

RISK MANAGEMENT GUIDELINES

Occupational Noise

INTRODUCTION

How Do We Hear?

Sound waves strike the eardrum which set up vibrations in the middle ear. These are picked up by the inner ear (cochlea) where they are translated into nerve impulses from the ear to the brain.

Humans can hear noise in frequencies 20 Hz to 20,000 Hz, but show particular sensitivity in the range 1,000 to 4,000 Hz which is the range of frequencies covering ordinary speech.

If hearing is damaged through extensive exposure to noise the higher frequency vocal sounds, around 4,000 Hz, will probably not be heard. This is why speech becomes distorted as hearing loss sets in.

To reflect this when noise is measured at work, emphasis or weighting is given to those frequencies which have most effect on the human ear. Hence noise meters having an "A Weighted Decibel Scale" or dBA are used.

Undesirable Effects of Noise

The effects of noise on workers has been recognised for many years. The main problems can be summarised:-

Social

- Interference with rest or sleep
- Causes annoyance
- Hinders communication
- Causes increased fatigue

Acute or Short Term Medical Effects

- Temporary threshold shift i.e. hearing loss due auditory nerve fatigue which returns to normal levels after a period of hours following the original exposure.
- Tinnitus or ringing in the Ears
- Acute acoustic trauma i.e. sudden damage to the eardrum or cochlea caused by very loud noises and which is often reversible.

Long Term Effects

- Permanent threshold shift otherwise known as noise induced hearing loss. This is irreversible damage to the inner ear and is difficult to differentiate from Presbycusis which is the natural deafening due to old age.
- Tinnitus
- Diplacusis which is uneven hearing between the ears which makes understanding difficult.

Audiometry

Assessment of hearing capability is carried out by a technique called audiometry. It involves asking a person to sit in a soundproof booth with headphones on and listen to a range of pure sounds over a chosen range of frequency. The intensity of the sound is varied slowly at each frequency and the subject indicates when they can hear. In this way, their own threshold of hearing is measured. These figures are compared with the normal level of hearing in a population with no presbycusis or noise induced hearing loss, and an audiogram produced.

Characteristics of Noise Induced Hearing Loss

- It is entirely due to damage to the inner ear
- Both ears are affected
- There is roughly equal loss in both ears
- There is significant dip in the audiogram at 4,000 Hz
- It has gradual onset
- It develops due to prolonged exposure to noise

- The hearing loss is not a linear progression over the life of the individual. The greatest amount of loss tends to be in the earlier years of exposure

Statutory Requirements

The main requirements are contained in the Noise at Work Regulations 1989. They set down the obligations and responsibilities of employers and employees, but the scope of the Regulations is wide and a self-employed person is treated both as an employer and an employee, and an employer has a duty towards persons not his employees.

The Regulations are based on the concept of a "daily personal noise exposure" which can be regarded as the total exposure to noise throughout the day taking account of the average noise levels in working areas and the time spent in them, but taking no account of ear protectors worn.

Three action levels are laid down:-

A first action level where the daily personal noise exposure exceeds 85 dBA. A second action level where the daily personal noise exposure exceeds 90 dBA. A peak action level where the noise exceeds 200 pascals (140 dB).

Assessment of Exposure

- A noise assessment by a competent person is necessary if the peak or 85 dBA action levels are likely to be exceeded
 - To identify which employees are affected
 - To enable him to comply with the noise reduction measures in Regulations 7, 8 and 10.
- The assessment is to be reviewed if the validity of the original assessment is in doubt or there has been significant change.

Records of the assessment are to be held until a subsequent assessment or until all employees covered by that assessment leave. It will usually be sensible to keep records for longer than this to provide information on long term trends or with regard to subsequent claims.

Reduction of Risk of Hearing Damage

There is a general duty to reduce the risk of damage to the lowest extent reasonably practicable.

Reduction of Noise Exposure

There is a duty to reduce the exposure, other than by the use of protective equipment, so far as is reasonably practicable when the peak or 90 dBA action levels are exceeded.

Ear Protection

- When an employee is likely to be exposed to noise levels between 85 and 90 dBA the employer is to take reasonable steps to provide hearing protection if the employee so requests.
- When the levels are at or above the peak action level or 90 dBA the employer must provide equipment which will reduce the risk to below 90 dBA.

Ear Protection Zones

Every employer shall ensure

- Each ear protection zone is demarcated and identified to indicate that it is an ear protection zone and employees should wear personal protectors while in that zone. The style of the form is specified in the Health and Safety (Safety Signs and Signals) Regulations 1996.
- None of his employees enter the zone unless they are wearing personal ear protectors.

An ear protection zone means any part of the premises where an employee is likely to be exposed at or above the peak action level or the second action level of 90 dBA.

Maintenance and Use of Equipment

- The employer is to take reasonable steps to ensure that protective measures (other than ear protection) are properly used and maintained in efficient working order and repair.
- There is a general duty on employees to use the personal ear protectors and protective measures provided by the employer and to report any defect in them.

Information for Employees

Every employer shall provide adequate information, instruction and training to employees exposed at or above the peak or 85 dBA action levels on

- The risk of damage that exposure may cause.
- The steps the employee can take to minimise the risk.
- The steps the employee should take to obtain hearing protection.
- The employees obligations

Duties of Manufacturers etc

A person who supplies an article for use at work have a duty to provide adequate information on the possible noise levels generated if they are likely to expose any employee to a level at or above 85 dBA or the peak action level.

Control Measures

The basic steps or procedures can be summarised:

- Identify the extent of the problem

Before any other decisions are taken, it is essential to measure the noise levels associated with particular plant or processes, and to establish the working patterns of people employed in noisy areas so that an assessment of individual exposure can be made. The main instruments used are:-

- a basic sound level meter - which gives an instantaneous reading of the noise levels. Where noise levels are fluctuating, the average sound level must be estimated by eye.

- a sound level integrating meter - this is a more sophisticated instrument which is capable of giving instantaneous readings and also an average reading taken over a period.
- an octave band analysis meter - this enables the intensities at the various frequencies to be measured.
- a noise dosimeter - this is placed on an employee for a long period and accurately measures the average exposure over that period.

- Noise Zones

All areas where noise levels exceed 90 dBA must be identified by the appropriate blue and white noise hazard warning symbols.

- Noise Reduction

The noise hazard associated with many classes of equipment is inherent in their design and method of operation and it is subsequently difficult to implement noise reduction measures which will significantly reduce the levels emitted. As a result the issue of hearing protection on a medium term basis is often the only practical solution. Manually fed equipment is much more difficult to control than equipment fed by conveyor belts or from remote locations.

- Hearing Protection

There are now many types of hearing protection available including:-

- Disposable plugs made from acoustic wool. These are commonly known as Bilson Down plugs.
- Higher efficiency disposable plugs made of foam. The most commonly encountered being ERA plugs.
- Reusable ear plugs. These are often attached to head bands or cords.
- Ear muffs.

Hearing protection should be provided as a means of last resort.

Unfortunately, this approach is rarely found in practice and a common response by Employers to a noise problem is to provide ear muffs and then leave it up to the employees as to whether they use them or not. This will not fulfil an employers statutory duty and a system as outlined below is necessary when introducing protective equipment:-

- the equipment must be capable of providing adequate protection
- the equipment must be issued individually and employees clearly instructed on how and where to use it. If possible, records of such issue or any training given, should be maintained.
- facilities must be provided for the storage and cleaning of equipment.
- employees must report defects and know where to obtain replacements.

- the usage of equipment must be monitored. Normally this will require a formal audit system with e.g. a member of management carrying out a monthly check. An example of a simple log form on which to record a spot-check and if necessary the names of employees not wearing hearing protection and comment on the action taken is attached. If on subsequent audits the same persons are still found to be unco-operative disciplinary procedure must be taken. At very least this will require the issue of formal recorded written warnings.
- Managers and Supervisors must set an example in the use of the equipment.

- Audiometry

A description of the technique has been given earlier. Audiometry is open to various problems and errors and its usefulness should not be overstated. However, from the Insurance Industries point of view it has uses:-

- To measure the hearing capability of any new employees.
- To monitor the effectiveness of preventive measures such as personal hearing protection when these are used in areas of high noise.
- To raise awareness among workers of the hazards of noise.

FURTHER INFORMATION

“Noise in the workplace: a select bibliography 1990”

“Noise Guide No.1: Legal duties of employers to prevent damage to hearing and Noise Guide No.2: Legal duties of designers, manufacturers, importers and suppliers to prevent damage to hearing”

HS(G)56 “Noise assessment information and control-Noise Guides 3 to 8”

PM56 “Noise from pneumatic systems”

Rubber Industry Advisory Committee
Noise control in the rubber industry”

IAC L21 “Noise from portable breakers”
(free)

IND(G) 75L “Introducing the Noise at Work Regulations: a brief guide to the requirements for controlling noise at work” (free)

IND(G) 99L “Noise at work - advice for employees” (free)

All the above are available from HSE
Books Tel: 01787 881165

For further assistance on this or any other risk management topic, please contact Risk Control via your Royal & SunAlliance Area Centre or via your insurance adviser.

HEARING PROTECTION COMPLIANCE RECORD

DEPARTMENT

DATE	SIGNATURE	NAMES OF PEOPLE NOT WEARING EAR PROTECTION / COMMENTS