



# Hearing protection

► **Peter Wilson** outlines the key factors required to make hearing conservation programmes in the workplace as effective as possible.

**D**espite the emphasis in legislation covering noise in the workplace on controlling noise levels at source, hearing protection is often (wrongly) considered by employers to be the first and only line of defence against the risks of hearing damage. **Noise problem? Issue PPE. Problem solved.**

However, new research<sup>1</sup> carried out by the Health and Safety Laboratory (HSL) which examined the effectiveness of hearing protection in everyday work situations has shown that many workers using hearing protection either get no protection whatsoever from it or the performance of their PPE is totally inadequate for their needs, either due to the incorrect use of hearing protectors or poor fitting. The research indicates that only around 60 percent of workers wearing hearing protection actually get the right amount of protection from it. The use of hearing protection in a quarter of the companies researchers visited was so ineffective that it was likely to result in negligible or no protection for most users.

The implications of these research findings are significant and should act as a warning for any employers who assume that PPE is a reliable "solution" to hearing damage risk problems. ►

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# Check Points

The **Control of Noise at Work Regulations 2005** require employers to:

- assess the risks to employees from noise at work
- take action to reduce the noise exposure that produces those risks
- provide employees with hearing protection if they cannot reduce the noise exposure by using other methods
- make sure the legal limits on noise exposure are not exceeded
- provide employees with information, instruction and training
- carry out health surveillance where there is a risk to health



“PPE cannot be used for long-term noise risk management”



Under the *Control of Noise at Work Regulations 2005 (CAWR)*<sup>2</sup>, employers are required to provide their employees with hearing protection as a last resort – only to be used if they cannot reduce noise exposure enough through other control measures. These include examining the design of the workplace/equipment, engineering controls (which eliminate noise at source), limiting the time spent in noisy areas, operating a Buy Quiet policy where low noise exposure is a priority when purchasing equipment, and providing suitable and sufficient information and training for employees on the correct use of work equipment, in order to minimise their exposure to noise from it.

The regulations set lower and upper exposure action levels. These are points at which the employers must take specific action. At the lower exposure action value – 80dB – a risk assessment is needed, employees should be told about the risks to them from noise and hearing protection must be made available on request. At the upper exposure action value – 85dB – noise control should be part of a planned programme, hearing checks are needed and hearing protection must be used.

PPE cannot, however, be used for long-term noise risk management unless an employer can prove that noise control measures are not practical. Consequently, companies must assess the costs and benefits associated with implementing an effective control programme based on the best of current technology. This requires a noise control audit. This is an engineering evaluation of noise control options carried out either as part of a noise management assessment



or as an add-on to an existing assessment where the competent person does not possess the required specialist engineering expertise. In many cases, low cost engineering noise control techniques are available that can provide the bonus of a potential pay-back due to reduced costs.

A simple, well policed, *Buy Quiet* purchasing policy is probably the most cost effective long-term noise control measure that a company can take. However, it is important that employers do not allow suppliers to spend their money on control measures that are not best practice. Information on implementing a *Buy Quiet* policy can be found in the HSE free leaflet *Noise at work: Guidance for employers on the Control of Noise at Work Regulations 2005* which can be downloaded from: [www.hse.gov.uk/pubns/indg362.pdf](http://www.hse.gov.uk/pubns/indg362.pdf)

The success these noise control measures can have is shown by the HSL research, which found that hearing protection was most effective in those companies where it was implemented as part of a comprehensive noise control programme.

## Management

The research also highlights some key management practices that should be in place in order to make hearing conservation programmes as effective as possible. These are:

- Risk assessment: report quality is a big issue – most reports are not of merchantably quality. You must be able to identify personnel at risk and the assessment must include a specific programme of action.
- Hearing conservation programmes should be implemented as part of a comprehensive noise control and management programme and efforts should be focused on higher risk areas and activities
- Do not issue edicts making whole sites or departments mandatory hearing protection zones when a significant proportion of the workforce is not at risk. This is poor management and can also be counter-productive as workers tend not to take the risks seriously, because they know that there is no risk in some of the areas where they are required to wear PPE. ➤

“Managers and supervisors must set an example and wear PPE if needed...”



## PPE field performance issues

**A**s well as examining hearing protection use in the workplace, HSL researchers also carried out laboratory testing on different types of hearing protection. They found:

### Earmuffs

The standard HSE recommendation has been to derate the manufacturer's attenuation data by 4dB to account for "real world" performance. However, the laboratory testing showed an additional 6dB loss after a simulated month of normal use, primarily caused by stretching of the headband which is invisible to the user. This means that nearly a third of the earmuff users seen by researchers would have been under-protected.

Damage to earmuff seals is more obvious, but tests showed that removing an eighth of the seal showed a drop in attenuation of only 2dB. The effectiveness of the seal is also compromised by glasses, goggles and dust masks. The less bulky versions reduce the attenuation by around 2dB, the bulkier versions by up to 10dB. Moreover, wearing earmuffs over clothing (eg. hoods in cold weather) reduced the performance by 14-21dB.

### Earplugs

Proper fitting is the key factor. Just over 50% of the compressed foam earplug users seen by researchers had not inserted the plugs properly and most of them were ignorant of the correct fitting procedure. Simulated tests showed that the attenuation could fall to as low as 9dB if the plugs were not properly fitted. Users generally preferred push-in plugs (foam or flange) as they are easier to fit and these were usually inserted deeper into the ear canal. Banded ear canal caps gave negligible protection under band pressure – they have to be inserted into the ear canal entrance.

Whilst custom moulded earplugs were generally considered by companies and users to be the best available, not all users found them comfortable. Whilst not included in the laboratory testing for the report, previously published information has indicated that the attenuation can fall by up to 6dB over the first hour of use due to temperature effects changing the shape of the ear canal.

# Check Points

## Reasons given by workers for not wearing the hearing protectors they are provided with:

- Peer group pressure and group behaviour plus reluctance of supervisors to enforce wear
- The need to hear traffic, radios and difficulties in communicating
- Attitude – viewing PPE as an imposition without adequate consultation
- Incorrect fitting (eg. foam plugs)
- Use of PPE as the sole control measure without a comprehensive noise control programme
- Inadequate protector provision

Source: *Real World use and performance of hearing protection, HSL*

- Where health surveillance (audiometry) is required, do not skimp on the process. Allow for a little more time over and above the minimum to discuss hearing damage, PPE selection and fitting. This is an opportunity for one-on-one education and motivation.
- Managers and supervisors must set an example and wear PPE if needed and companies must have a procedure in

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place to police the use of PPE – including enforcement and disciplinary procedures.

## Training and motivation

Personal motivation, company culture and supervision are also key factors in operating a successful noise control programme. Motivation is particularly important for remote workers where direct supervision is not practical.

Training materials should be suited to the workforce's needs. For example, in-depth diagrams on the 'Whys and Hows' of PPE will probably have little impact and inspire few people to wear hearing protection, whilst using colourful graphics, pocket cards will help workers remember the main issues.

Training should cover the correct use of PPE, including how to communicate clearly whilst wearing it. For example, users will often remove a protector and lean close to a colleague in order to hear speech. This is unnecessary. When you don protectors, you hear your own voice more clearly and tend to speak too quietly. If you shout at the same volume as you would whilst not wearing PPE, other people will be able to hear your speech (and warning signals) better with PPE than without in high noise areas.

## Choice

Offering a choice of suitable protectors in noise hazard areas is a mandatory requirement. "Suitability" is based on three criteria: field attenuation of the protectors; physical suitability for the circumstances; and comfort/wear rate.

### ■ Attenuation

The HSL research found that less than 50 percent of companies had selected PPE based on the attenuation actually required. Consequently, about half of these had specified PPE that over-protected. The issue with overprotection is that the wearer may feel isolated and may miss warnings etc. This may lead to them not wearing the PPE.

The HSE website includes a calculator to estimate the protection provided by PPE ([www.hse.gov.uk/noise/calculator.htm](http://www.hse.gov.uk/noise/calculator.htm)). Suitability is based on a calculated effective noise level inside the PPE with a rating of "good" or "acceptable".

### ■ Physical suitability

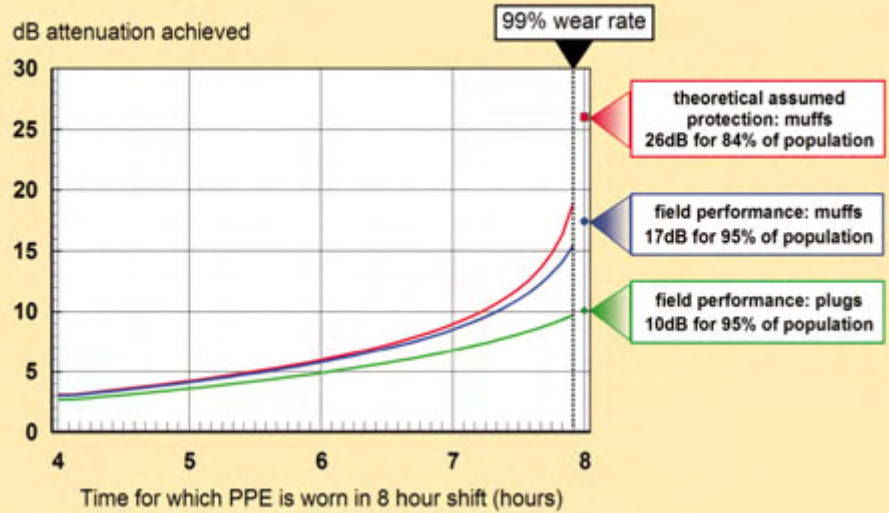
The main types of hearing protection available are:

- earmuffs, which completely cover the ear
- earplugs, which are inserted in the ear canal





## Protector Performance v Wear Time



- semi-inserts (also called 'canal caps') which cover the entrance to the ear canal

A very effective, but often overlooked, option to improve the performance of hearing conservation programmes is to encourage the use of different protectors at different times during the day.

The HSL research found that many employers had a lack of awareness of the different types of hearing protection available.

The main physical factors that govern the selection of suitable PPE are:

- safety glasses, hard-hats, other safety equipment, clothing, earrings, turbans, hairstyle
- temperature, dust, hygiene, confined spaces, fitting difficulties (plugs)
- physical factors (size of ears, skin disorders etc)

### ■ Wear rate

If you consistently achieved a 99% PPE wear rate in noise hazard areas, you would feel that you had an effective hearing conservation programme in operation. However,

at a 99% wear rate (doffing protectors for a cumulative total of only 5 minutes over an 8 hour shift), the maximum real-world attenuation is approximately 17dB for earmuffs and 10dB for earplugs (see chart above). If staff only wear PPE for 7 out of 8 hours, then protection is limited to around 7dB for earplugs and 9dB for earmuffs – no matter what the theoretical performance. Consequently, comfort, motivation and supervision are the paramount factors that determine the wear rate and therefore the protection that is achieved in practice.

## References

- 1 HSE Research Report (RR720) *Real world use and performance of hearing protection* [www.hse.gov.uk/research/rrhtm/rr720.htm](http://www.hse.gov.uk/research/rrhtm/rr720.htm)
- 2 The full text of the *Control of Noise at Work Regulations 2005* can be viewed at: [www.opsi.gov.uk/si/si2005/20051643.htm](http://www.opsi.gov.uk/si/si2005/20051643.htm)

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