



Noise in engineering

Engineering Sheet No 26

Introduction

This Information Sheet offers guidance to the engineering industry on the management of noise problems, noise assessments and practical methods of control. Employers will find that they can deal with many of these issues in-house, but if they do need specialist help the leaflet will enable them to brief a consultant properly, so as to ensure an adequate response. The information is current at 5/98.

What are the risks to health?

Noise can cause hearing damage and tinnitus (ringing in the ears). It can interfere with communication, cause fatigue and tiredness, reduce efficiency, affect morale and distract and disrupt job performance.

Temporary, partial loss of hearing, which may persist for several hours, can be caused by brief exposure to high noise levels. Such exposure if repeated or prolonged may lead to permanent hearing damage. It is one of the most serious and widespread industrial diseases.

The extent of the problem

About 1.7 million workers are thought to be exposed to noise above levels considered safe. It is estimated that around 100,000 people have suffered hearing damage because of their work. A best estimate is that between 21 and 36% of these are in engineering occupations. Civil liability claims relating to noise at work represented about 80% of all occupational disease claims in 1994.

Noisy processes in engineering

These are many and varied. They range from individual machines, such as metal cutting saws, to whole factories or departments such as press shops, drop forges and some machine shops. Portable, power-operated tools and hand tools can sometimes produce as much noise as fixed machines.

Those at risk may be not only those operating noisy machines, but those working nearby, for example, maintenance staff, cleaners, fork lift truck drivers and shop floor supervisors.

Engineering companies may also be undertaking contract maintenance work in a wide variety of other industries where high noise levels may be encountered.

Some examples of typical minimum noise levels where no steps have been taken to reduce noise are given below:

	dB(A)
Grinding on a pedestal grinder	90-95
Discharging metal objects into metal bins	85-95
General noise level in fabrication shop	85-95
Hammering steel	95-100
Guillotining	95-100
Multi-spindle automatic turning	95-105
Circular sawing metal	95-105
Pressing - blanking	95-110
- punch pressing	110-120
Riveting	100-110

What are decibels?

Noise is measured in units called 'decibels' - normally written 'dB'. It is often not appreciated that an extra 3 decibels doubles the noise level. Because the human ear is not equally sensitive to sounds at all frequencies, occupational noise is measured in a way which simulates the response of a healthy human ear. This is generally referred to as decibels with 'A' weighting, written dB(A).

Risk of hearing damage depends not only on the level of noise but also on its nature and the duration of exposure. Total noise exposure over the whole working day is called the 'daily personal noise exposure' and is usually abbreviated to $L_{EP,d}$.

Legal requirements

The Noise at Work Regulations 1989 aim to reduce risks of occupational hearing damage to the lowest level reasonably practicable. These Regulations place duties on employers and employees, and on machinery designers, manufacturers, importers and suppliers. A leaflet giving further information is available.¹

Briefly, the main requirements of the Regulations are:

- noise assessments to be made by a competent person if noise levels exceed 85dB(A);
- noise reduction measures to be taken where reasonably practicable;
- information to be provided to workers about risks to hearing;
- ear protectors to be provided in certain circumstances;
- employees to use equipment and ear protectors provided and report any defects; and
- machine makers and suppliers to provide information on the noise likely to be generated by equipment they are supplying.

Noise assessments

Regulation 4 of the Noise at Work Regulations requires employers to ensure that a competent person makes an adequate noise assessment when any of their employees is likely to be exposed to a LEP_{d} daily personal noise exposure of 85 dB(A) (the 'first action level') or above, or to the peak action level - a sound pressure of 200 Pascals or above. The peak action level is likely to be exceeded where exposure is to very high noise levels for a very short time, and may be exceeded even where the LEP_{d} does not reach 85 dB(A), eg during certain 'impact' type work or using cartridge operated tools.

Noise assessments have to be reviewed and, where necessary, updated when:

- there is reason to suspect that an assessment is no longer valid; or
- there has been a significant change in the work to which an assessment relates.

Starting a noise assessment

Noise is widespread in engineering. Most employers will need to consider whether they have a noise problem. As a rule of thumb, if there are areas in any workshop or factory where people have to shout or have difficulty in being heard clearly by someone about two metres away, or find it difficult to talk to each other, there could be a noise problem. Short duration, very high noise levels caused by impact-type work etc will be very obvious and also need to be considered.

If it is clear from this preliminary assessment that there is no noise hazard, no further action is required.

If it is obvious that there is a noise problem, arrangements need to be made for an assessment. If there is still doubt, then some noise measurements will need to be made to help decide whether an assessment by a competent person is needed.

Who is a competent person?

The competent person needs to understand the requirements of the Noise at Work Regulations and HSE's more detailed guidance on assessment.^{1,2}

Some, usually larger, organisations may have their own staff who are competent to carry out noise assessments. Some organisations may find it worthwhile to have a member of staff suitably trained so that their expertise is readily available on site.

Many employers will need outside assistance. Trade or employers' associations may be able to help and there are many noise consultants whose services can be

called upon. Employers should be aware of the HSE advice on choosing consultants.³

What is a noise assessment ?

Thorough noise assessments are the key to minimising risks from noise, but experience has shown that these are often poorly done. When engaging outside help to carry out noise assessments, employers are strongly recommended to specify in writing that an assessment conforming with the Noise at Work Regulations is required. A noise assessment is more than a noise survey. To be adequate, noise assessments must identify which employees are exposed to excessive noise and provide information which will allow employers to comply with their duties under other parts of the Noise at Work Regulations, in particular those dealing with:

- reduction of noise exposure;
- ear protection;
- the marking of ear protection zones; and
- the provision of information to employees.

As a guide, an adequate noise assessment should answer these simple questions:

- Is there a noise problem? In other words is there noise exposure above the first action level or above the peak action level?
- How severe is it? ie how many employees are exposed above the specified levels and who are they?
- What are the sources of the noise? At the very least, machines or processes which are contributing to the noise problem should be clearly identified.
- What should be done about it? The assessment should indicate where the elimination of the noise problem, or control at source, may be reasonably practicable. Methods of achieving this reduction should be indicated. The assessment should give some suggested priorities for action.
- Is ear protection necessary? If so the assessment should indicate what type or types would be suitable. Not all types of ear protection are, in fact, suitable for every application.
- What areas need to be marked as ear protection zones? This should be apparent from noise measurements made as part of the assessment.

Employers are required to provide each of their employees who is likely to be exposed to noise risks with adequate information, instruction and training. Ideally the noise assessment should be written in a

format which can be shown or given to employees concerned and will be understandable by them, perhaps with some additional explanation.

Records

An employer has to keep a record of assessments. To facilitate adequate record keeping, the noise assessment report should describe the scope of the assessment and the dates on which it was carried out. It should identify by whom it was done.

Other considerations

An adequate assessment can often be made without making detailed measurements of each worker's exposure individually, and can be based on an area where the noise levels are reasonably uniform. The workers in the area could be grouped together, adequately identified, and the exposures assessed.

If for any reason, either due to the lack of correct instruments or skills, the competent person is unable to provide a full assessment, the report should make this clear. Similarly, if there are any machines or processes which were not operating at the time of any assessment visit and which might reasonably be expected to add to any noise hazard, this should also be made clear.

An assessment does not need to have lengthy explanations of hearing mechanisms or over-long sections explaining how noise can damage hearing. It need not have detailed information on noise levels emitted by machines rather than levels to which persons are exposed. Long lists of frequency band spectra not relevant to the selection of personal ear protectors are also unnecessary.

Instruments required for noise assessments

Generally an integrating sound level meter with 'A' weighting is required for noise measurement. An octave band facility may be needed to specify appropriate ear protectors. Where workers move from place to place with different levels of noise for varying periods of time, individual dosimetry is sometimes (but not always) useful. In such cases, it is easier to use suitable noise dose meters than a sound level meter.

Health surveillance⁴

Briefly, it is good practice for employers to carry out regular hearing checks on all employees whose daily personal noise exposures equal or exceed 90 dB(A). The risk of hearing damage rises significantly with exposures above this level. Therefore, even allowing for the use of hearing protection, employers should normally provide hearing checks when noise levels reach or exceed 95 dB(A), except where that exposure is likely to be only temporary, eg for only a few weeks in a year.

Reduction of noise exposure

Where it is reasonably practicable to do so, employers must reduce noise exposure by means other than the provision of hearing protection. Expert advice is likely to be needed in many cases as noise reduction can be technically complex and there is considerable scope for wasted money if the wrong measures are taken.

Further information can be found in references 2 and 5.

Noise reduction measures may include:

- design changes to a process, component or machine;
- segregating noisy machines from employees;
- damping machine parts to reduce vibration;
- isolation of machinery using anti-vibration mountings;
- use of silencers, for example on pneumatic exhausts;
- enclosure of noisy machines;
- use of screens or barriers between noise sources and employees;
- provision of noise refuges for employees;
- fitting sound absorbing materials to work areas; and
- active noise control.

Action expected of employers - summary

- Decide whether you may have a noise problem - the two metres 'rule of thumb' referred to earlier is a starting point.
- If you have, or think you have, a noise problem, you will need to have a noise assessment carried out by a competent person. This may involve engaging a consultant.
- If the assessment indicates a noise problem, it should also suggest methods of reducing noise at source. A programme should be drawn up to deal with problems identified. It may be appropriate to prioritise action required and the programme may need to be phased, possibly over a substantial period if, for example, there are large numbers of machines to be dealt with or the work required is extensive, or if it is known that certain noisy machinery is nearing the end of its useful life.
- If there is a noise problem, ensure ear protectors are provided and worn. This may be necessary in the short or medium term until noise can be controlled at source or, if it is not reasonably practicable to reduce noise at source, ear protectors may be required long term. A proper management programme is needed to ensure that the correct ear protectors are purchased and that they are properly maintained and worn by those at risk.⁶
- Ear protection zones should be clearly marked where noise levels exceed the second action level of 90 dB(A).⁷

- A purchasing policy for buying quieter machinery in the future is advised and, in the long term, this may be the single most important step in reducing noise exposure at work.⁷

Action expected of machine suppliers - summary

Many engineering companies are also suppliers of machinery and other equipment which may generate noise in the workplace. If you supply machines likely to cause anyone at work to be exposed to noise reaching any of the action levels you must provide information on likely noise levels. In practice this means supplying data from noise tests in addition to other information on safe use and installation of machines which you are supplying. You should also be taking action, as far as is reasonably practicable, to control the noise your products produce if it is likely to be hazardous to health.²

References

- 1 The Noise at Work Regulations: a brief guide to the requirements for controlling noise at work INDG75(rev) (single copies free; ISBN 0 7176 0961 8 for priced packs of 15 copies)
- 2 Reducing noise at work Guidance on the Noise at Work Regulations 1989 L108 HSE Books 1998 ISBN 0 7176 1511 1
- 3 Selecting a health and safety consultancy INDG133 (Free leaflet)
- 4 Health surveillance in noisy industries INDG193 (single copies free; ISBN 0 7176 0933 2 for priced packs of 10 copies)
- 5 Sound solutions: techniques to reduce noise at work HSG138 HSE Books 1995 ISBN 0 7176 0791 7
- 6 Ear protection in noisy firms: employers' duties explained INDG200 (single copies free; ISBN 0 7176 0924 3 for priced packs of 20 copies)
- 7 Keep the noise down INDG263 HSE Books 1997 (single copies free; ISBN 0 7176 1480 8 for priced packs of 15 copies)

Other publications

Control of noise at metal-cutting saws EIS27 HSE Books (Free)

Control of noise at power presses EIS29 HSE Books (Free; due June 1998)

Further information

The future availability and accuracy of the publications listed in this Information Sheet cannot be guaranteed.

HSE priced and free publications are available by mail order from: HSE Books, PO Box 1999, Sudbury, Suffolk CO10 6FS Tel 01787 881165 Fax 01787 313995

HSE priced publications are also available from good booksellers.

For further enquiries ring HSE's Infoline, Tel: 0541 545500 or write to HSE's Information Centre, Broad Lane, Sheffield S3 7HQ.

HSE home page on the World Wide Web:
<http://www.open.gov.uk/hse/hsehome.htm>

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