work in an area in which the noise level exceeds 80 dBA for 14 hours before the test.<sup>4</sup>

<sup>4</sup> The National Institute for Occupational Health and Safety (NIOSH) in the U.S., in the publication, "Criteria for a Recommended Standard: Occupational Noise Exposure", Revised Criteria 1998" states "Use of hearing protectors should not be considered as a substitute for an actual 14 hour quiet period prior to a baseline test." If the worker has worked in a noise level of greater than 80 dBA within the last 14 hours prior to the test, this needs to be documented.

## Periodic audiometric testing

There are two approaches that can be followed when conducting the periodic tests.

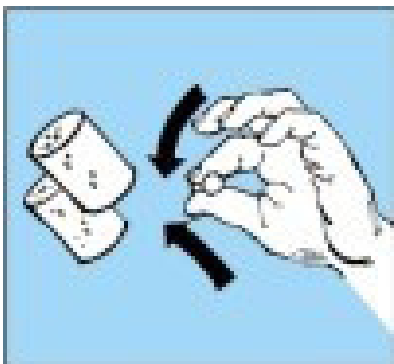
The first is the standard method which has been used for years; it measures the amount of **permanent hearing loss** which has occurred since the baseline test or since a previous periodic test. Whenever possible, in this approach, the periodic test should be conducted after a 14-hour period of no exposure to noise in excess of 80 dBA.

The second, much more recent approach<sup>5</sup>, which looks for **temporary hearing loss**, can be used to determine whether workers are being adequately protected against overexposure to loud noise. In this case the periodic test is conducted at, or toward, the end of a normal work shift, or within an hour or so after the end of the shift. It has the following advantages:

- It can detect temporary hearing loss and help to correct the situation before the hearing loss becomes permanent.
- It can be conducted on the same day as the baseline test, rather than waiting for six months to a year in order to detect permanent hearing loss. For more information on this approach, consult the NIOSH (1998) Criteria Document on noise or contact the Occupational Hygiene Unit of the Ministry of Labour Relations and Workplace Safety.

## Workers should bring their hearing protection to the audiometric test

The employer should ensure the workers being tested show their regular on-the-job hearing protection to the audiometric technician or supervising health professional. This will allow the professional to evaluate the appropriateness and effectiveness of the protection.



<sup>5</sup> Recommended by NIOSH in the document referenced on the previous page.

# Qualifications of persons providing audiometric testing

## Supervising health professional

Section 113(3)(c) of the regulations requires that the audiometric testing be conducted: “under the direction of a physician, an audiologist or a registered nurse certified in audiometric testing”. This person is hereafter referred to as the ‘*supervising health professional*’ and should have at least the qualifications contained in Appendix 4 of this publication.

“**Under the direction of**” in this Regulation means that the supervising health professional must be responsible for the audiometric testing and counselling and for the outcome of the results, including:

- Endorsing the audiometric testing arrangement, and the counselling and information being given to workers before and after the testing.
- Endorsing the system followed by the technician when abnormal baseline tests, audiograms and other unusual situations are encountered.
- Endorsing the procedures followed for handling, distributing and storing the test results.

## Audiometric technician

The person conducting the audiometric tests, hereafter referred to as the audiometric technician, should have at least the qualifications contained in Appendix 4 of this publication.

## Audiometric test location

Audiometric tests should be conducted in a location, such as an insulated audiometric test booth or a quiet office, where the octave band sound pressure levels do not exceed those



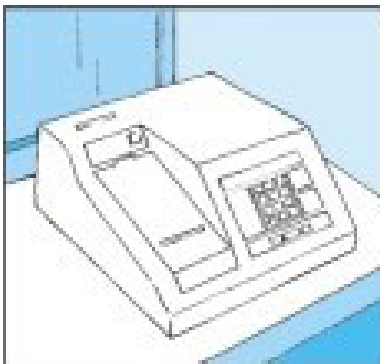
specified in the following table:

Octave-band centre frequency (Hz)	Octave-band sound pressure level (decibels)
500	30
1,000	30
2,000	35
4,000	42
8,000	45

## Audiometers

### Standards

Audiometric testing should be conducted with an audiometer that is constructed, used, maintained and calibrated in accordance with the requirements contained in one of the following publications:



- Canadian Standards Association publication, CAN 3-Z107.4-M86 *Pure Tone Air Conduction Audiometers for Hearing Conservation and for Screening*. Note: A revised version of this standard is currently in review with a sub-committee within Canadian Standards Association and should be reviewed upon publication.
- American National Standards Institute publication, S 3.6-1996 *Specifications for Audiometers*.

### Calibration

Audiometers should be calibrated according to the manufacturer's recommendations.

Periodic biological checks should be conducted on audiometers by checking the auditory thresholds of two persons who are not exposed to loud noise but whose hearing thresholds have been previously tested and recorded.

If the hearing threshold measured in a check differs from the previous measured threshold by 10 dB or more at any frequency, the audiometer must be withdrawn from service until it is recalibrated.

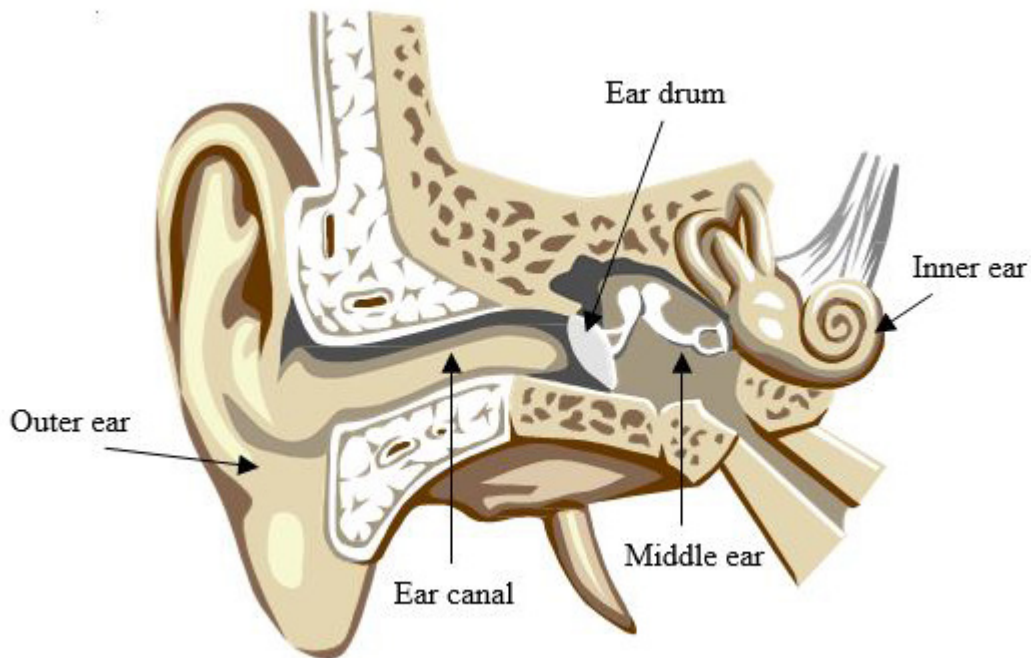
These checks should be conducted no more than one month before the audiometers are used for audiometric testing.

A log book containing calibration records should be kept with the audiometer.

## Protocol for audiometric testing and counselling

### Information to workers

Prior to conducting an audiometric test, the person doing the testing should inform the worker being tested that:



- Audiometric tests are being made available to noise-exposed workers at this workplace as required by *The Occupational Health and Safety Regulations, 1996*.
- Ministry of Labour Relations and Workplace Safety encourages all noise-exposed workers to have an audiometric test once every two years. However, the regulations do not require or force noise-exposed workers to undergo audiometric testing.
- Ministry of Labour Relations and Workplace Safety encourages workers to share their audiometric test results with their employer. However, audiograms and other test results are medical records. They may only be shared with employers if the worker voluntarily chooses to grant permission.

## Testing and counselling

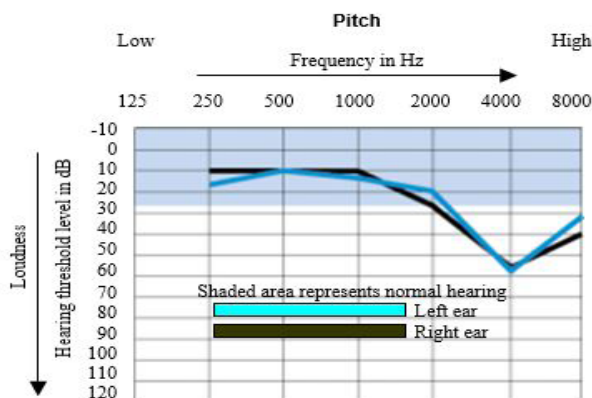
Audiometric testing and counselling deal with information of a medical nature and must be conducted in private. The testing and counselling should include:

- Documenting relevant health histories to work and act safely.
- Examining the worker's outer ears to ensure that the path to the eardrum is clear and open.
- Conducting audiometric testing of each ear at frequencies of 500, 1,000, 2,000, 3,000, 4,000, 6,000 and 8,000 Hz.
- Counselling workers regarding the harmful effects of overexposure to noise.
- Advising workers who appear to have noise-induced hearing loss, or the early warning signs of noise-induced hearing loss, of steps they might take to minimize the risk of further injury, or to obtain assistance or compensation.
- Advising workers on the use and care of hearing protection.
- Counselling of workers in a quiet office, or similar environment, in order to ensure all workers, including those who are hard of hearing, can clearly understand the counselling that is provided.

## Results of testing

### Providing test results to the worker

The employer must arrange to ensure that:



1. The worker receives a copy of his/her audiometric test results.
2. The significance of the worker's audiometric test results are explained to the worker.

These two requirements are best handled by the audiometric technician or supervising health professional during the audiometric test. Workers should be advised to keep copies of their audiometric test results for future reference.

## Abnormal test results and referrals

Where, in the opinion of the audiometric technician, the hearing of a worker has been impaired by excessive exposure to noise or the audiogram of a worker resulting from a current audiometric test is a confirmed<sup>6</sup> abnormal baseline audiogram,<sup>7</sup> the audiometric technician should refer the testing results to the supervising health professional.

The supervising health professional should provide the worker with appropriate follow-up recommendations and offer to send the worker's test results and their interpretation to the worker's physician.

## Repeat audiometric tests

Where, in the opinion of the supervising health professional or the audiometric technician, the results of a worker's audiometric testing are believed to be invalid for any reason, the employer must arrange for the worker to be tested again.

This re-test should be done within 30 calendar days from the time the previous test is determined to be invalid.

## Record keeping and maintenance

### Health records to be kept confidential



Audiometric test results and relevant health histories must be kept in confidence by the supervising health professional and the audiometric technician. In accordance with section 10(1) of the regulations, information of a personal medical nature must not be disclosed by the supervising health professional or the audiometric technician, except:

- to the worker
- to the chief occupational medical officer
- with the informed consent of the worker, to another person
- where otherwise required by law

## Records to be maintained

The supervising health professional should retain a copy of all audiometric test records on behalf of the employer for as long as that employer operates in Saskatchewan.

If a new person takes over as the supervising health professional, the employer should ensure that the previous supervising health professional transfers copies of all audiometric test records for that employer's workers to the new supervising professional.

A worker may ask to receive copies of his or her results from any test conducted under the regulations, and/or that copies be provided to a physician named by the worker. When such a request is made, the employer must arrange for copies of these test records to be provided.

## Hearing conservation plan

Where ten or more workers' occupational noise exposure exceeds, or is believed to exceed, 85 dBA  $L_{ex}$ , the employer must develop a hearing conservation plan in consultation with the workplace occupational health committee. This plan must be reviewed (and revised if necessary) at least every three years.

The plan must address a number of items, including audiometric tests. To monitor the effectiveness of the plan over time, the committee must periodically obtain and review summary reports of the general results of the audiometric tests.

## Summary reports

The employer should obtain a summary report of audiometric test results from the supervising health professional containing:

1. The names of the workers who underwent audiometric testing.
2. The number, but not the names, of workers who were found to exhibit each of the following:
  - a. abnormal baseline audiogram<sup>8</sup>
  - b. early warning audiogram<sup>8</sup> or
  - c. abnormal audiogram<sup>8</sup>
3. Any recommendations made by the supervising health professional.

This type of summary report would be useful in all workplaces where audiometric tests have been conducted, since it would indicate whether hearing conservation measures are successfully protecting workers' hearing without disclosing personal medical information.

The employer should keep copies of all summary reports for as long as the employer operates in Saskatchewan.

When requested by an occupational health officer, the employer must provide copies of any summary report to the officer.

<sup>8</sup>See the definitions in Appendix 1.

## Appendix 1: Definitions

- “**dBA**” means the noise level measured on the A scale of a sound level meter.
- “**dBA L<sub>ex</sub>**” means the level of a worker’s exposure, in dBA, averaged over the entire workday adjusted to an equivalent eight-hour exposure (e.g., the dBA L<sub>ex</sub> for exposure to 90 dBA for two hours during the day is 84; the dBA L<sub>ex</sub> for exposure to 90 dBA for 12 hours during the day is 91.8 dBA). (See *Appendix 3 for more information*).
- “**baseline audiometric test**” means the first audiometric test performed satisfactorily on a worker while employed by his/her current employer.
- “**abnormal baseline audiogram**” means an audiogram produced from a baseline audiometric test in which the hearing threshold, in either ear, averages 25 dB or more at 500 to 6000 Hz.
- “**periodic audiometric test**” means any audiometric test conducted after the baseline audiometric test for comparison with the baseline audiometric test and/or the last periodic audiometric test.
- “**early warning audiogram**” means an audiogram produced from a periodic audiometric test which shows a drop of 15 dB or more, in either ear, at 2,000 to 6,000 Hz when compared to the worker’s baseline audiometric test or to one of the worker’s periodic audiometric tests.
- “**abnormal audiogram**” means an audiogram produced from a periodic audiometric test which shows a drop, in either ear, of 15 dB or more at any two adjacent frequencies, or a drop of 25 dB or more at any one frequency, from 500 to 6000 Hz when compared to the worker’s baseline audiometric test or to one of the worker’s periodic audiometric tests.
- “**reasonably practicable**” means possible given current knowledge, technology and invention—unless the employer or contractor can show that there is a gross disproportion between the costs (in time and money) of changing the work or the workplace and the benefits of making the changes.

## **Appendix 2: The Occupational Health and Safety Regulations, 1996**

### **General duty**

#### **109**

1. An employer, contractor or owner shall ensure that all reasonably practicable means are used to reduce noise levels in all areas where workers may be required or permitted to work.
2. The means to reduce noise levels pursuant to subsection (1) may include any of the following:
  - a. eliminating or modifying the noise source;
  - b. substituting quieter equipment or processes;
  - c. enclosing the noise source;
  - d. installing acoustical barriers or sound-absorbing materials.

### **Noise reduction through design, construction of buildings**

#### **110**

On and after July 1, 1997, an employer, contractor or owner shall ensure that:

- a. all new places of employment are designed and constructed so as to achieve the lowest reasonably practicable noise level;
- b. any alteration, renovation or repair to an existing place of employment is made so as to achieve the lowest reasonably practicable noise level; and
- c. all new equipment to be used at a place of employment is designed and constructed so as to achieve the lowest reasonably practicable noise level.

### **Measurement of noise levels**

#### **111**

1. In every area where workers are required or permitted to work and the noise level may frequently exceed 80 dBA, an employer or contractor shall ensure that:
  - a. the noise level is measured in accordance with an approved method;
  - b. in consultation with the committee, the representative or, where there is no committee or representative, the workers, a competent person evaluates the sources of the noise and recommends corrective action; and
  - c. the measurements, evaluation and recommendations are documented.

2. An employer or contractor shall re-measure the noise level in accordance with subsection (1) where altering, renovating or repairing the place of employment, introducing new equipment to the place of employment or modifying any process at the place of employment may result in a significant change in noise levels or occupational noise exposure.
3. An employer or contractor shall keep a record of the results of any noise level measurements conducted at the place of employment as long as the employer or contractor operates in Saskatchewan.
4. On request, an employer or contractor shall make available to an affected worker a copy of the results of any measurements conducted.
5. An employer or contractor shall ensure that any area in which the measurements taken pursuant to subsection (1) show noise levels in excess of 80 dBA is clearly marked by a sign indicating the range of noise levels.

### **Daily noise exposure between 80 dBA $L_{ex}$ and 85 dBA $L_{ex}$**

#### **112**

Where a worker's occupational noise exposure is or is believed to be between 80 dBA  $L_{ex}$  and 85 dBA  $L_{ex}$ , an employer or contractor shall:

- a. inform the worker of the hazards of occupational noise exposure;
- b. on the request of the worker, make available to the worker hearing protectors that meet the requirements of section 99; and
- c. train the worker in the selection, use and maintenance of the hearing protectors.

### **Daily noise exposure greater than 85 dBA $L_{ex}$**

#### **113**

1. Where a worker's occupational noise exposure equals or exceeds 85 dBA  $L_{ex}$ , an employer or contractor shall:

- a. inform the worker of the hazards of occupational noise exposure;
- b. take all reasonably practicable steps to reduce noise levels in all areas where the worker may be required or permitted to work;
- c. minimize the worker's occupational noise exposure to the extent that is reasonably practicable; and
- d. document the steps taken pursuant to clauses (b) and (c).

2. Where, in the opinion of the employer or contractor, it is not reasonably practicable to reduce noise levels or minimize the worker's occupational noise exposure to less than 85 dBA Lex, an employer or contractor shall provide written reasons for that opinion to the committee and, where there is no committee, shall inform the workers of the reasons for that opinion.
3. Where it is not reasonably practicable to reduce a worker's occupational noise exposure below 85 dBA Lex or the noise level below 90 dBA in any area where a worker may be required or permitted to work, an employer or contractor shall:
  - a. provide a hearing protector to the worker that meets the requirements of section 99;
  - b. train the worker in the selection, use and maintenance of the hearing protector; and
  - c. arrange for the worker to have, at least once every 24 months during the worker's normal working hours, an audiometric test and appropriate counselling based on the test results under the direction of a physician, an audiologist or a registered nurse who has a certificate in audiometric testing.
4. Where a worker cannot attend an audiometric test mentioned in clause (3)(c) during the worker's normal working hours, an employer or contractor shall credit the worker's attendance at the test as time at work and ensure that the worker does not lose any pay or other benefits.
5. Where a worker cannot recover the costs of an audiometric test mentioned in clause (3)(c), an employer or contractor shall reimburse the worker for the costs of the test that, in the opinion of the director, are reasonable.

## Hearing conservation plan

### 114

1. Where 10 or more workers' occupational noise exposure exceeds or is believed to exceed 85 dBA Lex, an employer or contractor shall, in consultation with the committee:
  - a. develop a hearing conservation plan; and
  - b. review and, where necessary, revise the hearing conservation plan every three years.
2. An employer or contractor shall implement a hearing conservation plan developed pursuant to subsection (1) and appoint a supervisor to oversee the plan.
3. A hearing conservation plan must be in writing and must include:
  - a. the methods and procedures to be used in assessing the occupational noise exposure of workers;
  - b. the methods of noise control to be used, including engineering controls and administrative arrangements;

- c. the selection, use and maintenance of hearing protectors;
  - d. a plan to train workers in the hazards of excessive exposure to noise and the correct use of control measures and hearing protectors;
  - e. the maintenance of exposure records;
  - f. the requirements for audiometric tests; and
  - g. a schedule for reviewing the hearing conservation plan and procedures for conducting the review.
4. An employer or contractor shall make a copy of a hearing conservation plan readily available for reference by workers.

### Appendix 3: $L_{ex}$ values

Section 113(3)(c) of the regulations requires that employers arrange audiometric testing for workers:

- a. who regularly work in areas where noise levels are 90 dBA or greater, or
- b. whose noise level exposure is regularly equal to or greater than 85 dBA  $L_{ex}$

In some workplaces workers will not regularly work in areas where the noise level exceeds 90 dBA, but they will have to work in areas where the noise level regularly exceeds 85 dBA.



In such situations employers have three options:

1. They can assume that all employees who regularly work in areas where noise levels exceed 85 dBA have a noise level exposure of 85 dBA  $L_{ex}$  or greater and thus are eligible for audiometric testing.
2. They can measure workers' average noise exposure levels using noise dosimeters.
3. They can calculate individual dBA  $L_{ex}$  values to determine which specific workers are eligible for audiometric testing.

**The term “dBA  $L_{ex}$ ”, as defined in the regulations means** “the level of a worker’s total exposure to noise, in dBA, averaged over an entire workday and adjusted to an equivalent eight-hour exposure”.



**$L_{ex}$  can be calculated by using the formula:**

**$L_{ex} = L_{avgT} + 10 (\log_{10}[T/8])$** , where  $L_{avgT}$  is the average noise level to which the worker is exposed, averaged over a time period, T. For example, if a worker works in an area where the average noise level is 88 dBA for six hours, the  $L_{ex}$  would be 87 dBA.

The following table of  $L_{ex}$  values can be used to determine the  $L_{ex}$  value for a large number of situations where the average noise level and exposure time are known.

**L<sub>ex</sub> Values Table**  
(Sections 112, 113 and 114 of the regulations)

Noise Level (dBA)	T ( Exposure Time in Hours )															
	0.25	0.5	1.5	2	2.5	3	3.5	4	5	6	7	8	9	10	11	12
76	60.9	64.0	68.7	70.0	70.9	71.7	72.4	73.0	74.0	74.8	75.4	76.0	76.5	77.0	77.4	77.8
78	62.9	66.0	70.7	72.0	72.9	73.7	74.4	75.0	76.0	76.8	77.4	78.0	78.5	79.0	79.4	79.8
80	64.9	68.0	72.7	74.0	74.9	75.7	76.4	77.0	78.0	78.8	79.4	80.0	80.5	81.0	81.4	81.8
82	66.9	70.0	74.7	76.0	76.9	77.7	78.4	79.0	80.0	80.8	81.4	82.0	82.5	83.0	83.4	83.8
84	68.9	72.0	76.7	78.0	78.9	79.7	80.4	81.0	82.0	82.8	83.4	84.0	84.5	85.0	85.4	85.8
86	70.9	74.0	78.7	80.0	80.9	81.7	82.4	83.0	84.0	84.8	85.4	86.0	86.5	87.0	87.4	87.8
88	72.9	76.0	80.7	82.0	82.9	83.7	84.4	85.0	86.0	86.8	87.4	88.0	88.5	89.0	89.4	89.8
90	74.9	78.0	82.7	84.0	84.9	85.7	86.4	87.0	88.0	88.8	89.4	90.0	90.5	91.0	91.4	91.8
92	76.9	80.0	84.7	86.0	86.9	87.7	88.4	89.0	90.0	90.8	91.4	92.0	92.5	93.0	93.4	93.8
94	78.9	82.0	86.7	88.0	88.9	89.7	90.4	91.0	92.0	92.8	93.4	94.0	94.5	95.0	95.4	95.8
96	80.9	84.0	88.7	90.0	90.9	91.7	92.4	93.0	94.0	94.8	95.4	96.0	96.5	97.0	97.4	97.8
98	82.9	86.0	90.7	92.0	92.9	93.7	94.4	95.0	96.0	96.8	97.4	98.0	98.5	99.0	99.4	99.8
100	84.9	88.0	92.7	94.0	94.9	95.7	96.4	97.0	98.0	98.8	99.4	100.0	100.5	101.0	101.4	101.8
102	86.9	90.0	94.7	96.0	96.9	97.7	98.4	99.0	100.0	100.8	101.4	102.0	102.5	103.0	103.4	103.8
104	88.9	92.0	96.7	98.0	98.9	99.7	100.4	101.0	102.0	102.8	103.4	104.0	104.5	105.0	105.4	105.8
106	90.9	94.0	98.7	100.0	100.9	101.7	102.4	103.0	104.0	104.8	105.4	106.0	106.5	107.0	107.4	107.8
108	92.9	96.0	100.7	102.0	102.9	103.7	104.4	105.0	106.0	106.8	107.4	108.0	108.5	109.0	109.4	109.8
110	94.9	98.0	102.7	104.0	104.9	105.7	106.4	107.0	108.0	108.8	109.4	110.0	110.5	111.0	111.4	111.8
112	96.9	100.0	104.7	106.0	106.9	107.7	108.4	109.0	110.0	110.8	111.4	112.0	112.5	113.0	113.4	113.8
114	98.9	102.0	106.7	108.0	108.9	109.7	110.4	111.0	112.0	112.8	113.4	114.0	114.5	115.0	115.4	115.8
116	100.9	104.0	108.7	110.0	110.9	111.7	112.4	113.0	114.0	114.8	115.4	116.0	116.5	117.0	117.4	117.8
118	102.9	106.0	110.7	112.0	112.9	113.7	114.4	115.0	116.0	116.8	117.4	118.0	118.5	119.0	119.4	119.8
120	104.9	108.0	112.7	114.0	114.9	115.7	116.4	117.0	118.0	118.8	119.4	120.0	120.5	121.0	121.4	121.8
122	106.9	110.0	114.7	116.0	116.9	117.7	118.4	119.0	120.0	120.8	121.4	122.0	122.5	123.0	123.4	123.8
124	108.9	112.0	116.7	118.0	118.9	119.7	120.4	121.0	122.0	122.8	123.4	124.0	124.5	125.0	125.4	125.8
126	110.9	114.0	118.7	120.0	120.9	121.7	122.4	123.0	124.0	124.8	125.4	126.0	126.5	127.0	127.4	127.8
128	112.9	116.0	120.7	122.0	122.9	123.7	124.4	125.0	126.0	126.8	127.4	128.0	128.5	129.0	129.4	129.8
130	114.9	118.0	122.7	124.0	124.9	125.7	126.4	127.0	128.0	128.8	129.4	130.0	130.5	131.0	131.4	131.8
132	116.9	120.0	124.7	126.0	126.9	127.7	128.4	129.0	130.0	130.8	131.4	132.0	132.5	133.0	133.4	133.8
134	118.9	122.0	126.7	128.0	128.9	129.7	130.4	131.0	132.0	132.8	133.4	134.0	134.5	135.0	135.4	135.8
136	120.9	124.0	128.7	130.0	130.9	131.7	132.4	133.0	134.0	134.8	135.4	136.0	136.5	137.0	137.4	137.8
138	122.9	126.0	130.7	132.0	132.9	133.7	134.4	135.0	136.0	136.8	137.4	138.0	138.5	139.0	139.4	139.8
140	124.9	128.0	132.7	134.0	134.9	135.7	136.4	137.0	138.0	138.8	139.4	140.0	140.5	141.0	141.4	141.8

The shaded areas are used to illustrate the example discussed on page 18.

## How to Use the Lex Values table

1. Measure the noise level in the area where the person works. For example, suppose the person works in an average noise level of 100 dBA (left column of table).
2. Determine how many hours of the day the person works in the area. Say this person works in the noisy area for two hours (top row).
3. Locate the Lex values at the intersection of the noise level (left column) and the exposure time (top row). In this example, the person who works two hours a day in any area where the noise level is, or averages, 100 dBA would have  $L_{ex}$  value of 94 dBA. This assumes that, for the rest of the day, the person works in areas where the noise level (or average noise level) is 75 dBA or less.

## Appendix 4: Hearing Protection Devices

### Legislation

#### 114

1. Where a worker is required or permitted by these regulations to use hearing protectors, an employer or contractor shall:
  - a. provide approved hearing protectors; and
  - b. require workers to use those hearing protectors where the worker is required to use hearing protectors by these regulations.
2. Where practicable, an employer or contractor shall ensure that a hearing protector provided pursuant to subsection (1) reduces the noise level received into the worker's ears to not more than 85 dBA.
3. Where it is not practicable to comply with subsection (2), an employer or contractor shall ensure that a hearing protector provided pursuant to subsection (1) reduces the noise level received into the worker's ears to the lowest level that is practicable.
4. Where an employer or contractor provides a worker with a hearing protector that depends for effectiveness on a close approximation of size or shape to the auditory canal of its user, the employer or contractor shall ensure that the hearing protector is fitted to the worker by a competent person.

### General

The employer has a responsibility for providing appropriate personal hearing protection if reductions in noise levels and exposure times have not reduced worker exposures below the occupational exposure limits. It is recommended that hearing protectors meet the requirements in CSA Standard Z94.2, Hearing Protection Devices – Performance, Selection, Care and Use. CSA classifies muffs and earplugs as Class A, B, or C or Grade 1, 2, 3, or 4 based on the level of protection they provide.

## Appendix 4: Hearing protection devices

Maximum equivalent noise level (dBA Lex)	CSA class of hearing protection	CSA grade of hearing protection
≤90	C, B OR A	1, 2, 3 or 4
≤95	B OR A	2, 3 or 4
≤100	A	3 or 4
≤105	A	4
≤110	A earplug + A or B earmuff	3 or 4 earplug + 2. 3, or 4 earmuff
>100	A plug + A or B earmuff and limited exposure time to keep sound reaching the worker's ear drum below 85dBA L <sub>ex</sub>	3 or 4 earplug + 2. 3, or 4 earmuff and limited exposure time to keep sound reaching the worker's ear drum below 85 dBA L <sub>ex</sub>

Hearing protection cannot be modified without compromising the effectiveness of the hearing protection. Refer to manufacturer's recommendations for proper use of the hearing protection devices.

## Appendix 5: Minimum requirements for persons conducting audiometric testing

### General

Training resources should be provided through community college/university sponsored programs or by medically/audiologically directed programs, as available. All training programs should have, as a minimum, an audiologist, with medical resource personnel involved if possible.

### Requirements for course content

While no detailed medical knowledge is required, any course should include, in addition to practical training, some basic understanding of the anatomy of the ear, physics of sound, limitations and operation of the equipment, audiometric test methods, hearing threshold determination, ethics and legal implications. A minimum of 20 hours' instruction is recommended to satisfy this requirement.

## Acknowledgement

WorkSafe Saskatchewan wishes to thank the Workers' Compensation Board of British Columbia for the use of graphics printed in this publication.

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