

Disclaimer

This publication contains information regarding occupational health and safety. It includes some of your obligations under the Occupational Health and Safety legislation that SafeWork SA administers. To ensure you comply with your legal obligations you must refer to the appropriate acts and regulations.

This publication may refer to legislation that has been amended or repealed. When reading this publication you should always refer to the latest laws.

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NOISE AND RISKS TO HEALTH

WHAT IS NOISE?

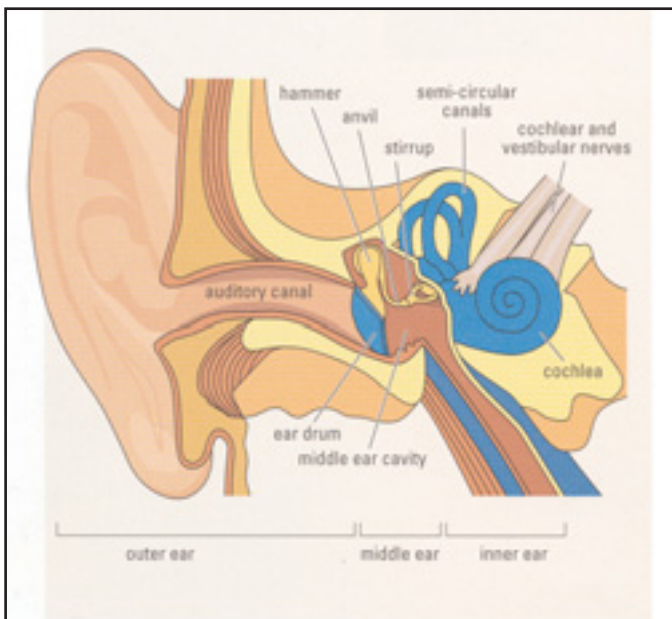
Noise is an unwanted or damaging sound that may damage your hearing and cause other health effects such as stress, hypersensitivity to noise, increased blood pressure and increased heart rate. It can also interfere with communication at work, which could lead to accidents.

The normal range of hearing for a healthy young person is from approximately 20 Hz (Hertz) to 20,000 Hz (20 kHz). Our ears are more sensitive to the middle frequencies, which range from 500 Hz to 4000 Hz - the speech frequencies.

Hertz is a measure of the pitch or frequency of sound, sometimes referred to as cycles per second.

HOW DO WE HEAR?

Noise causes sound waves that make our ear drums vibrate. These vibrations are received by hair cells in the inner ear, which flatten according to the frequency and loudness of the sound and stimulate nerves that pass messages to the brain.



The **outer ear** collects and funnels sound waves along the ear canal to the eardrum.

The **middle ear** contains three tiny bones, called ossicles. When sound waves strike the eardrum, the ossicles conduct the vibration to the cochlea in the inner ear.

Hair cells within the **inner ear** respond to vibrations by generating nerve impulses. The brain interprets this as sound. (It is the hair cells that are damaged by excessive noise, which leads to deafness.)

HOW DOES NOISE DAMAGE MY HEARING?

Very loud sounds make the hair cells collapse and flatten temporarily, resulting in temporary deafness. This is referred to as a **temporary threshold shift** and may last hours or longer depending on the degree of noise exposure.

This temporary hearing loss may also be accompanied by a ringing sensation called **tinnitus**.

If this severe noise exposure is repeated over many years, the hair cells in the inner ear become permanently damaged resulting in permanent hearing loss. This is referred to as **permanent threshold shift**.

Immediate permanent hearing loss can also occur if someone is exposed to very intense or explosive sounds (e.g. gunshot or an explosion). This type of damage is known as **acoustic trauma**. In some cases a very intense sound can actually perforate the eardrum.

The harmful effects of noise are cumulative and not necessarily confined to the workplace. For instance, the use of personal stereo units and frequenting discos and clubs may result in young people having some early damage to their hearing before they even join the workforce.

HOW CAN NOISE AFFECT YOUR LIFE?

Noise-induced hearing loss is one of the most common occupational injuries, resulting in health problems for many workers and it presents a significant social and economic cost to Australia.

The human cost is also high. This includes lost jobs, increased absenteeism, reduced performance, lost opportunities for promotion or other employment and impaired family and social relationships. In addition, if your hearing is damaged it could cause a workplace accident.

The first sign of noise-induced hearing loss is often the difficulty to hear high-pitched sounds, such as consonants (e.g. 't', 'd', 's') and the voices of women and children. When more than one person is speaking or there is a background noise, the problem becomes worse.

Noise-induced hearing loss occurs gradually over a long period of time and unfortunately, hearing loss is permanent (see Figure 1).

Hearing aids can offer limited help in decoding the distorted messages, but they can never fully compensate for hearing loss.

ARE THERE ANY METHODS OF TREATMENT FOR NOISE-INDUCED HEARING LOSS AND RELATED CONDITIONS?

Permanent hearing damage that is either caused immediately through a sudden extremely loud noise or gradually due to prolonged exposure to unacceptable noise levels is incurable.

Tinnitus, which is a ringing, whistling, buzzing or humming in the ear, is another possible problem arising from excessive exposure to noise. This distressing condition can also lead to disturbed sleep and can reduce a person's enjoyment of life. While there is no cure, some people who suffer from tinnitus may be assisted by undertaking **tinnitus retraining therapy**, which offers a way to manage the condition.

For further information about tinnitus retraining therapy visit www.neuromonics.com.au

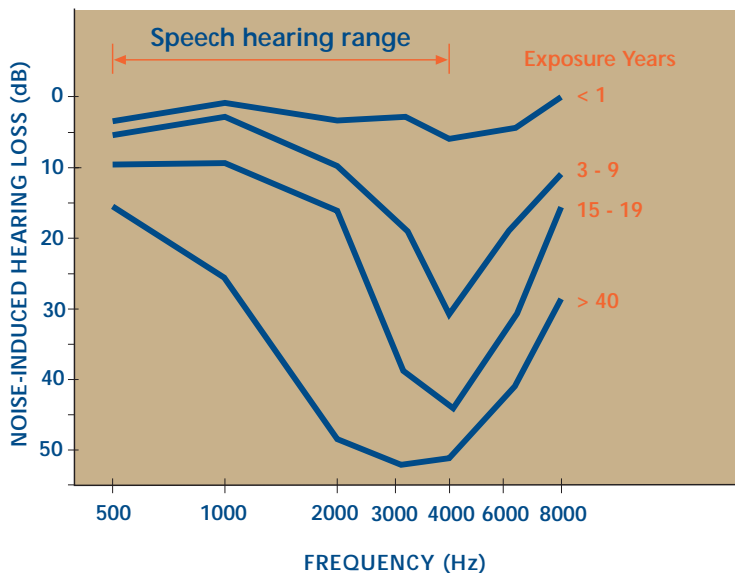


Figure 1: The progression of noise-induced hearing loss at exposures above the exposure standard.

HOW MUCH NOISE IS DANGEROUS?

As people respond differently to noise, the level at which noise will start to cause damage is not known. The amount of damage caused by noise depends on the total amount of energy received over time. This means, as noise becomes louder it causes damage in less time. A 3 dB(A) increase in noise level will produce twice the energy output and cause the same damage in half the time.

Figure 2 shows the different exposure times for different sound levels, all equivalent to exposures of 85 dB(A) for eight hours.

For example, two minutes of working in noise levels of 109 dB(A) may cause the same damage as eight hours working in 85 dB(A).

Long periods of repeated exposure to workplace noise levels between 75 dB(A) and 80 dB(A) present a small risk of developing a hearing disability. As noise levels increase, the risk becomes greater. For example, exposure to noise levels of 85 dB(A) to 90 dB(A) presents a considerably greater risk of developing hearing disability.

The acceptable noise exposure standard in the workplace is 85 dB(A) averaged over an eight-hour period. This is not to imply that below 85 dB(A) a safe condition exists. It simply means that an eight-hour exposure of 85 dB(A) is considered to represent an acceptable level of risk to hearing health in the workplace.

Impulse noise levels in excess of the peak exposure standard of 140 dB(C) are considered to be hazardous and capable of causing immediate hearing damage.

HOW DO I KNOW IF MY HEARING IS AT RISK IN MY WORKPLACE?

If you answer **yes** to any of the following questions your hearing may be at risk:

- Do you have to raise your voice to communicate to someone only one metre away?
- Do you experience ringing in the ears or dull hearing, either after work or after a particular job?
- Do you have to turn up the volume on your car radio or television after a day at work?
- Do you often have to ask people to repeat things they have just said?
- Does your family say you have difficulty hearing them when you are at home?

If you suspect that your workplace has a noise problem, speak to your OHS representative or your employer about having a noise assessment conducted.

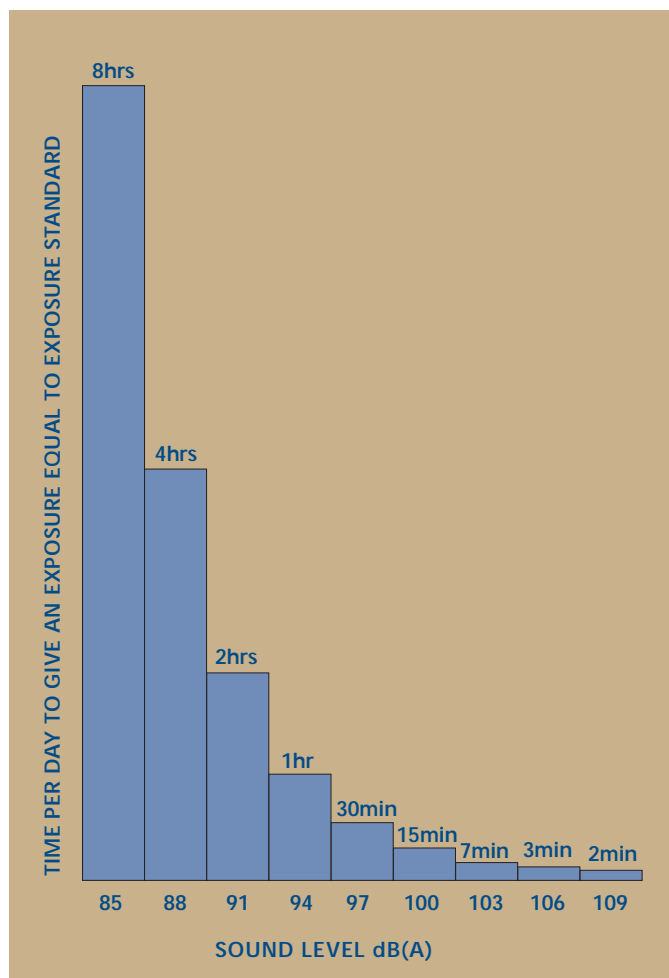


Figure 2

WHAT ABOUT NOISE EXPOSURE OUTSIDE WORK?

The harmful effects of noise exposures add up, so you need to watch your noise exposure outside the workplace as well. You should wear hearing protectors if you are doing any noisy work at home such as using power tools. Even if you are exposed to excessive noise for short periods of time it is important to protect your hearing.

NOISE FACTS

WHAT ARE DECIBELS (dB)?

The loudness of the noise depends on the size of the sound pressure wave (or the amplitude of the wave). The bigger the wave, the louder the noise. This amplitude is measured as a pressure fluctuation and the weakest sound heard by a healthy human ear has an amplitude of 20 μPa (μPa signifies micropascal, which is a millionth of a Pascal; Pa is the unit of pressure). Amazingly, the human ear can tolerate sound pressures more than ten million times higher, that is, up to 200 Pa.

If we measured sound in Pa, we would end up with some quite large, unmanageable numbers. To overcome this problem, we use the decibel (dB, or tenth (deci) of a Bel) scale.

The dB scale is a logarithmic scale and uses the hearing threshold of 20 μPa as the reference level. This is defined as 0 dB.

Therefore as can be seen in Figure 3, the dB scale compresses a range of ten million into a range of only 140 dB.

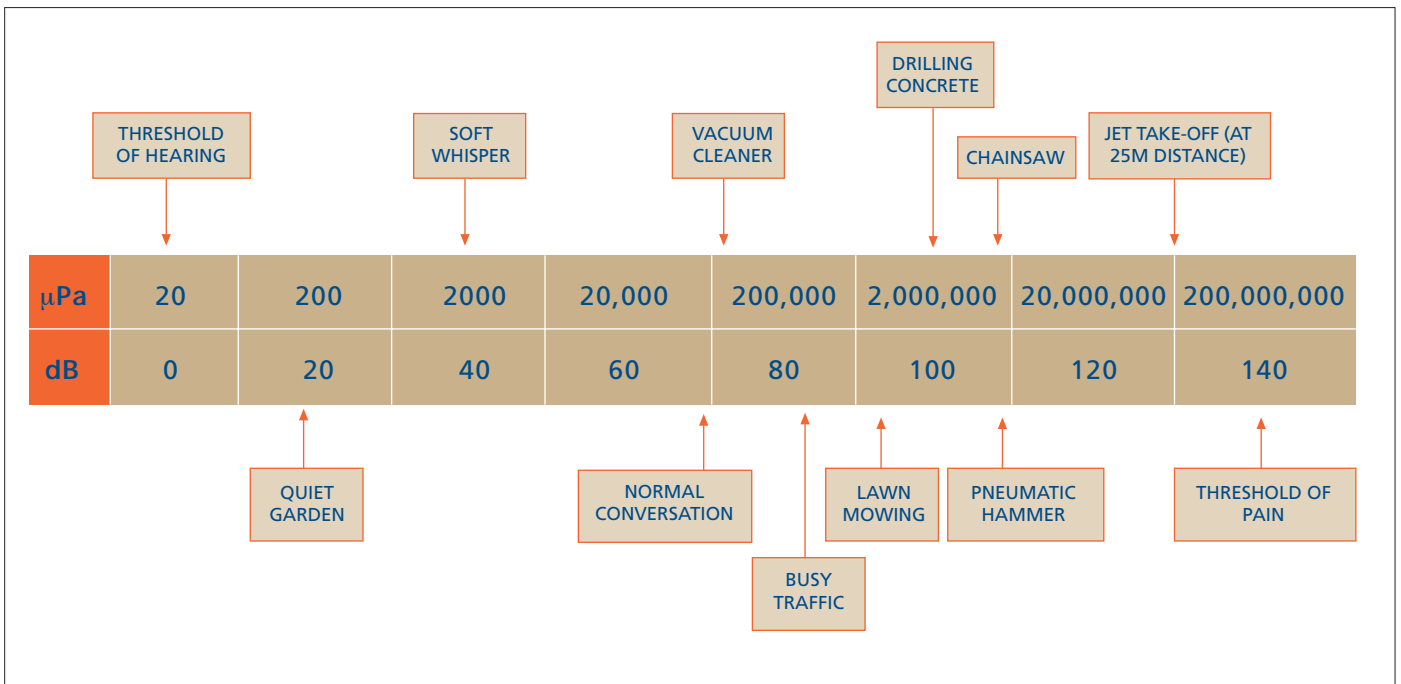


Figure 3: Some common sound pressures in Pa and dB.

WHAT IS dB(A) AND dB(C)?

The ear does not have equal response across the whole frequency spectrum. It responds best in the middle (e.g. 500 Hz to 4000 Hz) and high frequencies and worst in the low frequencies. Therefore, in order for the sound level meter to mimic the response of the human ear, an A-weighting filter is incorporated in the meter. The A-weighting filter de-emphasises the low frequencies produced.

The sound pressure level is expressed in dB(A). The A-weighted sound level measurement has become universally accepted in the assessment of the overall noise hazard since this level provides a rating of industrial broadband frequencies that reflects their association with noise induced hearing loss.

Sound level meters also contain a C-weighting filter, which influences only the highest and lowest frequencies and provides an almost flat response.

Peak noise levels are measured using the C-weighting filter and expressed as dB(C).

The difference between dB(A) and dB(C) levels is a rough guide to the low frequency content of a particular sound level.

HOW IS NOISE MEASURED?

Noise levels are measured using a sound level meter. The meter responds to pressure changes of the noise producing a sound level.

When the noise level varies an integrating sound level meter will provide the average noise level for the sampling period (L_{eq}).

Noise assessments should be carried out with a Type 2 general-purpose meter or better. Type 3 survey meters should only be used for preliminary noise checks to find out whether a more accurate assessment is needed.

The sound level meter, equipped with peak detector-indicating characteristics, is necessary to measure the C-weighted peak noise levels ($L_{C, peak}$).

Personal daily noise exposure can also be measured by personal sound exposure meters or noise dosimeters. These are designed to be worn on a person for a given period of time such as a working day (the microphone should be attached as close as possible to the ear).

Some sound exposure meters do not measure peak noise levels adequately.

More detailed guidance on noise measurements and recording can be obtained from the Australian Standard *AS/NZS 1269.1, Part 1: Measurement and assessment of noise immission and exposure*.



WHAT ARE THE BASIC RULES OF WORKING WITH dB?

The sound pressure levels in decibels dB or A-weighted decibels (dB(A)), are a logarithmic scale. They cannot be added or subtracted in the usual arithmetic way. For example, if one machine emits a sound level of 90 dB(A) and a second identical machine is placed beside the first, the combined sound level is 93 dB(A), not 180 dB(A).

A 3 dB(A) increase corresponds to a doubling of the sound energy.

A 10 dB(A) increase corresponds to a 10 times increase of the sound energy.

A 20 dB(A) increase corresponds to a 100 times increase of the sound energy.

Further information on the calculations of noise levels can be obtained from the Australian Standard *AS/NZS 1269.1, Part 1: Measurement and assessment of noise immission and exposure*.

IF I WORK MORE THAN AN EIGHT-HOUR SHIFT IS THE RISK GREATER?

Yes.

Research indicates that noise exposure for shift duration of ten hours or longer presents an increased risk compared to a normal eight-hour shift. Ten hours of exposure is considered to be the time taken to reach the maximum temporary threshold shift. After this time, additional damaging effects may occur.

The risk may be further increased if the recovery time between shifts is reduced.

Therefore, when the shift duration is ten hours or more, an adjustment to the normal eight-hour noise exposure level should be made before comparing it with the noise exposure standard.

Adjustments can be made using Table 2 in the Australian Standard *AS/NZS 1269 Part 1*.

For Example:

A person works a sixteen-hour shift. Noise measurements for this shift ($L_{Aeq,T}$) is 87 dB(A).

The normalised total daily noise exposure level (eight hours) is:

$$\begin{aligned}L_{Aeq,8h} &= L_{Aeq,T} + 10\log_{10}(T/8) \quad (T= 16) \\L_{Aeq,8h} &= 87 + 10\log_{10}2 \\&= 87 + 3 \\&= 90 \text{ dB(A)}\end{aligned}$$

The adjustment according to Table 2, in the Australian Standard *AS/NZS 1269* is 2 dB for a sixteen-hour shift.

Therefore, the adjusted equivalent eight-hour exposure level is $90 \text{ dB(A)} + 2\text{dB} = 92\text{dB(A)}$.

This value (92dB(A)) should be the value used to compare with the exposure standard (and **not** the 87 dB(A) measured over sixteen hours, and **not** the 90 dB(A) normalised total daily noise exposure).

Note: Below ten hours the adjustment is 0 dB; between ten and fourteen hours, the adjustment is +1 dB and between fourteen and twenty hours it is +2 dB.

RELEVANT NOISE LEGISLATION

WHAT IS THE NEW EXPOSURE STANDARD FOR NOISE?

In accordance with amendments to Division 2.10 of the *Occupational Health, Safety and Welfare Regulations 1995*, which came into effect on 7 October 2004, the noise exposure standard is:

- An eight-hour equivalent continuous A-weighted sound pressure level, $L_{Aeq,8h}$ of 85 dB(A) referenced to 20 micropascals (μ Pa).

The $L_{Aeq,8h}$ is that steady state noise level, which would in the course of an eight-hour period, cause the same A-weighted sound energy as that due to the actual noise over an actual working day.

That is, when the work period is either shorter or longer than eight hours the L_{Aeq} value must be extrapolated to an eight-hour L_{Aeq} and should be designated $L_{Aeq,8h}$.

- A C-weighted peak sound pressure level, $L_{C,peak}$ of 140 dB(C) reference to 20 μ Pa.

This means that exposure to varying, intermittent or impulse noise should not exceed 140 dB(C) at any instant in time (as measured on the peak setting on the sound level meter).

IS THERE AN APPROVED CODE OF PRACTICE FOR NOISE?

Yes.

On 14 October 2004, the *National Code of Practice for Noise Management and Protection of Hearing at Work [NOHSC:2009 (2004)]* came into effect as an Approved Code of Practice under section 63(1) of the *Occupational Health, Safety and Welfare Act 1986*. The code supports the amendments to the noise regulations and provides industry and SafeWork SA's Occupational Health and Safety Inspectors with a benchmark for the practices necessary to meet the new standard.

The amendments to the noise regulations and the introduction of the approved code of practice have brought South Australia in line with the other states and territories.

WHEN DID THE CHANGES TAKE EFFECT?

The amendments to Division 2.10 of the *Occupational Health, Safety and Welfare Regulations 1995*, which introduced the new noise exposure standard, came into effect on 7 October 2004.

The *National Code of Practice for Noise Management and Protection of Hearing at Work [NOHSC:2009 (2004)]*, came into effect as an Approved Code of Practice, on 14 October 2004.

I HEARD THAT THE NATIONAL NOISE STANDARD AND CODE OF PRACTICE WILL BE REVIEWED IN 2005. IS THIS CORRECT? AND HOW WILL IT AFFECT EVERYONE IN THE WORKPLACE?

The National Occupational Health and Safety Commission (NOHSC) is undertaking a review of the *National Standard for Occupational Noise* and *National Code of Practice for Noise Management* and the *National Standard for Occupational Noise [NOHSC:1007(2000)]*. This commenced in August 2005 and is expected to take at least one year.

The terms of reference for the review are broadened to include other health issues related to noise exposure as well as issues on noise-induced hearing loss.

Some of the issues that may be considered are: introduction of action levels, non-auditory effects of noise, effects of ultrasound and infrasound, and the combined effects of exposure to noise and certain physical or chemical agents (ototoxicity).

The current agreement with state and territory Ministers is to adopt national standards in order to provide consistent and uniform legislation Australia-wide. Therefore, once the standards and Code of Practice are reviewed they will be considered for adoption by South Australia and the other states and territories.

WORKPLACE MATTERS: WHAT EMPLOYERS, WORKERS AND SELF-EMPLOYED PERSONS SHOULD KNOW

I AM AN EMPLOYER. WHAT ARE MY RESPONSIBILITIES UNDER THE REGULATIONS?

You must ensure that safe work practices are implemented and maintained if your workers are at risk of being exposed to noise levels that are greater than the exposure standards specified in Division 2.10 of the *Occupational Health, Safety and Welfare Regulations 1995*.

If noise levels do exceed these standards, you must develop a noise management strategy. **A noise management strategy must be developed in consultation with your workers and occupational health and safety (OHS) representatives.** A noise management strategy must include:

- a noise control policy and program to eliminate the noise hazards or reduce the risks so that levels are below the exposure standards;
- appropriate control measures;
- a comprehensive hearing protection program, including the selection of personal hearing protectors and instruction in their correct use and maintenance;
- an information and training program for all levels of management, workers and contractors; and
- audiometric testing for workers likely to be regularly exposed to excessive noise, even if they use personal protective equipment.

Further information on noise management programs is outlined in the *National Standard for Occupational Noise [NOHSC:1007(2000)]* and *National Code of Practice for Noise Management and Protection of Hearing at Work [NOHSC:2009(2004)]* and *Australian Standard AS/NZS 1269.2:2005: Occupational noise management - Noise control management*.

HOW CAN EMPLOYERS MANAGE NOISE IN THE WORKPLACE?

If noise is a hazard at your workplace, you should conduct a walkthrough inspection to identify if noise is excessive or a problem at work.

No special skills are required to do this preliminary identification assessment; however, it should be done in consultation with those who understand the work processes such as affected workers and OHS representatives.

The walkthrough inspection will help determine:

- sources of excessive noise;
- workers likely to be exposed to excessive noise;
- work practices that are noisy; and
- ways of reducing noise levels.

The *Noise Hazard Identification Checklist* at the back of this booklet will help to determine the risks and identify whether a more detailed quantitative noise assessment is needed.

WHAT IS A NOISE ASSESSMENT?

When exposure to excessive noise is known or likely to occur (as identified by the preliminary identification assessment), the extent and magnitude of the noise problem needs to be determined through a noise assessment.

A noise assessment will provide useful information on:

- noise levels;
- items producing the most noise;
- the effectiveness of control measures;
- workers that are most affected by the noise; and
- prioritising control measures.

If a noise assessment determines that the noise levels in your workplace are too high, you must implement control measures to reduce the noise exposure to a legally acceptable level and develop a noise management strategy.

WHO CAN CARRY OUT A NOISE ASSESSMENT?

Noise assessments can be simple, involving only a single noise source or they can be complex involving multiple noise sources and posing a high risk to a significant number of workers.

A competent person who meets the requirements set out in Appendix A of Part 1 of Australian Standard, *AS/NZS 1269 Occupational noise management*, must carry out a noise assessment. For complex noise assessments it is recommended to employ a professional consultant who is experienced in workplace noise assessments (e.g. an acoustical consultant or an occupational hygienist – check the Yellow Pages).

WHAT METHODS CAN I USE TO CONTROL NOISE EXPOSURE AT WORK?

Implementing one or more of the following hierarchy of control measures can manage excessive noise levels (in order of effectiveness):

1. Eliminating the noise source.
2. Substituting noisy machinery with quieter machinery ('buying quiet'). (This is a cost effective way to control workplace noise at the source.)
3. Engineering controls by treating the noise at the source or in its transmission path (e.g. using sound dampeners or silencers, noise barriers and isolation).
4. Introducing administrative noise control measures (e.g. training and education, job rotation, job redesign or designing rosters to reduce the number of workers exposed to noise).
5. Providing hearing protectors (e.g. earmuffs, earplugs).

The most effective results may be achieved by implementing a combination of the above control measures.

Note: Hearing protectors are the last control measure and should be used as a last resort when the higher level control measures in the above list are not sufficient to reduce the noise exposure level to below the legal limit. They may also be used as an interim measure while engineering controls are being investigated.

SHOULD I PROVIDE TRAINING FOR MY WORKERS?

Yes.

Training should be provided to everyone in the workplace who is exposed to noise or involved in managing the risks from noise exposure. This would include:

- workers, managers and supervisors;
- OHS representatives and members of OHS committees;
- workers responsible for purchasing plant, noise control equipment and personal hearing protectors; and
- workers responsible for designing the workplace layout.

SHOULD I PROVIDE AUDIOMETRIC TESTING FOR MY WORKERS?

Yes.

Any worker regularly exposed to noise that is in excess of the exposure standard, should have a hearing test. Although this testing is not a preventative measure, it is a valuable check on the success of the noise management strategy and provides a unique opportunity for employee education.

The cause of any changes in hearing levels should be investigated so preventative control measures can be determined. A review of the noise management strategy may also be required.

A testing program should include:

- an initial reference audiogram prior to noise exposure at the workplace;
- a comparison test carried out within twelve months of the initial workplace noise exposure; and
- annual tests (unless a significant threshold shift is found or there is a change in work situation).

WHO CAN CONDUCT AUDIOMETRIC TESTING?

Audiometric testing should be carried out by a competent person as previously described with reference to the *National Code of Practice for Noise Management and Protection of Hearing at Work [NOHSC:2009 (2004)]* and *Australian Standard AS/NZS 1269 (Part 4 - Auditory assessment)*.

I AM A WORKER. WHAT ARE MY RESPONSIBILITIES UNDER THE REGULATIONS?

You must comply with all the policies and procedures that your employer has put in place to reduce noise exposure.

You must also take reasonable care to ensure your own health and safety and you must avoid adversely affecting the health and safety of others who may be affected by your work.

I AM SELF-EMPLOYED. WHAT ARE MY RESPONSIBILITIES UNDER THE REGULATIONS ?

You must take reasonable care to ensure your own health and safety at work and you must avoid adversely affecting the health and safety of others who may be affected by your work.

WHAT RESPONSIBILITIES DO DESIGNERS, MANUFACTURERS AND SUPPLIERS OF PLANT HAVE UNDER THE REGULATIONS?

The regulations recognise that the most effective way to reduce noise exposure is to control it at the source.

If you are a designer, manufacturer and/or supplier of plant you must ensure that the plant is designed and constructed so that its noise emissions are as low as practicable when properly installed and used. The noise levels produced should be below the exposure standard (85 dB(A)).

Employers should aim to 'buy quiet' and should ensure, before purchasing new equipment, that information is made available by the manufacturer or supplier, about the equipment's noise emissions and the recommended installation, maintenance and use of the plant to generate the lowest practicable noise levels.

DOES THE LEGISLATION COVER NOISE EXPOSURE TO MEMBERS OF THE PUBLIC?

The noise regulations administered by SafeWork SA, deal only with people at work such as employers and workers. However, the duties set out in the *Occupational Health, Safety and Welfare Act 1986*, are more general in scope, meaning that employers and workers have a responsibility to take appropriate action if noise creates a risk to other people such as members of the public.

For example, if a construction company is carrying out noisy work in a shopping centre, they need to take action to minimise the noise exposure to members of the public.

However, if your neighbour is making excessive noise at a residential property, this is a matter for your local council and the Environment Protection Authority (EPA).

NOISE AND HEARING PROTECTORS



WHY DO EMPLOYERS HAVE TO REDUCE NOISE AT THE SOURCE WHEN WORKERS CAN WEAR HEARING PROTECTORS?

In the hierarchy of control measures, hearing protectors such as earmuffs and earplugs are the least effective form of protection. This is because they rely on individual workers using the equipment correctly and they can fail or be inefficient without it being visibly obvious. The effectiveness of hearing protectors is also reliant on their condition and whether they fit the operator correctly.

WHEN DO I NEED TO PROVIDE HEARING PROTECTORS AND WHAT KIND?

If the other control measures are not sufficient to reduce the noise level to below the legal exposure standard you must provide the appropriate hearing protectors and you must ensure that your workers are trained in their correct use and maintenance.

The main types of hearing protection are:

- earmuffs (these completely cover the ear);
- earplugs (these are inserted in the ear canal);
- ear canal caps or semi-inserts (these cover the entrance to the ear canal); and
- special types of protection (this includes electronic earmuffs, musician's earplugs and radio earmuffs).

The hearing protectors should be stored in a clean and secured storage area. Cleaning materials for hearing protectors should also be conveniently located in the storage area.

HOW DO I CHOOSE MY HEARING PROTECTORS?

The choice of hearing protectors is a very personal one and depends on a number of factors including level of noise, comfort, suitability of the hearing protectors for both the worker and the environment and compatibility with other protective equipment used by the worker such as hard hats, respirators and eye protection.

Your noise assessment will allow your noise consultant or a qualified in-house staff member to work out the level of hearing protection required by workers exposed to excessive noise.

Once the protection needs have been determined, you need to provide your workers with a suitable range of hearing protectors so that they can choose the one that suits them best. This helps ensure that individual factors such as comfort are taken into consideration.

If noise exposure is intermittent, earmuffs or ear canal caps may be more suitable, since it may be inconvenient to continually remove and insert earplugs.

HOW CAN I FIND OUT HOW MUCH A HEARING PROTECTOR CAN REDUCE EXPOSURE TO NOISE?

Personal hearing protection equipment must be approved in accordance with Australian Standard *AS/NZS 1270 Acoustics - Hearing protectors*.

Manufacturers will provide information about the noise reducing capability of a hearing protector as a SLC_{80} rating number (or Class - ranging from 1 to 5). The higher the rating or Class number the greater the noise reduction in the wearer's ear.

For example, if an individual has an exposure level, $L_{Aeq,8h}$ of 98 dB(A), then the hearing protector with SLC_{80} rating of 18 to 21 dB (Class 3) will be adequate to attenuate or reduce the exposure to below the required exposure standard of 85 dB(A).

Table 1 provides a simple classification for the selection of hearing protectors for $L_{Aeq,8h}$ greater than 85 dB(A).

This method may be used if the daily exposure level, $L_{Aeq,8h}$ is less than 110 dB(A) and if the noise is broadband in character.

Table 1

$L_{Aeq,8h}$ (dB(A))	Class	SLC_{80} range (dB)
<90	1	10 - 13
90 to <95	2	14 - 17
95 to <100	3	18 - 21
100 to <105	4	22 - 25
105 to <110	5	26 or greater

For peak exposures ($L_{C,peak}$) there is no standard method for quantifying the attenuation of hearing protectors to impulse noise.

The following simple rules should be applied for selecting hearing protectors for use in noisy environments with peak levels greater than 140 dB(C), until a method is developed:

- impulse noise from impacts and tools - wear a Class 5 hearing protector; and
- impulse noise from blasting - wear earplugs having a classification of at least Class 3 in combination with earmuffs of any classification.

Further information on the selection of hearing protectors can be found in the Australian Standard, *AS/NZS 1269.3: Part 3 - Hearing protector program*.

CAN I USE A HEARING PROTECTOR WITH A HIGHER THAN RECOMMENDED SLC_{80} - CLASS RATING?

It is generally thought that a reduction in exposure level to about 70dB(A) is acceptable. However, if you are overprotected you may experience the following disadvantages:

- difficulty in communication and hearing warning signals;
- feelings of isolation; and
- discomfort. Often earmuffs with a high SLC_{80} rating will be heavier and have a higher clamping force on the head making them more uncomfortable to wear.

Therefore, if a hearing protector with a higher than recommended SLC_{80} or class rating is selected, it is more likely to be rejected by the worker or worn for only part of the time.

WHAT HAPPENS IF A WORKER REFUSES TO WEAR HEARING PROTECTION?

As an employer, you are responsible for ensuring that your workers wear hearing protectors.

If your workers are choosing not to wear hearing protectors or are only using them to a minimal extent you must find out why. Possible reasons may be that they find them uncomfortable, they do not have enough information on the health implications or they would like to wear a different type of hearing protector.

To address the needs of your workers in regard to using hearing protectors you may need to put someone in charge of implementing a hearing protection program. This would include issuing the protectors, providing training on their correct use and maintenance and conducting spot checks to see if the safe work procedures are being followed and whether hearing protectors are being worn correctly.

HOW WILL I HEAR INSTRUCTIONS OR WARNINGS WHEN I AM WEARING HEARING PROTECTORS?

Studies show that wearing the correct hearing protectors in a noisy environment can improve the ability of a person with normal hearing to hear what is going on around them. However, special communication earmuffs are available if required.

WILL MY AUDIO HEADPHONES PROTECT ME FROM WORKPLACE NOISE?

No. In fact, audio headphones used in a noisy environment will add to the outside noise and will contribute towards the damage to your hearing.

I AM USED TO THE NOISE LEVELS AT WORK. DO I STILL NEED PROTECTION?

Your ears do not get used to noise, even if you may think they have. Your hearing may already be damaged, in which case it is important to protect yourself against further hearing loss.

CAN I WEAR MY HEARING PROTECTORS FOR ONLY PART OF THE SHIFT?

No. In order to get the full protection you must wear your hearing protectors at all times during a noisy shift. If you remove your hearing protectors, even for a short duration, your protection will be substantially reduced.

For example a worker is exposed to noise for eight hours a day and wears a high-grade hearing protector with SLC_{80} rating of 30 dB (see Figure 4).

If the worker fails to wear the hearing protectors for fifteen minutes over that eight-hour exposure time (that is, percentage of time worn is approximately 97%), the effective attenuation supplied (reduction in noise) will be approximately 15 dB.

Similarly, if the worker worked for an hour and did not wear the hearing protectors for 10 minutes (time worn is approximately 83%), then the effective protection is only 8 dB instead of 30 dB.

These examples demonstrate a significant reduction in protection when compared with the expected 30 dB and therefore the worker's noise dose may be much higher than expected.

Note: If the hearing protectors need to be removed for communication purposes then the type of hearing protectors used should be reviewed.

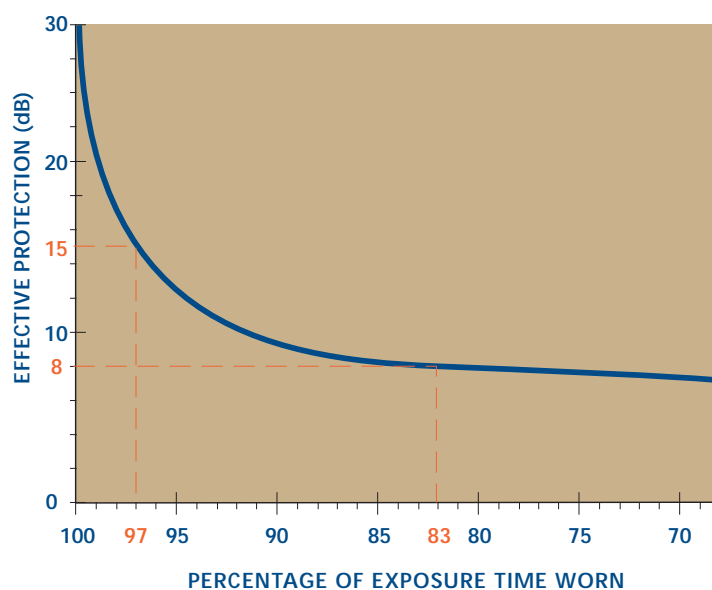


Figure 4: Maximum protection provided by non-continuous use of hearing protectors.

I WORK IN A DUSTY AND DIRTY PLACE. SHOULD I WORRY THAT USING EARPLUGS WILL INFECT MY EARS?

If you use clean earplugs and maintain good personal hygiene the earplugs should not infect your ears. Have clean hands when using earplugs that need to be rolled or formed with your fingers. If this is inconvenient, there are other types of hearing protectors you can use such as ear canal caps or earmuffs.

WHERE CAN I GET FURTHER INFORMATION?

- Division 2.10 of the *Occupational Health, Safety and Welfare Regulations 1995*.
- *National Code of Practice for Noise Management and Protection of Hearing at Work [NOHSC:2009 (2004)]*
- Australian Standard *AS/NZS 1269: Occupational noise management*
- Australian Standard *AS/NZS 1270: Acoustics - Hearing protectors*
- Contact SafeWork SA:
 - Telephone: 1300 365 255 or (08) 8303 0400
(for mobile and interstate callers)
 - Website: www.safework.sa.gov.au
 - **Dr Joe Crea**
Chief Advisor - Occupational Hygiene
Telephone: (08) 8303 0207
E-mail: crea.joe@saugov.sa.gov.au
 - **Darren Marinoff**
Principal Inspector - Occupational Hygiene
Telephone: (08) 8303 0254
E-mail: marinoff.darren@saugov.sa.gov.au

NOISE HAZARD IDENTIFICATION CHECKLIST

Description of work location: _____

Task at workstation: _____

Assessed by: _____

Worker representative: _____

Date: _____

Yes to any of the following questions indicates the need for a detailed noise assessment.

1. Is a raised voice needed to communicate with someone that is only about one metre away? Yes No
2. Do workers complain that there is too much noise? Yes No
3. Do workers say that they can't hear each other or hear instructions or warning signals? Yes No
4. Do people working in the area notice a reduction in hearing over the course of the day?
(This reduction might not be noticed until after work.) Yes No
5. Do workers experience any of the following:
 - (a) ringing in the ears (tinnitus) Yes No
 - (b) the same sound having a different tone in each ear Yes No
 - (c) blurred hearing Yes No
6. Are any of the long-term workers hard of hearing? Yes No
7. Are personal hearing protectors provided? Yes No
8. Are signs, indicating that personal hearing protectors should be worn, posted at the entrance or in the work area? Yes No
9. Have there been any workers compensation claims for noise-induced hearing loss? Yes No
10. Does any equipment have manufacturer's noise information (including labels) that indicates noise levels equal or greater than any of the following:
 - (a) 80dB(A) $L_{Aeq,T}$ Yes No
 - (b) 130dB peak noise level Yes No
 - (c) 88dB(A) sound power level Yes No
11. Do the results of audiometry indicate that past or present workers have hearing loss? Yes No
12. Does the noise in any part of the workplace sound as loud or louder than 85 decibels using the scale Decibel Levels of Common Sounds? Yes No

Please note that this noise hazard identification checklist can be photocopied

PLEASE TURN OVER

DECIBEL LEVELS OF COMMON SOUNDS

EXAMPLE	SOUND PRESSURE LEVEL dB(A)
30m from a jet aircraft	140
Threshold of pain	130
	120
	110
Chainsaw	
Night club	100
	90
Kerbside of busy road	80
	70
Conversational speech	60
	50
Quiet bedroom at night	40
	30
	20
	10
Background in TV studio	
Threshold of hearing	0

National Code of Practice for Noise management and protection of hearing at work [NOHSC: 2009(2004)].

