

# NOISE INDUCED HEARING LOSS IN INDUSTRY



## INTRODUCTION

Business activity related noise in industry is as old as industry itself. Many activities taking place in industry cannot be performed without causing high levels noise. Another aspect that is as old as industry, is the fact that employees loose hearing acuity due to the noise they are being exposed to in the workplace. This loss of hearing acuity, with all its psychological, economical and business implications, can easily be prevented, and it is the responsibility of management as well as the workforce to ensure that hearing loss, due to tasks performed and the work environment these tasks are performed in, does not happen.

## PURPOSE OF TRAINING SESSION

Employees should be conversant with the following after this session has been completed:

1. Legislation regarding noise in industry
2. What is noise
3. Sources of noise
4. How the human ear works
5. How noise impact on the hearing acuity of employees
6. Noise induced hearing loss
7. The noise survey
8. Precautions taken by the employer in order to minimise risk of hearing loss
9. Causes of hearing loss other than industrial noise
10. Personal hearing protectors
11. Hearing acuity testing
12. The hearing conservation programme

## 1. LEGISLATION

### Occupational Health and Safety Act

This Act was promulgated in 1993 and gives responsibility to the employer as well as the employee regarding safety in the workplace. Under this act, the following is required:

- **Section 8 of the act indicates that the employer shall determine all hazards to health or safety in the workplace.** This means that the employer must identify noise areas or sources of noise in the workplace. These noise levels must be measured to determine the exact level of noise the employees are exposed to
- **Section 8: The employer shall provide for precautionary measures to be taken with respect to such hazards.** This means that the employer must take action to engineer out the sources of noise in order to bring down the level of noise the employees are being exposed to. Should this not be possible, and employees will be exposed to high levels of noise in the workplace, sufficient actions should be taken to prevent loss of hearing. These actions include demarcation of noise areas, signage, supply of personal hearing protectors, employee education and hearing acuity testing. This section of the act implies that all preventative measures the employer implements with regards to the prevention of hearing loss, becomes law on site, and the law should not be disobeyed.

- **Section 13: The employer shall ensure that employees are conversant with hazards to health and safety.** This means that all employees working in a noise zone must be educated regarding the risk of hearing loss due to the exposure to noise in the workplace. The employer must also educate employees on what actions are taken to minimise the risk of hearing loss.
- **Section 14: Employees at work are responsible for their own safety as well as for the safety of those working with them.** This means that employees are **also** responsible to ensure that they do not have loss of hearing acuity due to the noise in the workplace. They must comply with the rules and requirements that the employer has put in place to prevent loss of hearing acuity.
- **Section 15: No employee shall tamper with or misuse anything provided to them in the interest of health and safety.** This means that the personal hearing protectors supplied to employees may not be abused or neglected. The protective equipment should be worn correctly, when required and should be kept well maintained.
- **Section 31: The Chief Inspector may investigate any incident in connection with work.** This means that, should there be cases of hearing loss on a specific site, the Inspector from the Department of Labour can investigate the causes of this hearing loss and can take appropriate action as is deemed necessary. Employers and employees will have to give evidence with regards to what was done to prevent loss of hearing due to noise in the workplace.
- **Section 38: Penalties and offences.** This section indicates that any person who fails to comply with a lawful order, such as taking steps to prevent hearing loss and to use personal hearing protectors, will be guilty of an offence and on conviction will be fined R50 000.00 and / or 1 year imprisonment (employee) or R100 000.00 and / or 2 years imprisonment (employers)

### Noise-induced hearing loss regulations (Occupational Health and Safety Act)

These regulations were promulgated in March 2003 in order to enforce effective prevention of hearing loss in industry due to exposure to noise at the workplace.

These regulations instruct the following:

- No employer shall allow any person to be **exposed to noise** equal to or above 85 dBA in the workplace
- All employees exposed to noise shall undergo **training** regarding sources of noise, impact of noise on hearing acuity and the actions taken to prevent loss of hearing due to exposure to noise
- All persons who are exposed to noise shall **obey any lawful** order given to him with regards to the actions for prevention of hearing loss
- Noise **assessment** shall be done within 6 months from commencement of these regulations and necessary actions should be taken
- Noise **monitoring** shall be done where noise levels are above noise-rating limit and shall be repeated at least every 24 months
- **Medical surveillance** (hearing acuity testing) shall be done on all employees exposed to noise
- Copies of **audiograms** shall be kept on each employee's file and a copy of such shall be given to the employee when he or she leaves the employment of the employer
- All areas where exposure to noise is at or above the noise-rating level, shall be demarcated as a **noise zone**
- Employers should **control noise exposure** through engineering control measures
- **Record** shall be kept of all assessments, noise monitoring, medical surveillance, training
- **Hearing protective equipment** shall be provided, well maintained and correctly use

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- Any person who fails to comply with this regulation shall be **guilty of an offence** and liable on conviction to a fine or to imprisonment of 6 months, as well as R200 for each day on which the offence continues or 1 day for every day the offence continues

### **COID Act**

Hearing loss cases are compensatable under the COID act. This act requires that:

- All cases of hearing loss shall be **reported** to the Commissioner
- Calculation of compensation will be done by the Commissioner and compensation will be paid out to the employee

## **2. WHAT IS NOISE**

Noise is the result of vibration of a medium such as water, air, metal or plastic. This vibration causes the air around us to move. We call these movements sound waves. When these sound waves come into contact with the ear, the sound waves are changed by the ear into sound or noise. These sound waves can have different lengths and speed. The loudness of noise is measured in decibels (dB). Noise from 85dB and above causes permanent damage to the ear, resulting in loss of hearing acuity. For this reason legislation has been written to enforce appropriate action to prevent loss of hearing in the industry where the level of noise is equal to or above 85dB, thus above the **noise-rating limit** (noise level where an employee is exposed to 85dB or above, for a 8 hour period, where loss of hearing will occur due to this exposure)

## **3. SOURCES OF NOISE**

In industry, different types of noise are caused by a variety of activities and equipment used. These different types of noise are:

- **Din:** This is a noise experienced in everyday work life e.g. sound of trucks and forklifts, voices, hammering and clanging of metal, sound of process machines etc.
- **Ultrasonic sound:** This sound can not be hear by the human ear and is experienced as vibration.
- **Impulse noise:** This is sudden impact noise, such as a loud bang or crash when something is dropped, pressure release takes place
- **Continuous noise:** The noise remains constant for a long period of time such as an electrical motor running
- **Fluctuating noise:** The intensity of noise is different over a period of time such as an engine running at different speeds
- **Interrupted noise:** When variations in noise levels take place due to the switching on and off of equipment like hand drills and grinding wheels

Different types of noise can have different effects on hearing and on the exposed individual.

Let's look at how loud a number of activities and equipment can be!

Source	Intensity Level	Source	Intensity Level
Threshold of Hearing (TOH)	0 dB	Walkman at Maximum Level	100 dB
Rustling Leaves	10 dB	Front Rows of Rock Concert	110 dB
Whisper	20 dB	Jackhammer	115 dB
Normal Conversation	60 dB	Threshold of Pain	130 dB
Production area	90 dB	Military Jet Takeoff	140 dB
Truck passing	93 dB	Instant Perforation of Eardrum	160 dB

**How can you decide which noises are too loud? Noise in an area is too loud when:**

- you have to shout to be heard above the noise.
- you can't understand someone who is speaking to you from less than 0.5 meter away.

#### 4. HOW THE HUMAN EAR WORKS

The human ear is divided into 3 parts namely the external, middle and inner ear. The inner ear is located inside the skull. It is the most complex part of the ear. The soft tissue of the inner ear is made of different types of cells and nerves, all arranged in a pattern on a thin sheet of tissue. Large tubes filled with fluid surround the soft tissue of the inner ear.

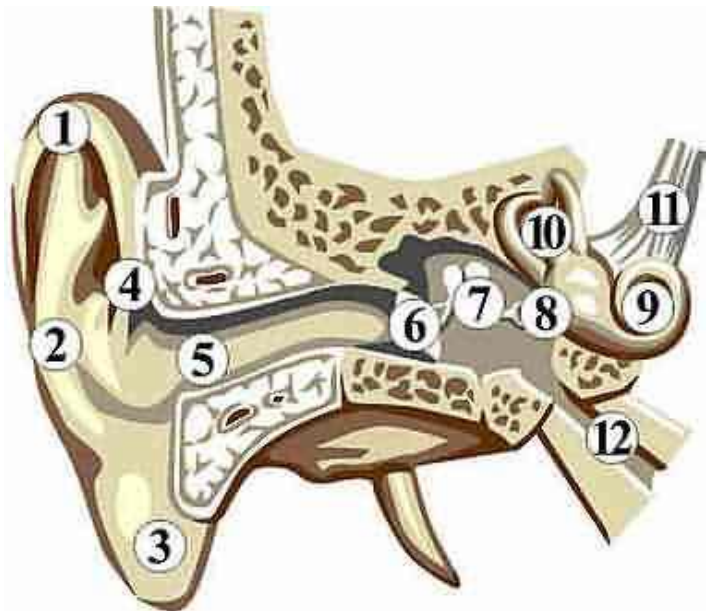
**1 – 4: Outer earlobe**

**5: Middle ear:** ear canal through which the sound waves are led to the inner ear

**6: Eardrum:** tympanic membrane at the end of the external ear canal

**7: Hearing bones:** their purpose is to lead the sound striking the eardrum further into the inner ear

**8 – 12: Inner ear:** Organs that transfer noise and nerves that takes message from inner ear to brain



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## 5. THE EFFECTS OF NOISE ON EMPLOYEES

Extended exposure to noise can damage the soft tissue of the inner ear. Cells and **nerves** in the inner ear are **destroyed** by continuous or repeated exposure to loud sounds. If enough cells and nerves are destroyed, hearing is **permanently damaged**. This is the most serious effect of noise on the body, especially as the loss of hearing can not be reversed.

Exposure to loud noise has other effects on the body as well. A person who has lost hearing acuity is not able to take part in normal conversation and becomes **isolated** from the group. This person also has difficulty hearing instructions clearly. This person will also not be able to hear noise from oncoming vehicles / forklifts, may not hear a change from the normal operating noise the equipment he is working with, will not hear a warning shouts and may not hear alarms in case of emergency. This inability to interpret the immediate work environment increases this individuals risk of injury and may impact on the quality of his work.

Continuous exposure to noise can cause problems like headache, high blood pressure, tiredness, feeling down, frustration and being angered easily. These feelings have a bad influence on **personal performance** and on **productivity** because people who do not feel well do not work well.

### NOISE INDUCED HEARING LOSS

Employees do not realize the danger of noise because exposure to noise causes few symptoms. Becoming deaf is **not painful**. The employee will have vague feelings of pressure or fullness in the ears, speech that seems to be muffled or far away, and a ringing sound in the ears that you notice when you are in quiet places. These symptoms may continue minutes, hours or days after the exposure to noise ends.

Employees think that if the symptoms go away, their ears have "bounced back" to normal. This is not really true. Even if there are no more symptoms, some of the cells in the inner ear may have been destroyed by the noise. Your hearing returns to normal if enough healthy cells are left in your inner ear. But you will develop a lasting hearing loss if the noise exposure is repeated and more cells are destroyed.

The first sign of a noise-induced hearing loss is not being able to hear high-pitched sounds, like the singing of birds, or not understanding the speech of women and small children. If the damage goes on, hearing declines further, and lower pitched sounds, including men's voices, become hard to understand. The employees themselves can do a lot to prevent loss of hearing.

#### How can loss of hearing acuity be prevented?

- Use your **hearing protective equipment** correctly at all times when you are working in a noise area
- Do not take part in **noisy activities**, such as welding, grinding and drilling after work hours, without wearing hearing protective equipment
- Do not frequent the **disco's** or listen to your own music to loudly
- Do not travel in **transport** where the music is played to loudly
- Have your **hearing tested** frequently

## 6. THE NOISE SURVEY

The employer must have the noise levels **measured** in all the areas identified as noise zones on site. These measurements must be done by a person qualified Occupational Hygienist, registered by the Department of Labour. The equipment used for the measurement must be calibrated and in good working condition. The noise survey must be done once every 24 months or sooner if any

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changes, such as new machinery, new processes or building alterations have taken place in the area. The report on all noise measuring must be kept on site. The **employees** working in the noise area must **know what the noise levels (dB) are** that they are exposed to.

## 7. PRECAUTIONS TAKEN BY THE EMPLOYER

Accepting the fact that noise is an inherent part of the processes and tasks on site, the employer must take action to lower the level of noise in the workplace firstly by using **engineering controls**. This means that he has to, as far as possible, enclose, encapsulate, insulate etc. machines that cause noise, a machine and equipment maintenance plan must be implemented to support noise reduction as far as possible, and if needs be, old equipment and machines should be replaced by newer, less noisy models.

Once all possible noise reduction actions have been taken and there is no possibility of bringing down the level of noise in the area to below 85dB, the employer must take the following actions:

1. **demarcate** this area as a noise zone. This means that the employer must indicate that the area is a noise zone by using **signage** (pictures) at all the entrances to the area. This signage serves as implied access control – no entry into the area unless all requirements regarding noise controls and hearing conservation are complied with.
2. supply all the employees working in the area with **hearing protective equipment** and he must ensure that all employees **know exactly how to use** the hearing protective equipment. The employee is given the responsibility through legislation to wear the hearing protective equipment correctly at all times when working in a noise zone.
3. all employees exposed to noise must have a **hearing acuity test** done annually or six monthly, depending on the noise level the employees are exposed to. (Annual testing 85dB to 104dB, 6 monthly testing above 105dB)

## 8. HEARING PROTECTIVE EQUIPMENT

Hearing protective equipment must be supplied to employees working in a noise zone **free of charge**. The hearing protective equipment should be procured from a **reputable** supplier. The employer must ensure that all employees who have to wear the protective equipment have been **trained** by knowledgeable people on how to use the equipment correctly. They must also know how to **clean** the equipment and where to **store** the equipment when it is not in use. They must also know when the equipment is not effective and functional and when a new set of protectors should be used. The employees should also understand the **limitations** of each specific type of hearing protector. Employees need to know the correct manner of **disposal** of redundant protectors. The employee is responsible under legislation to wear the hearing protectors **at all times** when they are working in a noise zone.

## 9. HEARING ACUITY TESTING

All employees working in a noise zone must have their **hearing tested** annually in the noise level is between 85 dB and 105 dB, or 6 monthly if the noise level is 105 dB or above. These tests must be organized by the employer and must be paid for by the employer. The employee must go for the hearing acuity test and **cannot refuse**. The result of the test must be given to the employee. Should the employee have a significant loss of hearing (10% loss or more) the loss is compensable and the necessary documentation should be completed by the employer and forwarded to the COID Commissioner to ensure that the employee will be **compensated** for this loss of hearing.

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## 10. THE HEARING CONSERVATION PROGRAM

Legislation makes the employer and the employee responsible to ensure that employees do not suffer hearing acuity loss due to exposure to noise in the workplace. All the aspects mentioned in the previous sections addresses the different components that form the hearing conservation program. This program needs to be formalized, implemented and maintained on all sites where there are sources of noise to a level above 85dB and where employees are exposed to this noise as part of their duties.

It is essential that employers and employees ensure the effectiveness of this program due to the unnecessary social and psychological impact, financial and production losses that result from loss of hearing acuity. Lastly, employers need to recognize their moral responsibility in this situation - deafness is an exorbitant price to pay to secure food for the family table.