



Noise in the workplace – how to protect your employee's hearing

Long-term and repeated exposure to high levels of noise can result in chronic health effects, known as Noise Induced Hearing Loss (NIHL). Protecting employees from potential noise hazards in the workplace is a legal requirement. Senior European Technical Specialist Mohammed Saleem, from the Personal Safety Division of diversified technology company 3M, looks at a four-stage approach to help employers understand and implement an effective hearing conservation strategy, covering the identification of potential noise hazards and selection of appropriate hearing protection equipment (HPE), as well as hearing protection validation and training for employees.

We are constantly surrounded by noise. Normal everyday living exposes us to traffic noise, loud music, even, in many social situations, conversation that seems only possible at raised volume. With this in mind, it can be difficult to assess just by guesswork whether noise in the workplace is harmful. However, excessive and repeated noise exposure can lead to irreversible hearing damage, tinnitus and other adverse health effects including anxiety, stress and high blood pressure.

It is not always possible to tell whether a sound in the workplace is excessively loud as the hearing threshold of the individual changes imperceptibly. Damage to hearing is insidious, building up gradually and eventually leading to permanent hearing loss.

There are stringent European regulations in place designed to safeguard and protect the worker from developing NIHL. At the heart of European legislation is the Physical Agents (Noise) Directive 2003/10/EC which outlines the minimum health and safety regulations relating to worker's risk arising from exposure to noise. This Directive also explains the role of hearing protection in the context of controlling risk of exposure to noise.

When reducing the risk of exposure to noise, the hierarchy of control should always be followed. This may include changes in manufacturing process, work practice, enclosure or damping. The final recourse is the use of Personal Protective Equipment (PPE), which in this case is appropriate Hearing Protective Equipment (HPE).

Assessing the noise risk

Before considering appropriate control measures it is important to understand the risk of noise exposure. Measuring noise levels forms an integral part of the risk assessment and can provide valuable information on individuals or groups exposed to harmful levels of noise. Although the Physical Agents (Noise) Directive 2003/10/EC does not describe how to measure the noise level, an appropriate risk assessment should be carried out by a 'competent person'.

A simple sound check device can sometimes be helpful in determining if the noise level in the workplace is potentially hazardous. For advanced measurements a more sophisticated sound level meter or dosimeter can be used.

Sound level meters, such as the 3M Sound Detector SD-200, are relatively simple and can be used to indicate areas with high noise levels. Other devices, for example the 3M SoundPro Sound Level Meter, can provide more detailed information on the noise source.

Dosimeters, such as the 3M Edge Sound Level Meter, are worn by individual worker to monitor personal noise exposure during a work shift. They can provide important information on noise exposure of an individual worker who frequently moves around the site and who may also be exposed to fluctuating noise levels, continuous or peak impulse noise.

In the absence of any measuring equipment, and as a very general rule of thumb, if you need to raise your voice to be heard at a distance of 2 metres the noise level is around 85 dB, and if you need to raise your voice at a distance of 1 metre the noise level could exceed 90 dB.

In accordance with the Physical Agents (Noise) Directive 2003/10/EC, where the continuous noise levels exceed 80 dB(A), hearing protection must be made available and at levels above 85 dB(A) they must be worn at all times in designated areas.

Once the need for noise control has been established and a suitable protocol put in place, best practice is to carry out periodic reviews to ensure that the corrective actions, including choice of HPE, remain appropriate. Changes in the working environment, such as the introduction of new equipment or changes in a workshop layout may have an impact on noise and as such, the risk assessment, including noise measurement, should be re-evaluated.



How to select hearing protective equipment

Hearing protective equipment is designed to help reduce noise to a safe level provided it is selected and used correctly and at all times when exposed to the hazardous noise level.

When selecting HPE it is important to ensure the hearing protector is appropriate to the task and work being undertaken. Selecting HPE with too much attenuation (protection rating) can lead to isolation and affect the wearer's ability to hear important signals. On the other hand, selecting HPE with insufficient attenuation leaves the wearer still exposed to noise risk. In addition to attenuation and workplace requirement (e.g. essential communication), comfort and wearer acceptance is one of the key factors when selecting appropriate hearing protectors.

European Guidance Document EN 458 (selection, use, care and maintenance of hearing protectors) provides a valuable insight into the correct process for selecting hearing protective equipment.

The ideal effective sound pressure level at the ear when wearing hearing protector is 75 to 80 dB(A). Effective sound level above 85 dB(A) at the ear is likely to cause hearing damage

whilst sound level significantly below 70 dB(A) could result in over-protection leading to isolation.

The attenuation properties of hearing protectors can vary greatly depending on the product design and the choice of sound absorbing material.

There are three ways of estimating effective sound level at the ear when wearing hearing protectors; octave band method, High Medium Low (HML) method and Single Number Rating (SNR) method.

Octave band and HML method provide a more effective way of estimating effective sound level at the ear as they take into consideration individual test frequency measurement or broader group of frequencies (High, Medium or Low).

The HML method is relatively simple and easy to use does not involve the use of sophisticated measuring equipment, whilst the Octave band method often requires a more advanced monitoring device.

As well as understanding that different occupational noise hazards and environments that require different types of hearing



protection, it is equally important to consider compatibility with other forms of personal protection equipment. If equipment such as a safety helmet or safety eyewear is also needed, the items must work together as a whole, otherwise there is always a danger that one piece might compromise the performance of another. This can also impact on comfort which is one of the important selection criteria. If an item of PPE is not comfortable it is unlikely to be worn thus leaving the worker vulnerable to noise induced hearing loss.

Training considerations

Under the PPE Use Directive 89/656/EEC, employers are required to provide employees with information, instruction and training on personal protective equipment. The primary aim is to ensure that workers fully understand the reason for using any PPE and health implications if they fail to wear and maintain their equipment correctly and for the entire duration of exposure to a given hazard. Workers also need to have a general awareness of the health hazard and different control measures to protect themselves from the risk of exposure.

It is important to communicate to employees the importance of wearing the right PPE for the complete duration of an exposure period.

If workers remove HPE for even a small amount of the time they are exposed to harmful noise and the level of protection will be significantly reduced. Wearing HPE for only 90 per cent of the time, for example, will mean that the wearer is offered virtually no protection.

Validating hearing protection

The Physical Agents (Noise) Directive 2003/10/EC states that suitable hearing protectors must be worn when you reach the Upper Exposure Action Value of 85 dB(A) continuous noise or equivalent peak level. It can be difficult to determine what level of protection a given hearing protector is achieved by the wearer without fit validation testing.

The overall effectiveness of the correctly chosen HPE depends on how well the product is fitted

by the individual wearer and whether it is worn for the entire duration when exposed to hazardous noise levels. If the chosen HPE is not fitted correctly the overall attenuation will be significantly lower, more so in the case of earplugs.

Often, a correction factor (de-rating) is applied to the laboratory generated attenuation value to compensate for any reduction in attenuation arising due to poor fitting, but there are inherent issues with this 'blanket' approach as some wearers may achieve higher protection than the stated labelled value thus leading to isolation. There is no agreed consensus on de-rating hearing protectors within the European member states. Some member countries have a varying level of de-rating depending on the product type, whilst others apply a single figure for all types of products.

As an alternative, you may wish to consider individual fit testing that can help determine the actual attenuation achieved by the wearer as part of general training and motivation.

The 3M E-A-Rfit Validation System enables employers to help train and educate employees of the importance of correct fitting of hearing protectors. The 3M E-A-Rfit Validation System relies on objective measurement thus eliminating any subjective variability in determining the Personal Attenuation Rating (PAR) of individual wearer. The PAR value can be used to check suitability of a given hearing protector against the workplace noise hazard with due consideration for under-protection or in some cases over-protection. It can also highlight the need for better training or size selection of different earplugs due to differences in the anatomy of the ear canal from one wearer to another.

Noise can have a devastating effect on people's health, livelihood and well-being. Noise induced hearing loss is an insidious problem and early signs are often ignored. Preventing the onset of hearing loss will help you enjoy your favourite sounds, whether they are sounds of your loved ones or natural sounds you enjoy as you stroll through the countryside.

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