

EAR DEFENDERS

What every
greenkeeper
should know

1. THE EFFECT OF EXPOSURE TO HIGH NOISE LEVELS

The main difference between mankind and animals is our advanced ability to communicate. Language and speech intelligibility would be impossible without a very intricate hearing mechanism. Our ability to convert the minute variations of the dynamic air pressures and frequencies of speech into electrical impulses to the brain is a wonderful process. It is without doubt one of the most important human faculties. This priceless process is at risk for millions of people who are working in a noisy environment.

Exposure to high levels of noise can permanently damage hearing. It is an insidious process because it is so gradual and frequency selective. Victims of noise induced hearing loss (NIHL) are not conscious of a general lowering of the overall sound which they hear. NIHL causes a severe notch in our hearing sensitivity in a very narrow frequency band. The overall sound in the form of

signals to the brain has only reduced by a very small amount and does not give a warning of deafness. Unfortunately the permanent damage occurs in a critical frequency band for the intelligibility of speech. Very often those who have had their hearing damaged blame the speaker for not speaking clearly. By the time they realise that their hearing is irreversibly damaged they have a severe injury which many sufferers consider to be as bad as loss of vision. Restricted ability to communicate can deprive people of the things which give them the greatest happiness and satisfaction in life. It can also detrimentally affect their work, family life and general health.

At The Noise and Man International Conference in 1993, Willy Passchier-Vermeer stated that 50% of industrial workers are exposed to potentially hazardous equivalent sound pressure levels of 80 dB(A) or above, and that similar noise exposures occur in

other occupational situations. According to ISO 1999, long term exposure to these sound levels could cause permanent hearing damage.

It is absolutely right that medical doctors, scientists and concerned people should campaign to make our elected representatives legislate to protect the hearing of employees by all reasonable means.

2. THE LAW

The main noise legislation which affects those responsible for golf courses, parks, grass verges etc are:

- The Noise at Work Regulations (1989);
- The Management of Health and Safety at Work Regulations (1992)
- The Supply of Machinery (Safety) Regulations (1992).

2.1 The Noise at Work Regulations (1989).

The most important requirements for employers in the Noise at

Work Regulations are as follows:

- Employers must do everything reasonable and practicable to reduce the exposure of employees to high sound levels so that hearing protection is not required;
- Noise assessments and investigations to reduce noise must be carried out by a competent person where there is a risk of hearing damage;
- A suitable person must be delegated to have responsibility for ensuring compliance with the legislation, including keeping records, instructing employees on ways to reduce the risk of NIHL, checking hearing defenders, etc.;
- Action levels (85 and 90 dB(A) daily exposure levels and 130 dB peak sound pressure level) are specified to control the use of hearing defenders for the protection of personnel as a means of protecting employees pending noise reduction to acceptable sound levels;
- If the first action level is exceeded employees must be warned of the NIHL risks and

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advised to wear hearing defenders which must be available;

- If the second action level is exceeded employees must be instructed that hearing defenders must be worn in the designated ear protection zone or while operating the machine; records must be kept and be available for inspection;
- Personnel should seek advice from a medical doctor before using hearing defenders if they have an ear infection or earache;
- HSE, in items 31 and 32 of their Noise Guide No.1, state that spot checks should be made for new machinery, and that the interval between check noise assessments should be a maximum of about two years.

The full details of the requirements for employers and employees are contained in the Health and Safety Executive (HSE) Noise Guides.

2.2 The Management of Health and Safety at Work Regulations (1989).

Under the Management of Health and Safety at Work Regulations (1992) employees exposed to high noise levels should be provided with health surveillance. The main objectives, concerning noise, of this legislation are to monitor the hearing health of employees and to take early precautions to reduce injury.

Health surveillance is not a substitute for measures to reduce and control noise and to inform and protect employees, as required by the Noise at Work Regulations. It is a very useful part of a hearing conservation programme and an important indication for putting into place further measures to reduce noise.

More detailed information on audiometric testing can be obtained from the HSE publications listed at the end of this article. The HSE do not consider that it is compulsory for employers to provide health surveillance. They do, however, consider that it is good practice and serves the best interests of employees and employers.

2.3 The Supply of Machinery (Safety) Regulations (1992)

The Supply of Machinery (Safety) Regulations (1992) and 1994 Amendments apply to the manufacturers, suppliers and importers of machinery for the maintenance

of golf courses and parks. The instructions for the machines must give the following information concerning airborne noise emitted by the machinery:

- The equivalent continuous A-weighted sound pressure level at workstations, where this exceeds 70 dB(A); where this level does not exceed 70 dB(A), this fact must be indicated;
- Peak C-weighted instantaneous sound pressure value at workstations, where this exceeds $130 \text{ dB re } 2 \times 10^{-5} \text{ Pa}$;
- Sound power level emitted by the machine where the equivalent continuous A-weighted sound pressure level at workstations exceeds 85 dB(A).

In the case of very large machinery, instead of the sound power level, the equivalent continuous sound pressure levels at specified positions around the machinery may be indicated.

The EU Directive states the following two essential requirements:

- Machinery must be designed so that the risks resulting from noise are reduced as much as possible, making full use of state-of-the-art technology;
- Details of the sound pressure and power levels must be made available by the manufacturers.

The acoustic performance data must be in the machine instructions before authority to use the CE mark can be obtained. Without the CE mark the equipment can be prevented from being sold in the enormous EU market area.

The original requirement to publish acoustic performance data in sales literature was deleted in the 1994 Amendment. This downgraded the importance of noise and would have the retrograde effect of decreasing the investment and effort to reduce noise at source by research and development.

Failure to comply with the machinery directive could result in prosecution and, if convicted, a fine of up to £5,000 and imprisonment for up to three months, or both.

2.4 Proposed New Legislation

The European Commission's pro-

posals on Physical Agents, published in July 1994, includes much more stringent legislation. If these proposals are ratified, employees will have to be informed of possible hearing damage risk at a daily noise exposure level of 75 dB(A). At 80 dB(A) employees will have the right to audiometric screening. At 90 dB(A) systematic audiometric screening by or under the responsibility of a medical doctor must be carried out. Employees and workers' representatives must be given copies of noise exposure assessments and the programme of measures for noise control.

3. HEARING DEFENDERS

Hearing defenders – muffs or plugs – can protect the delicate hearing mechanism from damage caused by exposure to high sound levels. However, they have many disadvantages, shortcomings and failings, including the following:

- It is not always possible for managers or supervisors to ensure that employees wear hearing defenders in conditions when the second action level is breached. This is a particular difficulty for golf course, park and grass verge maintenance staff who may be working out of sight of supervisors.

• Even when fitted by specialists in laboratory conditions there is a very large difference in the measured performance of hearing defenders for repeat tests. This could be as high as 10 dB in one of the octave bands. Hence even the assumed mean octave values minus the standard deviation could over-estimate the actual attenuation by several decibels for the BS5108 tests. In practical use in the field or shop floor the true attenuation of the hearing defenders could be considerably lower than specified by the supplier.

• Operators using hearing defenders may not hear urgent warnings of pending danger.

• Most people find wearing ear muffs or plugs very uncomfortable, especially for long periods in hot weather.

• Ear muffs are not suitable for

people with glasses or long hair.

• Ear plugs could be a risk to health if very careful hygiene precautions are not always adopted.

• Hearing defenders prevent circulation of air in the ear.

• Most medical doctors would not approve their use if the operator had an ear infection or earache.

• Sometimes it is not easy to detect damage to the ear muffs which could detrimentally affect their noise safety performance.

• Some people, particularly young men, are macho about using hearing defenders. (They do not think high noise levels could damage their hearing and are therefore reluctant to wear hearing defenders).

• Some types of hearing defenders do not allow equalisation of the pressure on either side of the plug. Hence the ear drum could be at a different pressure from atmosphere and the other ear drum.

These are some of the reasons why the use of hearing defenders is a last resort. The main effort and investment must be to reduce the machine generated sound pressure levels and the noise exposure times.

It is wrong for a manager to instruct all ground maintenance staff to wear hearing defenders while operating all the noisy machines. It is not possible to determine which machines breach the first or second action levels without careful sound measurements and an exposure assessment based on the maximum operating time per day. Taking this arbitrary approach could be forcing operators to wear ear muffs for very long periods when it is not necessary. This flawed administration policy undermines the basic strategy of the legislation.

4. GENERAL COMMENTS

It is a fallacy, and dangerous misconception, to think that the responsibilities of managers, committee members and senior executives are upheld by buying hearing defenders and telling the ground maintenance staff to use them.

To comply with the noise legislation, to make a positive contribution to noise reduction and to reduce the risks of hearing damage to acceptable levels require not just a technician who can

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read a sound level meter, but a qualified engineer with in depth acoustic experience.

The fact that the sound pressure levels generated by many grass maintenance machines are still very high, is directly related to a poor feedback by users to the manufacturers who therefore do not consider noise to be an important factor in product sales. If HSE had sufficient funding and resources adequately to enforce the legislation, the market driven manufacturers would soon get the message and invest in research to improve the acoustic performance of their machines. They would also speed up the development of battery powered electrical machinery which is much quieter and more environmentally friendly.

The average equivalent sound pressure level at the operators head for twenty recently tested brush cutters (strimmers) was 99 dB(A). It would only take operation for one hour for the second action level (90 dB(A)) to be breached with this average sound

level. For the highest measured value of 101.4 dB(A) the exposure time to breach the second action level reduces to thirty six minutes!

Many types of strimmers, flymos, hedge cutters, chain saws, pedestrian mowers, tractors, triple mowers, turf cutters, soil shredders, aerators, top dressers, quad bikes, edgers, blade grinders, hammer drills, disc grinders, etc. cause a breach of the second action level. The operators of these machines are vulnerable to permanent hearing damage. Their risk of NIHL would be considerably decreased by properly conducted noise assessments.

Equivalent sound pressure levels should be measured near the operator's head with each noisy machine at normal speed over grass. If fitted, blades should be rotating. For at least one of each type, octave band sound pressure levels should be recorded to ensure that the hearing defenders, if required, attenuate the sound to a level which eliminates

the risk of hearing damage. Unusual or inconsistent sound measurements should be investigated.

After the supervisors have had time to read and study the comprehensive report, the acoustician/engineer consultant should spend some time explaining the results and analysis to those concerned.

The noise consultant should also provide a telephone advice service for the managers and supervisors.

It is essential that the noise consultant convinces the user to rate acoustic performance as a crucial parameter in the decisions on which machines to phase out and on which machines to buy.

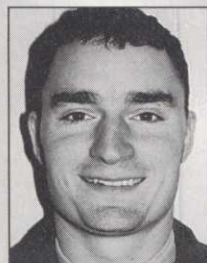
For normal golf courses the first noise assessment project would cost about one pound for each club member.

Two years later the cost of a recheck noise assessment would be much less. This is a relatively small price to pay to protect the hearing of those who maintain our parks and golf courses. It

would cost a great deal more if HSE prosecute those responsible for breaking the law or if one of the ground maintenance staff sues them for causing hearing damage.

Advanced planning and decision making on noise is not only a responsible social attitude, it is also good business practice and a substantial cost saving strategy in the long term.

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