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Noise at Work
Policy and Guidance

Occupational Health & Safety Service
HSD084P

UNIVERSITY OF CAMBRIDGE

Contents

1. Introduction

Over one million employees in Great Britain (HSE: Noise at Work – Health and Safety in the Workplace, 27/11/2015) are exposed to levels of noise in the workplace which put their hearing at risk. In the University there are staff and researchers who are potentially at risk from hearing loss caused by their work or research. This includes grounds and gardening staff, some maintenance and technical staff and some musicians and research staff in noisy environments.

Noise may at times be described as annoying, distracting and causing stress; it can also affect communication and interfere with concentration. Most importantly, the effects of excessive noise at work can permanently and irreversibly damage an individual's hearing. The risk depends on the loudness of the noise and the duration i.e. how long the individual is exposed to it.

However, noise induced hearing loss is completely preventable. Therefore it is important that the University controls the exposure to noise of its employees and anyone else affected by it.

2. The law

In order to protect employees from the risks of noise induced hearing loss, the University of Cambridge has put measures in place to comply with the Health and Safety at Work Act 1974, the Management of Health and Safety Regulations 1999, and **the Control of Noise at Work Regulations 2005.**

The Control of Noise at Work Regulations 2005 introduced a reduction in the action values (thresholds) for all noise at work, including the music and entertainment sectors, from April 2008. It also introduced a change of emphasis towards controlling noise at source, wherever reasonably practicable, rather than relying on mitigating the effects of noise at the human ear through hearing protectors.

'Reasonably practicable' is a term in health and safety law that refers to balancing the cost of taking action, against the risk of harm to people if no action is taken.

The Regulations impose a hierarchy of control measures triggered by action values, as shown below.

Lower Exposure Action values:

- Daily exposure of 80 dB(A): as an average over 8 hrs.
- Peak sound pressure of 135 dB(C): maximum single event noise level.

If either of these values is exceeded, the Regulations require the noise to be controlled at source, where reasonably practicable. If the control measures do not reduce the noise below the action values, then the Regulations state that hearing protection must be 'offered' to those exposed.

The Regulations indicate that personal hearing protectors should be made available on request to any employee who is exposed. **University policy recommends that hearing protection is used for any work at or above the lower exposure action values.**

Prolonged and/or repeated noise close to the lower exposure threshold does NOT represent an entirely safe level of exposure. The lower exposure action value is merely a level that the Health and Safety Executive considers reasonably practicable

and below which the hearing of most, but not all, people should not be adversely affected.

Upper Exposure Action values:

- Daily exposure of 85 dB(A): as an average over 8 hrs.
- Peak sound pressure of 137 dB(C): maximum single event noise level.

If either of these values is exceeded the **Regulations require a formal program to control the noise at source where reasonably practicable.**

If the control measures do not reduce the noise below these action values, **then hearing protection must be used by those exposed above the upper action values.** Furthermore the areas concerned must be delineated with warning signs as a compulsory hearing protection zone, and health surveillance provided through the University's Occupational Health Service for those at risk.

3. Responsibilities

Departments and Institutions have a duty to:

- Assess the risks from noise at work, identify areas and people at risk
- Take action to reduce the risk of noise induced hearing damage to all who may be affected by keeping exposure to noise as low as is reasonably practicable by engineering controls
- Ensure equipment is regularly serviced and maintained
- To review the relevant risk assessments when machinery/tools are replaced.
- Provide employees, students and visitors with suitable hearing protection if the noise exposure cannot be reduced by other methods
- Make sure the legal limits on noise exposure are NOT exceeded
- Provide employees, students and visitors with information, instruction and training
- Where an individual has been identified as regularly exposed above the upper action value as determined by noise monitoring and risk assessment or are at risk for any reason, e.g. have a pre-existing hearing condition, to carry out health surveillance, including audiometry.

Sound pressure is measured in deciBels (dB). To ensure we are measuring the relative loudness of sound as perceived by the human ear, we use A-weighted deciBels expressed as dB(A). Exposure to noise at work is assessed as a function of both how 'loud' the noise is (in dB(A), and how long an individual is exposed to that noise.

Exposure to noise at work above the Regulation's lower action value of 80 dB(A), averaged over eight hours a day, will require actions to be taken by the Department or Institution to protect all those exposed. The relationship of noise level and exposure time is such that if noises louder than 80 dB(A) are experienced for shorter times the averaged value over 8 hours may still exceed the first action level (see Table 1 below).

Table 1: Rough guide to noise levels from various sources

Noise Source	***Typical noise level*** ¥ ***in dB(A)***	***Daily Exposure Time****
Office	40 to 50	8 hrs
Conversation	50 to 60	8 hrs
Photocopier	65 to 70	8 hrs
Loud radio	65 to 75	8 hrs

Lathe	70 to 95	8 hrs to 15 mins
Band saw	75 to 90	8 hrs to 45 mins
Power Drill	85 to 100	2 hrs to < 4 mins
Arc welding	85 to 100	2 hrs to < 4 mins
Thicknesser - planer	85 to 105	2 hrs to ~1 min
Road drill	100 to 105	4 mins to ~1min
Chain saw	105 to 110	~1 min to < 30secs

¥ *T*he way ears work means you might only just notice a 3 dB change in noise, yet because of the logarithmic scale **every 3 dB increase doubles the noise pressure level**. So what seems like small differences in dB numbers can be quite significant.

***** This is the **approximate time** that the law allows an unprotected person to work in this level of noise each day, 5 days a week. It relates to the actual time the individual is exposed to the noise ie: quiet meal and rest breaks will reduce the exposure time and thereby the daily exposure.

The figures in the Table 1 are approximations for a range of equipment types and **are NOT a substitute for a professional noise survey** of the actual equipment in use in the workplace.

Noise levels from an individual item of equipment will vary depending on its make, model, age, condition, how well it has been maintained, what it is doing /how it is being used, which type and size of material it is working on/with, among other factors.

If there are additional sources of noise in the work place, at the same time as a particular piece of equipment is in use, the noise level at the ear will be higher and the approximated exposure times shown above may be reduced.

Furthermore, if a person's exposure to noise were to reach their daily exposure limit in less than 8 hrs, they could only continue to work that day in an area below 68 dB(A) for the rest of the day. Noise below 68 dB(A) would not significantly add to the day's average exposure level (this is a function of the logarithmic dB scale).

Note: Some work environments within the University may have levels of noise which are a genuine 'nuisance' and may cause stress to the individuals being exposed to them, but are below the statutory action levels and therefore NOT covered by the Control of Noise at Work Regulations 2005.

4. Noise Surveys

If a Department or institution suspects it may have a problem associated with exposure to noise at work, they should contact the Safety Office to arrange a professional noise survey immediately. The Department or Institution should identify equipment / machinery / processes which are noisy and contact the SO. Information on equipment should be available from the suppliers or manufacturers.

As part of the survey the level of noise should be identified, and how long the equipment / machinery is being used for on a daily/weekly basis.

As a rule of thumb: "If a person has to raise their voice to carry out a 'normal conversation' with a person 2 metres away, then the level of noise is excessive, and a noise survey is required". (P2 Noise at Work – A Brief Guide to Controlling the Risks INDG362).

As well as providing professional noise surveys and advice on control measures, the Safety Office can carry out an 'Octave Band Analysis' which will enable Departments and Institutions to select the appropriate hearing protection for the task.
Noise is made up of a spectrum of sound frequencies of different intensities. Attenuation across this sound spectrum (range of frequency bands) is dependent upon the specific capabilities of the hearing protection under consideration. Attenuation data/information for each frequency band is supplied by the manufacturer with the hearing protection and should be retained by the user (it can usually be found as a leaflet, on the box / packaging or on the manufacturer's website).

Octave band analysis uses the manufacturer's attenuation data to calculate the residual sound level at the ear for the specific hearing protection being considered and makes an allowance for the assumed 'real world' protection. An allowance of 4 dB assumes the 'real world' level of hearing protection given in use will be less than might otherwise be indicated by the laboratory tests used to obtain the attenuation data..

Control measures and/or hearing protection should reduce the noise at the ear to below 80 dB(A). However, if used, hearing protection should not completely attenuate all sound, since full removal of sound would mean the individual would be unaware of audible safety warnings and unable to communicate efficiently. The Health and Safety Executive (HSE) recommends that the sound level at the ear should not normally be reduced by hearing protection to below 70 dB(A).

5. Control Measures

Controlling noise and exposure to it at source is preferable to mitigating its effects at the ear through hearing protection. This can often be achieved by one or more of the following:

- Buying / using quieter equipment ie: having a 'buy quiet policy'

- Using a different and quieter process

- Introducing engineering controls – these are methods that are built into the design of a plant, equipment or processes to minimise the level of noise. They are a very reliable way to **control** worker exposure to noise, as long as the **controls** are designed, used and maintained properly. For example you can:

    - Avoid impact of metal on metal
    - Add vibration damping panels
    - Use vibration isolation mountings
    - Fit silencers
    - Fit sound proof enclosures around equipment
    - Put workers in sound proof booths
    - Erect sound barriers and screens
    - Increase the spatial separation of noise and workers
    - Fit sound-absorbing material to the equipment or in workplace

- Use management controls, for example you can:
    - Limit time spent in noisy areas; halving time halves exposure
    - Limit number of people in noisy areas
    - Provide training to people exposed to noise, so they understand why the control measures are in place, and cooperate with using them correctly.
    - Rotate work activities to reduce exposure times

6. Hearing Protection

Hearing protection is a form of personal protective equipment, and should only be used when engineering and other controls are not reasonably practicable, whilst engineering controls are being developed or when the engineering and other control measures introduced have not reduced the noise below the lower exposure action value.

Selection of hearing protection should be a considered decision in light of the British Standard EN 458:2004, 'Hearing protectors. Recommendations for selection, use, care and maintenance.

The following factors should be considered:

- The suitability of the hearing protection for the work being carried out
- The level of noise reduction offered by the protector
- Compatibility with other safety equipment (e.g. hard hats, eye protection)
- Pattern of the noise exposure
- The need to communicate and hear warning sounds
- Environmental factors including:
  - The thermal environment
  - Humidity
  - Dust and dirt
- Comfort and user preference
- Any relevant medical disorders suffered by the user

6.1 Earplugs

Earplugs fit into the ear or cover the ear canal to form a seal. They sometimes have a cord or a neckband to prevent loss. Some earplugs are reusable and others are designed to be disposed of after one use; check the manufacturer's instructions. Earplugs are available in different forms (pre-shaped, user-formable, semi-insert) and are suitable for use with safety glasses and other forms of PPE (personal protective equipment).

Figure 1 – Some typical ear plugs

However earplugs can be hard to fit, they will only be effective when fitted properly so correct fitting is essential and training will need to be provided; see manufacturer's instructions. It is also difficult to check correct fit by visual inspection and they can work loose over time, so allow for refitting in a quiet environment every hour. Earplugs may not be suitable where the hearing protection is likely to be removed often, particularly in dusty or dirty environments, which can cause ear infections. It

must be remembered that earplugs may not be suitable for certain individuals due to medical conditions or discomfort.

Information/instruction for users should include;

- Never share ear plugs with anyone else
- Clean reusable plugs regularly and ensure they are not damaged or
- degraded Use disposable earplugs only once
- Clean hands when fitting earplugs
- Ensure adequate supplies of disposable earplugs
- Always follow manufacturer's instructions: insert earplugs correctly or they will not protect you

6.1.1 Custom moulded plugs

Custom moulded plugs are made from a material such as silicone rubber and are individually moulded to fit a person's ears. They are reported to be more comfortable that ordinary earplugs and may be easier to fit than other types and therefore more likely to be used and give good protection.

Figure 2 – Custom moulded ear plugs

However they will perform poorly if manufacturing and initial fitting are not done properly. Therefore it is important to ensure fit tests are done before the plugs are put into use. Maintenance is similar to that for ordinary reusable earplugs.

6.2 Earmuffs

Earmuffs consist of hard plastic cups which fit over and surround the ears, and are sealed to the head by cushion seals filled with soft plastic foam or a viscous liquid. Tension to assist the seal is provided by a headband. The inner surfaces of the cups are covered with a sound-absorbing material, usually soft plastic foam. Earmuffs are available in a range of sizes and noise reduction (attenuation) efficiencies. They are easy to fit and use. They generally offer higher levels of protection that earplugs (check manufacturers data), and are clearly visible making it easier to monitor their use.

Figure 3- Earmuffs

However the headband can interfere with the correct use of hard hats when these are required – in these cases, earmuffs designed to clip onto a hard hat should be used – see 6.2.1.
Earmuffs may not be suitable for use with safety glasses and other forms of personal protective equipment. Long hair, beards and jewellery (earrings) may interfere with seals and reduce protection and they can be uncomfortable in warm conditions.

Information/instruction for users should include;

- Check seals for cleanliness, hardening, tearing and mis-shape.
- Check cup condition for cracks, holes, damage and unofficial modifications.
- Avoid over bending or twisting headband, which may degrade performance.
- Check tension of headband (compare with a new earmuff).
- Store in a clean environment (preferably clean locker or lidded box).
- Always follow manufacturer's instructions, and wear correctly to ensure you are protected.

6.2.1 Helmet mounted earmuffs

These earmuffs have individual cups that are attached to safety head-gear such as a visor or a hard hat, usually by adjustable arms. They can overcome the difficulties with compatibility of conventional earmuffs with hard hats. Noise protection information should be obtained for the specific combination of earmuff and helmet.

Figure 4 – Helmet mounted earmuffs

However they may not be suited for use with safety glasses and other forms of protective equipment (check compatibility). As with all earmuffs, long hair, beards and jewellery (earrings) may interfere with seals and reduce protection and they can be uncomfortable in warm conditions.

Maintenance is similar to that required for ordinary earmuffs. It is also important to ensure the seals do not sit on the side of the helmet for long periods as this can damage them and affect their performance.

6.3 Special types of protectors

A range of specialised ear protectors are also available including;

- Level-dependant or amplitude-sensitive protectors for intermittent exposure
- Sound restoration level dependant protectors that use a microphone to relay and control the level of noise at the ear
- Non-electronic level-dependent protectors for single loud noises
- Flat protectors designed to give a similar reduction to all frequencies of noise, unlike most protectors which give greater reduction at high frequencies
- Tailored protectors designed to give either high or low frequency reduction
- Active noise reduction protectors incorporating electronic noise cancelling
- Protectors with built-in communications devices

7. Training

Those potentially exposed to noise above the first action level should be given information, instruction and training including:

- The potential noise exposure and its risk to their hearing
- What needs to be done to control exposure
- Where and how to obtain hearing protection
- How to use hearing protection correctly, including;
    - How to avoid interference from long hair, spectacles and earrings
    - How to wear hearing protection in combination with other PPE
- How to maintain hearing protection correctly, including
    - Care and checking
    - Storage
    - Reporting of defects
- Their duty and the importance of wearing the protection at all times in a designated hearing protection zone
- The need for and details of health surveillance system for those exposed above the upper exposure action value
- Providing information on noise levels relevant to the equipment or processes that are used, identifying particular pieces of equipment that are known to have higher noise level and who to report problems to.

8. Health Surveillance

Occupational Health undertake health surveillance for employees that, following risk assessment, have been identified as regularly exposed to noise at or above the Upper Exposure Action Value (EAV) of 85db. Where exposure is between the first and second action value i.e. 80db and 85db; or where employees are only exposed occasionally to noise levels at or above 85db(A), then surveillance will only be required if information comes to light that the individual has been identified as particularly sensitive to noise/NIHL and therefore registered the health surveillance programme.

8.1 Purpose of health surveillance

Health surveillance is required for employees regularly exposed above the Upper Exposure Action Values or who at the Lower Action Value is at risk for any reason, e.g. they have already suffered hearing loss, are particularly sensitive to hearing damage or are working with ototoxic chemicals that may exacerbate noise-induced hearing loss.

Departments can use the HSE noise calculator to monitor and record noise exposure trigger times to determine whether health surveillance is required (reference http://www.hse.gov.uk/noise/calculator.htm)

Health surveillance identifies the early signs of irreversible damage and gives the opportunity to introduce further control measures where necessary.

Suitable health surveillance usually means regular hearing tests (audiometric testing) which is available from the University's Occupational Health Service (01223 336594). Records of employees registered on the health surveillance programme should be kept, results of hearing tests made available to the employee and information used to review the effectiveness of control measures.

8.2 Responsibilities and actions when health surveillance reveals hearing damage

Regulation 9 (4) of the Control of Noise at Work Regulations states that:

" *Where, as a result of health surveillance, an employee is found to have identifiable hearing damage the employer shall ensure that the employee is examined by a doctor and, if the doctor or any specialist to whom the doctor considers it necessary to refer the employee considers that the damage is likely to be the result of exposure to noise, the employer shall –*

(a) ensure that a suitably qualified person informs the employee accordingly;

(b) review the risk assessment;

(c) review any measure taken to comply with regulations 6, 7 and 8, taking into account any advice given by a doctor or occupational health professional, or by the enforcing authority;

(d) consider assigning the employee to alternative work where there is no risk from further exposure to noise, taking into account any advice given by a doctor or occupational health professional; and

(e) ensure continued health surveillance and provide for a review of the health of any other employee who has been similarly exposed."

This means that a person suffering hearing loss will not necessarily lose their job, but their work is likely to need further changes to protect their hearing.

9. Further information

HSE noise related webpages: http://www.hse.gov.uk/noise/index.htm

HSE publications:

- Controlling Noise at Work, Guidance on Regulations, L108, ISBN 0 7176 6164 4
- Noise at Work (leaflet), INDG362(rev1), ISBN 0 7176 6165 2.
- Sound Advice - Control of noise at work in music and entertainment HSG260
- Noise - Don't lose your hearing INDG363

10. Appendix – Examples of University Gardeners Wearing Hearing Protection

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