



CSA Z1007:16
(reaffirmed 2020)

Hearing loss prevention program (HLPP) management



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CSA Z1007:16
***Hearing loss prevention program
(HLPP) management***



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Preface

This is the first edition of CSA Z1007, *Hearing loss prevention program (HLPP) management*.

This Standard sets out requirements for, and provides comprehensive guidance on, the management of HLPPs designed to protect individuals exposed to occupational noise.

This management system Standard is designed to serve as the basis for other CSA Group hearing conservation Standards. Once effective management for the HLPP is established using this Standard, professionals involved in the HLPP can use detailed requirements and application guidelines in those other Standards for specifying equipment and processes to be incorporated in the HLPP.

This Standard strikes a balance between the latest best practices in hearing loss prevention and current regulations in various Canadian jurisdictions. Some of the requirements, therefore, are more stringent than existing regulations. Each section in this Standard contains both normative clauses (where compliance is required or recommended) and informative clauses (providing explanatory information and best practices). For the most part, the informative clauses precede the normative clauses in each section.

By permission of Standards Australia and Standards New Zealand, AS/NZS 1269.0:2005 was used as a seed document for the development of part of this Standard.

By permission of The National Institute of Occupational Safety and Health, a division of the United States Center for Disease Control, parts of this Standard are based on *Criteria for a Recommended Standard: Occupational Hearing Conservation Program (Revised Criteria 1998)*, and *Preventing Occupational Hearing Loss — A Practical Guide*.

CSA Group acknowledges that the development of this Standard was made possible, in part, by the financial support of federal, provincial, and territorial governments' occupational health and safety agencies.

This Standard was prepared by the Subcommittee on Hearing Conservation Management, under the jurisdiction of the Technical Committee on Occupational Hearing Conservation and the Strategic Steering Committee on Occupational Health and Safety, and has been formally approved by the Technical Committee.

Notes:

- 1) *Use of the singular does not exclude the plural (and vice versa) when the sense allows.*
- 2) *Although the intended primary application of this Standard is stated in its Scope, it is important to note that it remains the responsibility of the users of the Standard to judge its suitability for their particular purpose.*
- 3) *This Standard was developed by consensus, which is defined by CSA Policy governing standardization — Code of good practice for standardization as "substantial agreement. Consensus implies much more than a simple majority, but not necessarily unanimity". It is consistent with this definition that a member may be included in the Technical Committee list and yet not be in full agreement with all clauses of this Standard.*
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 - d) *rationale for the change.*

CSA Z1007:16

Hearing loss prevention program (HLPP) management

0 Introduction

0.1 General

Noise is one of the most common occupational health hazards, and a widespread problem in many workplaces. Extended exposure to high noise levels presents a hazard to hearing. It can also have other adverse effects, such as interfering with speech communication, reducing perception of warning sounds, causing tinnitus, increasing stress, and cardiovascular effects (e.g., changes in heart rate, increasing blood pressure, and other systemic effects). Hearing loss has a significant impact on the worker's life for which professional advice and counselling might be necessary.

0.2 Elements of a hearing loss prevention program (HLPP) (see Figure 1)

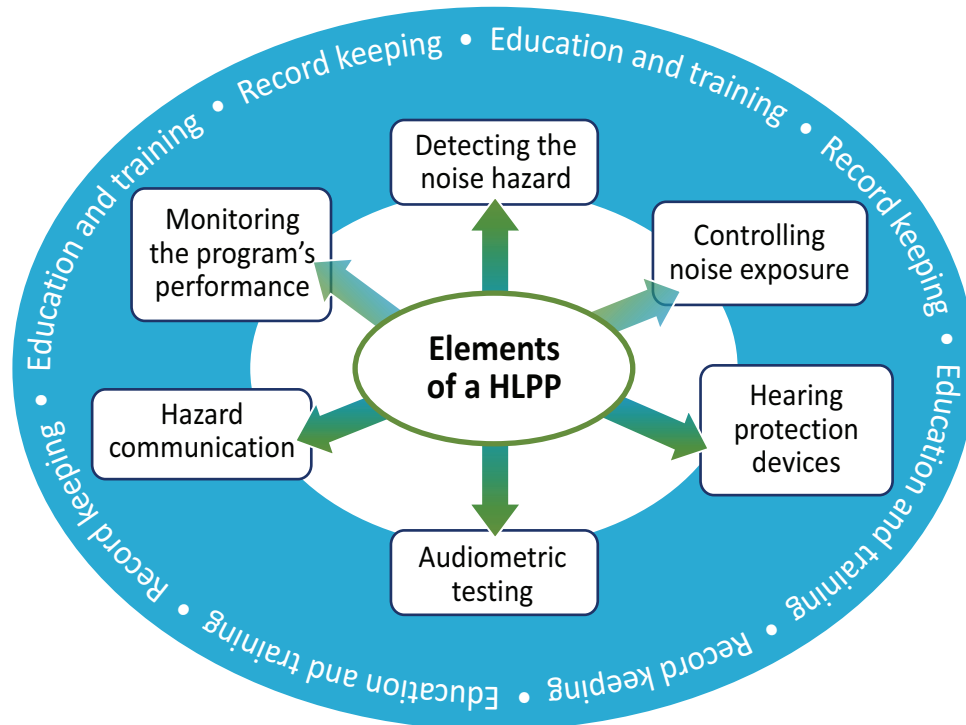
This Standard outlines the issues that an occupational hearing loss prevention program administrator (referred to hereinafter as the "administrator") needs to address to manage a program effectively. It is designed to guide the person charged with worker health and safety or the business owner in establishing and managing an HLPP. Where elements of the HLPP are addressed in other standards, this Standard mirrors those elements. This Standard also follows the "Plan, Do, Check, and Act" methodology detailed in Annex 1.

An HLPP starts with the identification of a noise hazard. This can be as simple as noticing that it is hard to converse in a raised voice in an area or during a particular process. Once a noise hazard is suspected, the following processes are used to set up an effective HLPP:

- a) Perform noise exposure measurements throughout the workplace.
- b) Eliminate sources of hazardous noise.
- c) Employ engineering and/or administrative controls to reduce or eliminate worker exposure to hazardous noise.
- d) Employ noise hazard communication throughout the workplace.
- e) Educate and train the workforce on hazards of noise exposure, audiometric testing, and proper use of hearing protection devices (both on and off the job).
- f) Provide appropriate hearing protection devices.
- g) Perform audiometric testing.
- h) Keep records of all aspects of the HLPP.
- i) Implement a review process for the HLPP.

The ultimate goal is to prevent occupational hearing loss. Only by continuous improvement, pursued diligently by everyone involved, can this goal be approached.

Figure 1
Elements of a hearing loss prevention program (HLPP)
 (See Clause 0.2.)



0.3 Content of this Standard

Where possible, relevant clauses of the CSA Group Standards relating to the prevention of noise-induced hearing loss (NIHL) have been either incorporated or referenced in this Standard. In addition, annexes in this Standard provide

- a) an explanation of ototoxicity and its application to a hearing loss prevention program;
- b) further detail on what engineering the noise out of a facility entails;
- c) best practices in hearing loss prevention going beyond the recommendations and requirements of this Standard;
- d) examples of a noise map of a facility;
- e) the methodology of doing a risk assessment calculation;
- f) legislative context for hearing conservation (see also the CCOHS [Canadian Centre for Occupational Health and Safety] website: <http://www.ccohs.ca/>);
- g) information on the impact of unprotected exposures and how to modify an HLPP to account for them;
- h) a comparison and guidance for the various methods of estimating hearing protection device (HPD) attenuation;
- i) an explanation of the "Plan-Do-Check-Act" methodology;
- j) periodic assessment of HLPP performance sample worksheets;
- k) an explanation of dBA and dBC;
- l) details on the concept of auditory fitness (hearing ability) and its impact on the safety of the worker; and
- m) a sample of the hearing protection job compatibility analysis.

Note: Other CSA Group Standards provide detailed requirements for specific elements of an HLPP, while this Standard addresses management systems for an HLPP.

0.4 Legislative context

The specific parameters of hearing loss prevention regulations vary between Canadian jurisdictions. Many of these are listed in Annex F. Any differences between this Standard and regulations in any jurisdiction should be seen as reflecting an evolving understanding of this topic. Criteria and recommendations in this Standard assume that eliminating causes of hearing loss in the workplace is a fundamental goal of a hearing loss prevention program.

0.5 Sources of occupational hearing loss

Excessive noise exposure is the primary source of occupational hearing loss. (See Table 1.) General methods for noise hazard assessment, control, and mitigation have been extensively studied in past decades, and make up much of this Standard. However, other causes of hearing loss, such as ototoxic chemicals, can also be present in the workplace. These can combine with noise to create additive or synergistic effects. Much less is known about the potency of non-noise sources and the exact dose–effect relationship; nonetheless, this Standard provides basic information and guidance on these hazards.

Table 1
Noise comparison table
(See Clause 0.5.)

Examples of sound levels and permissible exposures

Occupational	"Safe" durations for daily exposures*	Sound level (dBA)	Non-occupational
Revolver†	Unsafe	160	12 gauge shotgun†
	Unsafe	150	Firecracker†
Jet takeoff	< 1 s	140	Drag racing, in stands
Pneumatic riveter	1 s	130	50 hp siren (30 m)
Pavement breaker	9 s	120	Severe thunder
Riveter	1.5 min	110	Rock concert
Jackhammer	15 min	100	Chainsaw
Excavator/tractor	150 min	90	Belt sander
Portable air compressor	24 h	80	Electric lawn mower
Generator	Unlimited	70	Automobile (80 km/h)
Normal conversation	Unlimited	60	Dishwasher
Transformer	Unlimited	50	Window fan
Quiet office	Unlimited	40	Refrigerator hum
	Unlimited	30	Whisper
	Unlimited	20	Grand Canyon, remote trail
	Unlimited	10	Breathing
	Unlimited	0	Threshold of hearing

* Estimated values based on an 85 dBA permissible daily exposure with a 3 dB exchange rate. See Note below.

† Gunfire and impulses are very short sounds measured with a peak SPL reading that is different than the average SPLs used to rate the other sound exposures in this Table.

Note: The risk of harm due to loud sound depends on the sound level (measured in decibels), the duration of the exposure (measured in time), and personal susceptibility. Occupational regulations recognize that levels at or above 85 dBA can cause damage when the time of exposure equals 8 h or more per day; for each 3 dB increase in level the time of exposure is cut in half. For example: 85 dBA for 8 h is the same risk as 88 dBA for 4 h and 91 dBA for 2 h. See Annex F (Canadian legislative context) for further information.

Source: 3M Noise Navigator® found at www.e-a-r.com/hearingconservation (Berger, Neitzel, and Kladden).

0.6 Non-occupational exposures

Occupational hearing loss prevention programs rarely succeed without a suitable attitude and culture of hearing awareness (by both the organization and its workers). To develop awareness and create a culture of hearing preservation, training should emphasize hearing loss prevention both on and off the job. If the organization ignores non-occupational exposures, workers might doubt the sincerity of the organization's concern for their safety.

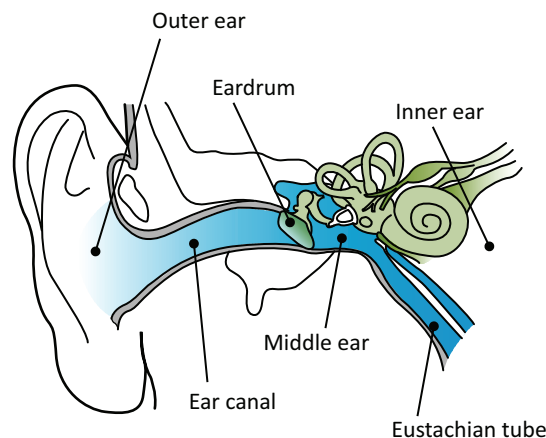
Therefore, a hearing loss prevention plan should educate workers on causes of hearing loss outside the workplace and the effects of unprotected exposures, and provide hearing protection devices for home and recreational use. Unprotected short-term, high-noise exposures can quickly result in a noise dose that exceeds the daily limit. Focusing on non-occupational exposures can help to promote a cultural shift, so that workers protect against all kinds of noise exposures out of their own awareness and understanding.

0.7 Effects of workplace noise and hearing loss prevention

Exposure to excessive occupational noise can cause permanent hearing loss through sensory-neural damage in the cochlea, the organ of hearing. Typically, hearing is first affected in a specific range of audible frequencies (3000 to 6000 Hz). Damage spreads to other frequencies over time and becomes more severe. Further, NIHL is often accompanied by other long-term auditory effects, such as tinnitus (ringing in the ears); increased sensitivity to loud noise; and poorer frequency selectivity (i.e., decreased ability to hear sounds in background noise) compared to individuals with normal hearing. High levels of noise in the workplace can also lead to temporary hearing loss and increased fatigue, affect job performance and productivity, and interfere with speech communication and with the detection of warning signals and other important sounds. In short, noise affects workplace safety and productivity, as well as hearing health.

A brief explanation of the function of the ear is helpful in order to describe how noise can affect and damage hearing. (See Figure 2.) Sound waves, collected by the pinna, or outer ear, pass along the ear canal and vibrate the eardrum (tympanic membrane), thereby transmitting vibrations through the bones of the middle ear to the cochlea. Each specific frequency causes vibration in specific "hair cells" in the cochlea, which in turn send nerve impulses to the brain as sound. Excessive noise exposure causes a reaction that damages these essential hair cells, causing a temporary or permanent loss in hearing.

Figure 2
Diagram of the ear
(See Clause 0.7.)



One of the conditions associated with exposure to noise is tinnitus (ringing in the ears). It is often worse when background noise is low — for example, when one goes to sleep at night in a quiet room. Tinnitus is common, and for most people, the condition is merely an annoyance. In severe cases, however, tinnitus can cause difficulty in concentrating and sleeping. Although one of the most common causes of tinnitus is NIHL, there are many other causes not related to noise or hearing loss.

In a noisy workplace, the auditory demands placed on the workers to maintain safety can be quite challenging. Operators of industrial equipment often need to be able to distinguish subtle variations in machinery noise to ascertain operation within safe limits, despite noise from other machines and industrial processes. All workers also need to be able to hear warning sounds alerting them to dangerous events or situations that require immediate attention. In addition, they also need to be able to communicate orally with others to react appropriately. Balancing these auditory demands with the use of hearing protection is challenging, especially in the presence of pre-existing hearing loss.

Reducing noise in the workplace provides both short-term and long-term hearing health benefits for workers, and promotes a safer and more productive work environment for everyone. As a first step, efforts should be taken to remove the noise hazard from the facility. Buying quieter machinery and engineering noise controls initiatives are strongly favoured, since they provide immediate benefits in all areas of hearing health and safety.

1 Scope

1.1 General

This Standard specifies requirements for the management of hearing loss prevention programs (HLPPs) designed to protect individuals from occupational hearing loss.

1.2 Subjects addressed

Following principles set out in CAN/CSA-Z1000, this Standard specifies requirements for

- a) management commitment, leadership, and participation;
- b) assignment of roles and responsibilities;
- c) identification and quantification of noise hazards;
- d) selection and application of controls;
- e) provision of protection (e.g., hearing protection devices);
- f) training, monitoring, and measurement (e.g., noise exposure and audiometric testing);
- g) documentation; and
- h) continuous improvement and management review.

1.3 Subjects not addressed

The following subjects are not addressed in this Standard:

- a) psychological effects of exposure to noise;
- b) non-auditory effects of noise exposure; and
- c) non-industrial noise exposure except as it impacts industrial noise exposure.

1.4 Relation to other Standards

This Standard is part of CSA Group's Z1000 series of Standards on management of occupational health and safety. (See Figure 3.) As such, it is based on the OHS management principles in CAN/CSA-Z1000.