Part 1 – Business classification information table for OG intranet library– completed by author and used to help categorise

Industry	Workplace noise (all industries)
Topic	Enforcement of noise at work regulations
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Directorate/Division/Unit/Team	Regulation/Specialist/Health/Noise & Vibration
Security classification	Open
Date created	18/04/2024
Date to be reviewed	18/04/2029
Date to be retired	Health Unit, Noise & Vibration Technical Lead (Chris Steel)
Unique OG reference no.:	OG-00146

Operational guidance (OG)

Noise: Inspection and Enforcement Guidance

Reference No.: OG-00146

Open government status: Open

Audience

All HSE Inspectors
SG Specialist (Noise and Vibration & Occupational Hygiene) Inspectors

Operational guidance (OG) template

Summary

This guidance is for; inspecting work activities involving risks from exposure to noise, investigating occupational noise induced hearing loss (NIHL), and other hearing damage ill-health cases. It also covers investigation of third-party noise reporting. Advice on the investigation of failures with audible warning signals can be found here. This OG replaces the Topic Inspection Pack on Noise.

Actions

Inspectors should check that risk from noise is under control when they identify high noise exposure or high peak noise.

Inspectors should ask for estimates of the employees' noise exposures that are good enough to tell if the 80 dB(A) lower exposure action value (LEAV) or the 85 dB(A) UEAV is likely to be exceeded. If the UEAV is likely to be exceeded, inspectors should assess the adequacy of organisational and technical measures to eliminate exposure at source or reduce it too as low as reasonably practicable (ALARP).

Inspectors should check dutyholders have measures in place to secure employees' full and proper use' of hearing protection for the entire time they are in high noise areas.

Inspectors should check for health surveillance. Health surveillance is a check on the effectiveness of noise controls, helps detect earlier signs of NIHL, and prevents further disability caused by NIHL.

Inspectors should focus on activities with the potential for high noise exposures, i.e. exposures likely to be above the UEAVs where inadequate controls can result in an extreme risk gap under the Enforcement Management Model (EMM). Appendix 5, the 'Industry Good Practice' contains a range of high-noise activities and corresponding established noise control measures, organised according to industry/sector.

Inspectors should take the following steps to assess exposure and the adequacy of its control. Initial Enforcement Expectations (IEEs) in accordance with the EMM and Enforcement Policy Statement (EPS) are given for situations where inadequate controls or management are found.

Step 1: Determine exposure.

Note: This guidance deals mainly with daily and weekly personal noise exposure and gives brief advice on peak noise exposure. Concern over risk from peak noise should be discussed with a Noise and Vibration Specialist Inspector.

The level of the risk from noise, is determined by the daily (or weekly) personal exposure. The information to consider is set out in Appendix 1.

Primary duties of control and management of risks from noise under the Noise Regulations are dependent upon the employees' likely daily and weekly noise exposures and the frequency and regularity of that exposure. Gathering and recording this information is important to support any subsequent action.

Step 2: Assess the adequacy of risk controls.

Inspectors should give priority to preventing and minimising the risk to ALARP (i.e. elimination, substitution and control).

- Appendix 2 gives the principles for assessing the adequacy of, controls, management measures, and other factors that should be considered are listed in.
- Appendix 5 give Industry Good Practice guidance; identifies risk control measures appropriate to the work activity.

Step 3: Assess the adequacy of residual risk management.

Where risk from exposure to noise remains at or above the UEAV after being reduced to ALARP, personal protective equipment and administrative controls become the last line of defence. Hearing protection, supervision of its full and proper use, instruction, training, and health surveillance (audiometry) must be in place. Inspectors should:

- check that suitable hearing protection is provided in consultation with the workers who wear it (for example, identify types and models that are effective and comfortable for each worker).
- check that hearing protection provided is used fully and properly the whole time in high noise areas.
- check that hearing protection is in an efficient state and good repair.
- check that health surveillance is suitable to detect new and worsening cases of NIHL and other hearing damage and is used to identify and implement improvements necessary to prevent new cases of disabling NIHL.

Step 4: Enforcement Action

When exposures are likely to exceed the UEAV and it is reasonably practicable to reduce noise exposure by organisational and technical measures, enforcement of **Reg 6(2)** (control) will usually be appropriate.

When exposures are regularly and frequently at or above the UEAV and there are deficiencies in one or a combination of HPE (Hearing Protection Equipment) and administrative programmes leading to risk of new and worsening cases of NIHL, enforcement of **Reg 7** (hearing protection), **Reg 9** (health surveillance), **Reg10** (Information, Instruction & Training) will usually be appropriate.

It is usually appropriate to enforce under **Reg 8** (maintenance and use of noise control equipment and hearing protection) where:

- Noise control equipment and/or hearing protection has been supplied but it is not fully and properly used.
- Noise control equipment and/or hearing protection has not been maintained in an efficient state, in efficient working order and in good repair.

Where inadequate control and management are found, Inspectors should determine the risk gap and IEE using the EMM. **Appendix 3** shows how to apply the EMM to health risks from

noise. **Appendix 4** shows the enforcement guidance and Initial Enforcement Expectation (IEE) for health risks from noise where exposures and risks are not adequately controlled and/or managed.

Introduction

Noise is the most common cause of occupational ill-health encountered by inspectors. The risk of NIHL and tinnitus from noise exposures is high in many industries. Prolonged and regular exposure to noise, as well as acute exposure to high intensity impulsive noise, can cause hearing damage that is permanent and disabling. The Control of Noise at Work Regulations (Noise Regulations) 2005 is the primary legislation dealing with noise risks to health and safety in the workplace.

This OG gives guidance on what Inspectors should consider when enforcing the Noise Regulations, where there are high noise exposures and inadequate measures to control and manage risks.

Noise as a Matter of Evident Concern (MEC)

Noise should be considered as a matter of evident concern (MEC) where:

- exposure is likely to be at or above an Upper Exposure Action Value (UEAV) (see the 'Rough guide' in Appendix 1).

AND

- there is evidence of failings in the control of risk (see Appendix 2 and IEEs in Tables A4.1 and A4.2 in Appendix 4).

Background

Exposure to high levels of noise causes gradual damage to hearing, which adds to the hearing loss that is normal as people age. As noise-induced hearing loss (NIHL) progresses, it can become disabling: conversation becomes difficult, people have difficulty using the telephone and cannot hear certain sounds in speech like 't', 'd' and 's'. Exposure to noise can also cause tinnitus, which is a sensation of noises in the ears such as ringing or buzzing. Tinnitus can occur in combination with hearing loss. To be aware of the impact hearing loss can have for an individual, you should listen to the audio demonstration of hearing loss on HSE's website at https://www.hse.gov.uk/noise/assets/video/index.htm. There is also a link between high noise environments and workplace injury and fatigue.

Hearing damage can also be caused by sudden, brief, extremely loud noises.

Hearing damage caused by exposure to noise is permanent and incurable. Many people are exposed to noise levels at work that may be harmful. There are many new cases of people receiving compensation for hearing damage each year, through both civil claims and the government disability benefit scheme, with considerable costs to industry, society and, most importantly, the people who suffer the disability.

This OG helps Inspectors decide what action to take where inadequate control and management of noise exposure are identified. It focuses on activities with potential for high noise exposures which, if not controlled effectively, will result in an extreme or substantial risk gap under EMM.

Organisation

There are no special organisational requirements.

Further References

Inspectors should pay particular attention to:

HSE guidance book on noise

Controlling noise at work. The Control of Noise at Work Regulations 2005 - Guidance on Regulations. HSE Books L108.
http://www.hse.gov.uk/pubns/books/l108.htm

HSE leaflet for employers

Noise at work. A brief guide to controlling the risks. INDG362(rev2)
http://www.hse.gov.uk/pubns/indg362.htm

HSE pocket card for employees

Noise. Don't lose your hearing! INDG363(rev2)
http://www.hse.gov.uk/pubns/indg363.htm

HSE website

http://www.hse.gov.uk/noise/index.htm

Contacts

Advice and support for Inspectors is available from Noise and Vibration Specialists and Occupational Health Inspectors. You should always ask for advice if in doubt.

Noise and Vibration Specialist Inspectors can:

- Advise you on reasonably practicable noise control measures (including complex or novel situations).
- Advise you on suitability of risk assessment and information, instruction & training (IIT).
- Help you determine the daily (or weekly) personal noise exposure, particularly where there are highly variable exposure patterns.
- Lead for you on interventions addressing any aspects of high peak noise exposure.
- Advise you on compliance with the Noise Regulations.

Occupational Health Inspectors, Medical Inspectors and Scientists in Central Medical Unit can:

- Advise you on the quality and suitability of health surveillance services.
- Provide you with clarification on the health surveillance requirements.
- Advise you on the appropriate management of employees diagnosed with NIHL or who are at particular risk from noise.

- Advise you on the suitability of Information, Instruction & Training around health surveillance.

Noise and Vibration Specialist Inspectors, Occupational Health Inspectors and Medical Inspectors can also provide expert evidence for prosecution.

Appendix 1. Determining exposure.

Enforcement will usually require evidence of exposure but may, in some circumstances, require evidence of risk.

To take enforcement based on exposure you will need an estimate of exposure sufficient to determine whether the Exposure Action Values (EAVs) or Exposure Limit Values (ELVs) are likely to be exceeded. You (and employers) **do not** need to make a precise or detailed assessment of exposure beyond what is required to identify the need for action and for you to decide what duties apply.

When are you most likely to take enforcement?

You will usually enforce where the daily or weekly personal noise exposure is likely to be above the 85 dB(A) upper exposure action value (UEAV) and exposure is not controlled so far as is reasonably practicable. Compliance is achieved by the dutyholder through a programme of organisational and technical measures. Enforce on: **Reg 6(2)** for control failures, **Reg 7** for supply of hearing protection failures (the presence of mandatory hearing protection signs can indicate noise is above the upper exposure action value), **Reg 8** for failures to ensure full and proper use of hearing protection or where noise control measures are not being used or maintained, **Reg 9** for health surveillance failures and **Reg 10** for information, instruction, and training (**Reg 10**).

When else might it be appropriate to take enforcement?

It can be appropriate for you to enforce where noise exposures are likely to be above the 80 dB(A) lower exposure action value (LEAV) but below the 85 dB(A) UEAV. Enforce on: **Reg 5** if you think the dutyholder needs to create, update, or review their risk assessment, **Reg6(1)** if you think reasonably practicable controls have not been used and noise levels are not ALARP, **Reg 7** if hearing protection is not being made available.

Help in assessing when the exposure action values are reached

Situations where daily personal exposures ($L_{EP,d}$) are likely to exceed UEAV are outlined in the rough guide below.

Rough guide

it is likely that the UEAV will be exceeded if:

- *You have to shout, really shout, to talk to someone about 2 m away and employees are exposed to the noise for most of the working day;*
- *You have to raise your voice to talk to someone about 1 m away and employees are exposed to the noise for more than about 2.5 hours;*

Daily personal exposures above the UEAV will arise for many of the activities listed in the **Appendix 5 Industry Good Practice** and for all the activities if good practice is not followed.

You can form your opinion on the likelihood of exposures exceeding the UEAV by:

- Using the ‘rough guide’ above to decide whether the upper exposure action value is likely to be exceeded.
- Referring to the employer’s noise risk assessment, where $L_{EP,d}$ has been calculated or there is sufficient information to allow it to be calculated, and you are satisfied that the assessment reflects the working conditions.
- Drawing comparison with your experience of noise exposures and records of noise risk assessments in similar premises.

Values of $L_{EP,d}$ should be estimated from the average noise levels for each process an employee completes, and the time spent on that process during the working day. If noise measurements have been taken they must be average A-weighted levels taken over several full cycles of the process using an integrating sound level meter (this is the average noise level measured over the duration of the measurement period). The exposure duration can be calculated from the timed duration of a full cycle of each process the person works on and multiplying by the number of cycles completed in a day. HSE provides a ready reckoner and calculator on the noise section of the website.

*Note 1: Daily personal noise exposures, for comparison with the upper and lower exposure action values, must take **NO** account of the effect of any personal hearing protection.*

*Note 2: When considering the exposure limit values, the reduction provided by the hearing protectors **should be** taken into account. You can use the HSE Calculator to do this for you.*

Using Weekly Exposure Estimates

Dutyholders may use weekly personal noise exposure ($L_{EP,w}$) rather than $L_{EP,d}$ where noise exposure varies markedly from day to day. Exposure-related duties under the Noise Regulations may not apply even when the daily personal exposure exceeds action values on one or more days. The use of weekly exposure assessment may be suitable where:

- Workers use noisy machinery on one day in the week but not on others.
- Daily noise exposure varies markedly from day to day; the worker has daily exposures on one or two days where the levels are at least 5 dB higher than the other days.
- The working week comprises three or fewer days of exposure.

Inspectors are advised to consult a Noise & Vibration Specialist Inspector if in any doubt about the consequences for assessment of exposure.

Enforcement concerning exposure related duties will usually be achievable based on the $L_{EP,d}$ (or $L_{EP,w}$). Only rarely (for some highly impulsive or impactive sources, such as explosives, firearms, drop forges and some punch presses) will peak noise action values be exceeded without the $L_{EP,d}$ (or $L_{EP,w}$) action values also being exceeded. Inspectors are advised to consult a Noise & Vibration Specialist Inspector if enforcement action for peak noise is envisaged.

Appendix 2. Control and management of risks from exposure to noise

Successful control and management of the risks from noise is achieved with:

- **Control by elimination, substitution, engineering methods or administrative measures.**

  The noise controls described in Appendix 5, Industry Good Practice, have been established in the industries concerned and will often be reasonably practicable, depending on local circumstances (the list is not exhaustive). Inspectors should seek to secure compliance with **Regs 6(1)** and **6(2)** to ensure that the employer adopts suitable controls to eliminate the risk from noise, or to reduce the exposure as low as is reasonably practicable (ALARP).

- **Personal hearing protection.**

  The Personal Protective Equipment (PPE) at work Regulations were extended to limb B employees on 6th April 2022. Advice can be found here Personal protective equipment (PPE) at work regulations from 6 April 2022 (hse.gov.uk).

  Personal hearing protection (earmuffs or ear plugs) is relied on extensively by employers, but its use is not permitted as a substitute for control of exposure to noise by technical or organisational means. Long-term use of hearing protection is appropriate to protect against the residual risk if the upper exposure action values (UEAVs) are still likely to be exceeded after the exposures have been reduced to ALARP.

  Hearing protection provided by the employer should be suitable for the tasks and the work environments (**Reg 7(4)(a)**) considering risks to both health and safety of workers, for example, to assure audibility of warning signals (**Reg 5(3)(d)** and **(i)**). Hearing protection must be selected in consultation with the employees concerned to ensure, amongst other things, that they are comfortable for workers to wear properly throughout the period(s) they are exposed to high noise (**Reg 7(4)(b)**). Disposable hearing protection should only be used once. Reusable hearing protection should be individually issued and must be maintained in an effective state (**Reg 8 (1)(b)**).

  Inspectors should challenge poor fitting or partial or full removal of hearing protection at any time whilst in noisy areas because this rapidly degrades the protection provided. You may want to ask for records of noise-related ill health (e.g. NIHL, tinnitus) to check that the use of hearing protection is being effective. Establishing the reason for ineffective use of hearing protection (to hear colleagues or other sounds, comfort, avoiding a feeling of isolation, etc.) will help you identify the measures required to achieve satisfactory protection.

- **Health surveillance.**

  A suitable health surveillance programme (including audiometry) must be in place for employees who are at risk from noise (**Reg 9**). HSE's guidance (L108) states that this is expected where employees have regular and frequent exposure at or above a UEAV. The health surveillance should enable any new cases of hearing loss to be detected and existing cases to be monitored. The results (anonymised as appropriate) for groups of employees should be given to the employer to help monitor the effectiveness of the controls, and full and proper use of hearing protection provided. A health record should be kept for each employee under health surveillance. The employer should also have a clear policy for the management of affected employees.

Note: It is advisable to discuss any enforcement on quality of health surveillance providers with an Occupational Health Inspector before taking action.

- **Information, instruction, and training.**

  When the employees are exposed above a lower exposure action value (LEAV), they should be provided with suitable and sufficient guidance on:

  - Information, instruction, and training on the risks/exposures to noise.
  - The control measures in place to reduce risks/exposures.
  - The hearing protection provided.
  - How to detect and report signs of hearing damage.
  - The health surveillance programme.

Table A2.1 recommends factors to consider when assessing the adequacy of control and management of exposures to noise. The table is arranged according to the principles of controlling and managing the risks from noise. It can be used during noise interventions to ensure that the necessary information is gathered to assess the compliance levels and support subsequent enforcement actions.

Table A2.1 Factors to consider during noise inspections and applicable legislation.

Factors	Legislation
Noise risk management system Does the employer demonstrate a commitment to minimising risks from noise by (as appropriate): • Allocating responsibility to a senior manager? • Holding a suitable and sufficient risk assessment? • Having an appropriate procurement policy, considering noise when selecting machinery and work equipment (see below)? • Ensuring full and proper use of noise control equipment (silencers, noise enclosures, refuges, etc.) and personal hearing protection? • Having a system for preventive and reactive maintenance of noisy machinery and work equipment? • Having a system for preventive and reactive maintenance of noise control equipment (silencers, noise enclosures, refuges, etc.)? • Providing appropriate information, instruction, and training (see below)? *Note: Procurement processes for equipment used in construction must eliminate or control so far as is reasonably practicable using the principals of prevention. Construction Design & Management Regs 2015 Reg, 11, 13 and 15 can be applied; inspectors do not need to prove that the dutyholder is an employer on a construction site.*	HSWA S.2 Noise Regulation Reg. 5 Noise Regulation Reg. 6 Noise Regulation Reg. 8
Noise exposure control – Adoption of alternative working methods Where exposure is likely to exceed **the UEAVs**, has the employer reduced exposure and risk to ALARP by: • Identifying and adopting reasonably practicable measures for eliminating or reducing noise exposures using technical or organisational means (see Appendix 5 to judge reasonable practicability)? or • Having plans to improve control, with an appropriate timescale? • Taken action, if required, to ensure that the exposure limit value is not exceeded? *Note: compliance with the exposure limit value can be achieved with personal hearing protection but the requirement to reduce noise exposure to ALARP by technical and organisational means remains if compliance with the limit is achieved only through hearing protection*	HSWA S2 Noise Regulations Reg. 6

Factors	Legislation
Noise exposure control – Workplace design for reduced noise exposure In addition to the measures outlined in Appendix 5, there will usually be benefits to be gained from applying general principles of workplace design for reducing noise exposure. Has the employer considered, for example: • Keeping the number of employees working in noisy areas to a minimum? • Careful planning to segregate noisy machines from areas where quiet operations are carried out? • Reducing noise exposure by increasing the distance between a person and the noise source? • Using noise refuges at frequently occupied positions to provide quiet areas where hearing protection can be removed for discussion of the work? • Placing screens, barriers or walls between the source of the noise and the people to stop or reduce the direct sound? • Lining building surfaces with acoustic absorption to reduce the effects of reflected sound (specialist help will be needed to put this in to effect)?	HSWA S2 Noise Regulations Reg. 6
Noise exposure control – Selection of quieter tools and machinery Employers should demonstrate a positive purchasing policy which takes noise into account when selecting machinery. For many types of equipment there will be models designed to be less noisy. When selecting equipment to buy or hire, besides ensuring that the tool or equipment is generally suitable for the job, has the employer: • Asked about likely noise levels for the intended use(s)? • Considered the need for purchase of the manufacturer's noise control options – (further) acoustic enclosure of the machine, noise havens at control consoles, etc. • Checked how the manufacturers' noise data should compare with likely noise levels for their intended use(s)? • Used the noise information to compare machines before making the final choice? • Looked for warnings in the instruction book to see if particular uses of the tool or machine are likely to cause unusually high noise? Manufacturers should be noise testing their machines during the noisiest typical use of the machine. Employers may use the machine in modes that are quieter than reported by the manufacturer. The employer should report concerns over manufacturers' noise data to HSE (for example, the actual use of the machine is higher than reported by the manufacturer or the manufacturer does not supply any noise data).	HSWA S2 Noise Regulations Reg. 6

Factors	Legislation
Noise exposure control – Limiting exposure duration. Restricting the time spent in noisy areas, or doing noisy tasks, can reduce noise exposures, as can ensuring that noisy devices are only used when they are needed. Where some employees do noisy jobs all day or week, and others do quieter ones, job rotation should be considered – especially when the exposures of all involved can be managed to below the 85 dB(A) LEAV. Employers might need to train employees to carry out other jobs. Job rotation will reduce the noise exposure of some employees while increasing that of others, so care and judgement is needed. Employees' time on noisy jobs will need to be halved to reduce their daily exposure by 3 dB. The noise exposure ready-reckoner and exposure calculators can be used to indicate the reductions in exposure that can be achieved by reducing the duration of exposure to noise.	HSWA S2 Noise Regulations Reg. 6

Health surveillance (including audiometry) Where exposure is likely to be at or exceed an UEAV (on a regular and frequent basis), or where employees are otherwise at risk (e.g. people whose health is at particular risk from such exposure, such as those with an existing hearing condition or a family history of deafness), the employer should have in place a suitable health surveillance scheme, including: • Appointing a designated competent occupational health professional to oversee the health surveillance programme. This person should be fully conversant with the technical and ethical aspects of the conduct of occupational audiology and understand the relevant workplace risks. • Appointing a suitable person with training in performing audiometry. A training syllabus has been prepared by the British Society of Audiology (www.thebsa.org.uk). The person performing the tests may not be the same person as the competent adviser who interprets the audiogram results. • Arranging for a 'baseline' audiogram of employees likely to be exposed above an UEAV, conducted before exposure to hazardous noise or as soon as possible after initial exposure. • Arranging regular audiometry, typically annually for the first two years, then every three years if no hearing loss is detected. More frequent testing may be required if significant changes in hearing level are detected, or the risk of hearing damage has increased. • Where NIHL is suspected, this determination will first be identified by a competent occupational health professional or advisor by review of several information sources including interpretation of the audiogram, alongside the HSE categorisation scheme calculations. • Where the competent OH professional judges that there are indications of newly identified, rapid progression or progressive noise induced hearing loss then they must make a referral to an appropriately qualified doctor (an OH Physician). • Arranging for referral of employees with abnormal hearing, that is not associated with NIHL, to a medical practitioner for any necessary treatment. • Keeping health records. The competent adviser should provide the employer with fitness for work information and health surveillance dates (completed and scheduled) but not audiometric results unless employee consent has been given. • Using the results (including anonymised group information) to review the risk assessment, controls, and full and proper use of hearing protection in high noise environments. The person or organisation (e.g. occupational health service provider) carrying out the testing should: • Be able to follow the guidance on audiometric testing programmes in L108, apply quality control to ensure robustness of results, and refer to a suitably qualified doctor where appropriate. • Have access to the employer's noise risk assessment and familiarise themselves with the nature of the work, ideally by visiting the workplace. • Explain the results of the test to individual employees and discuss with them the risks from noise and the need for full and proper use of hearing protection. • Ensure that a suitably qualified person informs the employer when there is a need to review the noise risk assessment. • Give the employer advice to review any measure taken to comply with Reg 6, 7 and 8. • Consider writing to the employer recommending assigning the employee to alternative work where they will not be exposed to further noise risk. • Provide the employer with anonymised grouped information derived from the results of the audiometric testing, indicating any workshops or processes where new incidence or	HSWA S2 Noise Regulations Reg. 9 HSWA S3 HSWA S36

Factors	Legislation
progression of hearing damage has occurred, and provide information for inclusion in the employer's health records.	

Factors	Legislation
Hearing Protection Where exposure to noise is likely to; (a) exceed the 80 dB(A) **LEAV** but is below the 85 dB(A) UEAV: • Has the employer supplied employees with suitable hearing protectors on their request? (b) exceed the 85 dB(A) UEAV, has the employer: • Provided suitable hearing protectors for the health and safety risks on site in consultation with employees concerned or their representatives? • Ensured hearing protection is fully and properly use at all times in high noise? • Organised adequate supervision? • Designated hearing protection zones with appropriate signage and management? • Established adequate storage and maintenance arrangements for hearing protectors? Information on hearing protection and peak noise given below. Providing personal hearing protection should be one of the first considerations on discovering a risk to health due to noise. It should not be used as an alternative to controlling noise by technical and organisational means, but for tackling the immediate risk while other control measures are being developed. In the longer term, it should be used where there is a need to provide additional protection beyond what has been achieved through noise control. Personal hearing protection use should be targeted at noisy jobs and activities. It must be supplied by the employer to any employee whose daily personal noise exposure is likely to exceed the 85 dB(A) UEAV. The employee must use the protection provided. The employer should ensure that, by using hearing protection, the employee's effective noise exposure is reduced at least to below the 87 dB(A) ELV and should aim for noise levels, at the ear, below 80 dB(A). The employer should consider the safety risks from noise and avoid over-protection (at ear noise levels below 70 dB(A)). The HSE Hearing Protection calculator helps find hearing protection with a satisfactory noise attenuating performance. There are many types and models of hearing protectors available to suit different requirements. In addition to mainstream (passive) plug type and muff type hearing protectors, there are devices with lower attenuation, custom moulded ear plugs including non-passive hearing protectors with built-in level dependent attenuation, communications and/or entertainment available at reasonable cost. Important factors to consider in the selection and use of hearing protection include: • Comfort and user preference for types of protectors. • Achieving noise levels at the ear between 70 and 80 dB(A), after allowing for 'real-world' factors. • Compatibility with other safety equipment. • Ease of fitting and removal, compatible with the pattern of exposure to noise. • The need to communicate and hear warning sounds (including moving vehicles). • Environmental factors such as heat, humidity, dust and dirt. • Cost of maintenance or replacement. • Medical disorders suffered by the wearer. The use of personal hearing protection should be managed through the provision of appropriate information, instruction and training for employees, adequate supervision and the appropriately defined and demarcated Hearing Protection Zones.	HSWA S2 Noise Regulations Reg. 7

Factors	Legislation
Information, instruction and training Has the employer provided employees at risk from noise with adequate information, instruction, and training on: • How to detect and report signs of hearing damage? • The likely noise exposure and the risks to their hearing? • The importance of correct operation and maintenance of any noise control measures (e.g. silencers, machine enclosures)? • How and where to obtain hearing protection, how to use it properly (especially ear plugs), the need to use it at all times during specified activities or when in a Hearing Protection zone, and how to look after it? • Other steps they can take to reduce risk? • The employees' duties under the Noise Regulations and HSWA? • Arrangements for health surveillance and their duty to cooperate? This information should be given in a way the employee can be expected to understand (for example special arrangements might need to be made if the employee does not understand English or cannot read). To establish whether information, instruction and training has been carried out effectively, look for; evidence that personal hearing protection is in a good condition, it is being fully and properly used, that noise control equipment is being used and in good condition, and that procedures for low noise working are being followed.	HSWA S2 Noise Regulations Reg. 6(3)(d) Noise Regulations Reg.10 HSWA S7
Peak noise It is rare for risk from peak noise to require management without average noise exposures also requiring management. Examples include some cartridge operated tools or weapons firing. Individual peak sound pressure level events, L_{Cpeak}, may exceed the 135 dB(C) peak LEAV or the 137 dB(C) UEAV but there are insufficient peak events to exceed the time-weighted average 80 dB(A) LEAV or 85 dB(A) UEAV. The above factors will usually require consideration when addressing risk from peak noise as they do for time-weighted average exposures. Enforcement will depend on comparison of event peaks with the peak EAVs and the peak ELV. Noise and Vibration Specialist Inspectors will assist with interventions on peak noise risk when requested.	

Appendix 3. Applying the Enforcement Management Model (EMM) to health risks from noise

The EMM is applied here to health risks from noise following the general guidance on applying the EMM principles to health risks, including occupational health descriptors, given in OG EMM: Application to Health Risks.

Consequence/Credible health outcomes

Noise-induced hearing loss (NIHL) is a permanent, irreversible condition, the effects of which are compounded by age-related loss. A 25 dB hearing loss averaged over the frequencies 1, 2 and 3 kHz represents disabling interference with social function (Medical Research Council National Hearing Survey, 1989) and represents a **serious health effect.**

Permanent, cumulative damage to structures of the inner ear, and/or rupture of the ear drum (acute trauma), which can occur in response to single exposures to very loud noise, is also a **serious health effect** but it is not possible to apply the EMM to acoustic trauma caused by high peak sound pressures because there is insufficient data available to predict the peak noise exposures which may result in possible, probable or remote likelihood of that serious health effect.

Benchmark

The benchmark for exposure to noise is set at a **'nil/negligible'** risk of a **serious health effect** caused by occupational exposure. The serious health effect, in this case, is that hearing loss reaches a disabling severity whilst in work. This benchmark standard is met if there is full compliance with the Noise Regulations.

Likelihood/Risk matrix

The extent of noise-induced hearing loss is affected by both the level of noise and the duration of exposure. HSE Contract Research Report 2/1988 provides tables for the estimation of hearing impairment due to noise as a function of age and duration of exposure. This is an 'interpretive' report. Reference to these tables has been undertaken to determine percentages of the population experiencing a 25 dB or greater hearing loss (averaged over both ears and frequencies 1, 2 and 3 kHz) at the age of 60 with different levels of noise exposure. In developing the risk matrix it has been assumed that individuals are exposed for up to 40 years throughout their working life and the levels of noise exposure do not take into consideration the effects of the use of personal hearing protection. As the effects of hearing loss caused by exposure to noise are compounded by normal age-related deterioration, the percentage of the population affected by a 25 dB or greater hearing loss incorporates the effect of ageing. The data used relates to a normal unselected population.

At the age of 60, 25-30% of the population are likely to have a 25 dB or greater hearing loss from ageing alone, and with a daily personal exposure ($L_{EP,d}$) of 80 dB(A) this proportion is assumed not to increase. Exposure below the lower exposure action value (LEAV) of 80 dB(A) therefore represents a 'nil/negligible' risk of the serious health effect from occupational exposure. At a daily personal exposure of 85 dB(A) (the upper exposure action value (UEAV)) approximately 35-40% of a population exposed for 40 years will have a 25 dB or greater loss. It is thus considered to be 'possible' that this level of occupational noise exposure will result in a serious health effect in a person who would not be expected to

suffer the effect due to ageing alone[1]. At a daily personal exposure of 92 dB(A) the proportion of people affected increases to 60-65%, leading to the conclusion that it is 'probable' that this level of occupational noise exposure will result in a serious health effect in a person who would not be expected to suffer the effect due to ageing alone[2].

Table A3.1: Risk matrix for exposure to noise

DESCRIPTOR	APPLICATION/ INTERPRETATION	LIKELIHOOD		
		PROBABLE/POSSIBLE	REMOTE	NIL/ NEGLIGIBLE
SERIOUS HEALTH EFFECT	NOISE-INDUCED HEARING LOSS of 25 dB or more before retirement	$L_{EP,d}$ of 85 dB(A) or above	$L_{EP,d}$ of 80-84 dB(A)	$L_{EP,d}$ below 80 dB(A)

Risk Gap

The risk matrix in Table A3.1, when used with Table 2.1 in the EMM, will indicate an **extreme** risk gap for any daily personal exposure above the UEAV (85 dB(A)).

For a daily exposure between the LEAV and UEAV (80 to 85 dB(A)) there is a **substantial** risk gap.

Standards

The principal standards are:

Table A3.2: Standards

Title	Authority
The Control of Noise at Work Regulations 2005	Defined in parts, established in others depending on the wording of the individual Regulations.
Guidance on the Controlling noise at work – The Control of Noise at Work Regulations 2005, HSE books L108, Health and Safety Executive, 2005 (third edition 2021)	Established
Health and Safety at Work, etc. Act 1974, Section 2(1)	Established

1 Approximately 10% of those in the exposed population who would not expect to achieve this level of hearing loss due to ageing alone will achieve it as a result of their occupational noise exposure.
2 Approximately 50% of those in the exposed population who would not expect to achieve this level of hearing loss due to ageing alone will achieve it as a result of their occupational noise exposure.

Appendix 4. Enforcement guidance and Initial Enforcement Expectation (IEE)

Enforcement Guidance

The aim is to secure the elimination of risk of hearing damage while avoiding the creation of the safety risk where workers cannot hear instructions or warnings. Where risk cannot be eliminated, it must be reduced to ALARP. Most enforcement action will be to secure reduction of exposure to ALARP, by organisational and technical measures, where the exposures are likely to exceed the upper exposure action value (UEAV). Enforcement of **Reg 6(2)** (Control) will usually be appropriate, together with enforcement of **Reg 7** (Hearing Protection) and **Reg 10** (IIT).

For Control. The priority is to secure a reduction in exposure to ALARP through enforcement of **Reg 6(2)**, where applicable, Appendix 5, the Industry Good Practice guidance provides risk control measures appropriate for many work activities. If you need additional guidance on control, you should contact a Noise & Vibration Specialist Inspector.

For Hearing Protection. When exposure is ALARP but still above the UEAV, inspectors should ensure that the residual risks from noise are eliminated using hearing protection (**Reg 7(2)**). The dutyholder must also ensure that the hearing protection is maintained (**Reg. 8(1)(b)**). Dutyholders must also ensure that hearing protection is fully and properly used where exposures are at or above the UEAV (**Reg.8(1)(a)**); this applies on sites where hearing protection zones can be defined or sites where they cannot be defined (e.g. outdoor worker using a noisy power tool). When hearing protection is found not to be working effectively, for example from grouped anonymised results of health surveillance (**Reg 5(3)(h)**), inspectors should consider underlying issues, such as suitability of hearing protection provided (**Reg 5(3)(i)**), information, instruction, and training (**Reg 10(1)**) and adequate supervision to achieve compliance with **Reg 8(1)(b)**. If there is doubt as to whether personal hearing protection can allow the exposure limit value (ELV) to be met, for example where daily/weekly personal exposures appear to be in the region of 100 dB or above, inspectors should seek advice from a Noise & Vibration Specialist Inspector.

Hearing Protection Zones. Where hearing protection is mandatory (i.e., workplaces where exposures cannot be controlled to below the UEAV), the dutyholder must identify the workplace as a hearing protection zone (**Reg 7(3)(a)**), place signs saying it is a hearing protection zone (**Reg. 7(3)(b)**) and ensure that employees wear the hearing protection (**Reg. 7(3)**). Dutyholders should also designate as hearing protection zones any areas where an upper EAV is likely to be exceeded if personnel spent a significant portion of the working day within them, even if access is generally infrequent (e.g., plant rooms or compressor houses).

Prosecution should be considered where serious breaches of the Noise Regulations are found, in particular, where non-compliance in the following situations has resulted in significant hearing damage (category 3 hearing loss – see L108):

- failure to supply or enforce use of suitable personal hearing protection; or
- failure to provide suitable health surveillance; or
- failure to maintain personal hearing protection or anything provided for the purposes of noise control.

It is advised that a Noise & Vibration Specialist Inspector is consulted if prosecution is proposed.

Initial Enforcement Expectation (IEE)

Tables A4.1 and A4.2 contain common situations that inspectors are likely to encounter and provide guidance on IEEs. Note that any reference to exposure action values in terms of daily personal noise exposure ($L_{EP,d}$) should be taken to include weekly personal noise exposure ($L_{EP,w}$).

Please Note, for exposures between the lower and upper exposure action values the EMM may indicate an IN for Control where straightforward and low-cost actions are available and the exposure is not ALARP; however, a NoC letter may be more proportionate and appropriate for this situation. IN or NoC will require a proof of risk of hearing damage or risks to safety. You may wish to discuss this with a Noise & Vibration Specialist.

Table A4.1: Initial enforcement expectation – Improvement Notices (IN)/NoC Letter

Exposure	Situation	Initial Enforcement Expectation
Likely to be at or exceed the UEAV of 85 dB(A)	**Control –** Exposure is not ALARP; it is reasonably practicable to reduce the exposure by organisational and/or technical measures.	*Require a programme of work to reduce exposures to ALARP.* IN HSWA S2 Noise Regulations Reg 6(2)
Likely to be at or exceed the UEAV of 85 dB(A)	**Hearing protection – supply of –** No hearing protection provided, or hearing protection is not suitable (either under- or over-protection).	*Require provision of suitable hearing protection* IN HSWA S2 Noise Regulations: No protection – Reg 7(2); Under-protection – Reg 7(4); Consider prosecution. Note: Inaudible warning signals etc. due to over protection should be considered under Reg 5(3)(d) and 5.3(i)
Likely to be at or exceed the LEAV of 80 dB(A) but be below UEAV of 85 dB(A)	**Hearing protection – supply of –** Personal hearing protection has not been provided upon request from an employee.	*Require provision of suitable hearing protection to employees who request it.* IN HSWA S2 Noise Regulations Reg 7(1), 7(4) Note. If employees are being asked to supply their own Hearing protection this could be a breach of Section 9 HSWA
Likely to be at or exceed the UEAV of 85 dB(A)	**Hearing protection – use of –** Personal hearing protection is not being fully or properly used where it has been supplied under R7(2).	*Require full and proper use of personal hearing protection.* IN HSWA S2 Noise Regulations Reg 8(1)(a) Consider prosecution. Note: also consider underlying issues, such as information, instruction, and training; adequate supervision; or suitability of the protection provided.

Table A4.1: Initial enforcement expectation – Improvement Notices (IN)/NoC Letter

Exposure	Situation	Initial Enforcement Expectation
Exposures likely to be at or exceed the UEAV of 85 dB(A) in areas (including infrequently visited areas of the workplace)	**Hearing protection zones –** Hearing protectors are worn, but the hearing protection zones (HPZ) are not designated or demarcated by signs or access is not restricted where practicable.	*Require clearly marked hearing protection zones and management of access.* NoC Letter HSWA S2 Noise Regulations Reg 7(3)
	Hearing protection zones – Personal hearing protection is not worn within designated hearing protection zones (HPZ) and/or access to zones is not restricted where practicable.	*Require that access to HPZ is restricted and no employee enters zone unless wearing personal hearing protectors.* IN HSWA S2 Noise Regulations Reg 7(3)
Exposures likely to be at or exceed the LEAV of 80 dB(A)	**Maintenance – hearing protection** Personal hearing protection provided by the employer is not adequately maintained.	*Require maintenance of hearing protection provided.* IN HSWA S2 Noise Regulations Reg 8(1)(b) Consider prosecution when exposures are likely to exceed the UEAV of 85 dB(A) and where failure to maintain hearing protection will or has led to significant hearing damage.
Requirement is independent of level of risk or exposure but should be pursued when exposure is above the LEAV of 80 dB(A).	**Maintenance and use – noise control equipment** Noise control equipment provided (e.g., enclosures, silencers) is not fully and/or properly used and/or is not adequately maintained.	*Require full and proper use and/or maintenance of noise control equipment provided.* IN HSWA S2 Noise Regulations Reg 8(1) Consider prosecution when exposures are likely to exceed the UEAV of 85 dB(A) and where failure to maintain noise control equipment will or has led to significant hearing damage. Note: also consider underlying issues, such as information, instruction and training; adequate supervision
Likely to be at or exceed the UEAV of 85 dB(A), or any employees at particular risk	**Health surveillance –** (i) there is no health surveillance, or health surveillance systems inadequate; or (ii) the employer is failing to act on the results.	*Require a suitable system of health surveillance* or *require appropriate action in the event of identifiable hearing damage.* IN Noise Regulations: • no health surveillance – Reg 9(1); • not act on results – Reg 9(4). Consider prosecution where exposure usually exceeds the UEAV of 85 dB(A) and subsequent audiometry shows damage that could have been avoided with earlier health surveillance.

Table A4.1: Initial enforcement expectation – Improvement Notices (IN)/NoC Letter

Exposure	Situation	Initial Enforcement Expectation
Likely to be at or exceed the LEAV of 80 dB(A)	**Information, instruction & training –** employees have not been provided with suitable and sufficient information, instruction, and training.	*Require suitable and sufficient information, instruction and training.* IN HSWA S2 Noise Regulations Reg 10
Likely to be at or exceed the LEAV of 80 dB(A)	**Risk assessment –** No risk assessment or risk assessment is not suitable and sufficient and employer taking no action.	IN HSWA S2 Noise Regulations Reg 5 Note: It will usually be appropriate also to enforce other regs within the Noise Regulations.

Table A4.2: Initial enforcement expectation – Prohibition Notices (PN)

Exposure	Situation	Initial Enforcement Expectation
Likely to be at or exceed an UEAV of 85 dB(A)	**Control –** HSE sector has agreed with the industry that the work method is no longer acceptable and will be prohibited where seen. PN can be issued for remote working (i.e. working away from place of employment, workshop or home office) which is high noise and workers on site have not been issued with hearing protection. Work can be prohibited until hearing protection can be supplied. This would cover most construction sites	PN HSWA S2 Noise Regulations Reg 6(2)
Likely to be at or exceed an UEAV of 85 dB(A)	**Hearing protection –** Transient site (e.g., construction) and no personal hearing protection is provided.	PN HSWA S2 Noise Regulations Reg 7(2) (IN appropriate for fixed sites)
Equal to or Exceed an ELV of 87 dB(A) or L_{CPeak} 140dB	**Hearing protection –** Dutyholder cannot supply personal hearing protection, there and then, suitable for immediate control of exposure to below the exposure limit value and work likely to continue for too long a duration under these conditions unless inspector intervenes.	PN HSWA S2 Noise Regulations Reg 6(4)

Appendix 5 Industry good practice

This section provides a benchmark from which you can assess dutyholders commitment to their duties to minimise risks from exposure to noise.

Table A5.1 identifies general techniques for control of noise emissions that you should expect to see applied to machinery – usually by the machine manufacturer but in the case of machinery that falls short of current design requirements, possibly by the employer. These are summarised in a pdf of the top 10 most useful noise control techniques that you may wish to share with dutyholders.

https://www.hse.gov.uk/pubns/top10noise.pdf

The subsequent bullet list provides links to examples of noise control measures specific to particular industries.

All the noise control methods and techniques are available on HSE's noise website and the principles are described in HSE guidance book L108.

For specific advice or further information contact a Noise & Vibration Specialist Inspector.

Table A5.1 Checklist of noise control measures you can expect to see in good performers.

Process	Noise control measures you should expect to see
Air movement	Noisy static plant e.g., compressors, vacuum pumps, blowers etc should be sited in lesser or non-occupied rooms. The propagation of high noise from air movement machinery sited near workstations should be controlled by, for example, acoustic enclosures, acoustic screens, or noise havens at workstations. Fans at inlets and discharges should be on vibration isolating mounts and silencers and ducting should have flexible section to reduce duct borne noise. Fixed position or portable blow-off pipes used for removing swarf cuttings, wood chips, lubricants, water cooling, components ejection or segregation should be operated at the minimum fully effective airline pressure and fitted with quiet nozzles. Periodic noise emission from exhaust ports of pneumatic actuator should be silenced by manifolds using porous metal or plastic port silencers. Hoses should be fitted with good, well-maintained connector seals to avoid noisy (and expensive) air leaks.
Conveying/ transporting	Machines are procured with damped/composite materials for rollers. Component impact noise is minimised by use of component guide/sequencing release mechanisms. bearings/rollers are adequately lubricated. Conveyor speeds are the minimum compatible with production needs. Conveying ductwork is suspended on vibration-isolating hangers to reduce structure borne noise. Air conveyors ducting has integral damping or is lagged with vibration damping material. Noisy conveyor lines run within acoustic tunnel hoods. Lightweight flat sheet metal surfaces of conveyor or transport components (chutes, conveyor sides, trolley tables, non-critical machine panel work, etc.) should be manufactured with integral

	vibration damping (such as bitumastic damping compounds or riveted construction) to reduce noise emission.
Forming	High noise presses, moulding machines, corrugating machines, bowl polishers, blast chillers or freezers, block making machines, granulators, should be sited in lesser or non-occupied rooms. The propagation of high noise from forming machinery sited near workstations should be controlled by, for example, acoustic enclosures, acoustic screens, or noise havens at workstations. Use hydraulic rams to realign distorted fabrications after welding, forming or alternatively, use magnetic damping mats or sandbags if realigning by hammering; Heat distortion during cutting should be minimised using arc-air CNC or laser profilers. Noise emission from thin sheet metal during cutting/processing e.g., motor vehicle panel work, should be minimised by firmly supporting the workpiece and using magnetic damping mats, sandbags, etc. also where feasible, eliminate noise by laser type profiling etc.
Other processing	Relocate/segregate noisy machinery and/or ancillary equipment e.g., compressors, presses, fans, saws, cutting-off moulding, fabrication, grinding, fettling etc. to lesser and or non-occupied rooms; Machinery could be acoustically enclosed within an accessible and adequately ventilated noise reducing enclosure. Where not reasonably practicable to remove or enclose e.g., long process lines, local noise refuges can be installed for operators to control/oversee processes. Where possible minimise the use of handheld grinders by improved component design e.g., machine weld preparation and removal, or using 'low noise' discs fitted to both portable and pedestal grinders. The need to (re)work with handheld power-tools should be minimised by improved product design e.g., minimising the need to prepare and dress welds. Noise from cutting tools should be minimised by maintaining sharpness, reducing speeds, increasing the number of cutting teeth or blades, using damped bits or blades. Cut materials should fall only short drops into damped or mesh collection bins. Chutes, hoppers, bins should be manufactured from damped metal or deadened steel. Materials being cut should be clamped and/or covered by acoustic tunnels to minimise creation and propagation of noise; vibration i.e., 'bouncing' on supporting surfaces to reduce noise emission infeed/discharge chutes, hoppers. Use of damped percussive and rotary percussive tools e.g., chisels, (in chipping hammers, rock drills and breakers). Breaking materials using percussive methods should be seen only in exceptional circumstances. You should see material removal using hydraulic crushing or bursting, cutting using damped wall saws or diamond wire saws.

Simple noise control techniques that have wide application across the whole of industry are available in 'Top 10 Noise Control Techniques'. Furthermore, a simple approach to guide application of control methods is also available in 'Noise Control: Determining the Best Option' on HSE's noise website.

Engineering noise control

Follow the links below for information on noise control measures for high noise activities and processes. In HSE's experience these are reasonably practicable in many circumstances.

- Plastic products
- Woodworking
- Concrete and cement products
- Agriculture
- Air Transport
- Ceramics
- Construction
- Docks
- Engineering
- Food and drink
- Foundries
- Glass (flat and container)
- Motor vehicle repair
- Paper and printing
- Quarries
- Rubber
- Stonemasons
- Textiles

Control advice for the Music and entertainment sector can be found in HSG 260 https://www.hse.gov.uk/pubns/books/hsg260.htm

Plastic products – controlling noise.

This table identifies high-risk activities or processes in plastics manufacturing and lists examples of methods. See 'how do I reduce noise' on HSE's noise website for general advice on controlling exp

Activity or process	Example noise levels*, dB(A)	Established noise control methods
Granulators (and other size reduction machines, e.g. agglomerators, crumbers, shredders, pelletisers)	100 (granulators) 90 (agglomerators)	Situate high noise size reduction machines in separate rooms or buildings. Provide remote or automated feeding to remove operators from high noise are Lag or damp the machine casing. Form a sound trap in the feed aperture or hopper. Enclose the machine. Fit segmental or helical cutters. Use a tangential feed. Fit resilient backing to knives. Reduce rotor speed.
Injection moulding machines	97–100	Use slow speed pumps. Control the release of exhaust air. Mount pumps and motors on anti-vibration mounts and incorporate flexible ho pipe lines. Enclose hydraulic power packs. Convert injector guards to acoustic guards. Fit low noise nozzles to blow guns etc.
Extruders	90	Specify low noise designs. For hydraulic systems, see injection moulding machines above. Fit silencers to drive motor air intakes and exhausts. Enclose the drive motor.
Mould cleaning guns	105	Ensure nozzles are low-noise types (e.g. those which generate an induced se air flow). Non-quiet types can be more than 10 dB noisier

Activity or process	Example noise levels*, dB(A)	Established noise control methods	Further information (links)
Extrusion line cut off saws	100	Replace guards with solid panels lined with acoustically absorptive material. Fit an acoustic strip curtain at product out-feed. Ensure noise from the extrusion is contained by an acoustic tunnel	Example: Extrusion line cut-off saws
Ultrasonic welding machines	96	Enclose with sound reducing material.	

* Noise levels are indicative only and will vary depending on equipment type and conditions of use.

Woodworking – controlling noise.

This table identifies high risk activities or processes in woodworking and lists examples of established noise control methods. See 'how do I reduce noise' on HSE's noise website for general advice on controlling exposure to noise in the workplace.

Activity or process	Example noise levels*, dB(A)	Established noise control methods	Further information (links)
Circular saws	97–102	When purchasing new blades, obtain 'low noise blades'.	Noise control in sawmilling (see page 60 to 62 in HSG172)
Vertical spindle moulders	95–100	The use of limited cutter projection tooling will reduce noise levels; they should have been in place since 2003 under PUWER.	Woodworking Information Sheet 37
Multi-spindle planer moulders	up to 105	Segmented blocks (widely available) can reduce in-feed noise levels. Properly designed and maintained chip extraction systems (where not part of integral enclosure) will reduce idling noise levels. Use of smoother profile blocks with low blade projection. Slotted or perforated table lips can reduce idling noise levels. Noise levels can be reduced by reducing the cutter's rotational speed and increasing the number of knives on the cutter. There should be a noise enclosure, either as an integral part of the machine or retrofitted. As with all noise enclosures, it should have a suitable design, form as complete an enclosure as possible, and be properly maintained and used.	Air turbulence noise
Band resaws	90–105	Maintenance of the machine (e.g. pulley scrapers, lubricating felt pads or sawdust extraction system) and blade, combined with blade adjustment, is extremely important for reducing noise levels. Noise enclosure of band-resaws is considered to be reasonably practicable.	Woodworking Information Sheet 4 Noise control in sawmilling (see page 60 to 62 in HSG172)
Planer thicknesser	97–101	Reductions of 7 to 13dB have been achieved during thicknessing only by adjustment of the table to slightly increase gap between cutter and table. Not to be used when the machine is used for planing when the timber is fed across the top of the cutter.	Air turbulence noise

Activity or process	Example noise levels*, dB(A)	Established noise control methods	Further information (links)
			Example: Removing woodworking machine noise by adjustment
Small hand fed thicknesser	104	Enclosure (can be as simple as a 15mm lined chipboard box).	
Chipper/hoggers	118 – 120>	Segregation of the machine from work areas, or enclosure of machine.	

* These sample L_{Aeq} values are indicative only and will vary depending on equipment type and conditions of use.

Concrete and cement products

This table identifies high risk activities or processes when working with concrete and cement and lists examples of established noise control methods. See 'how do I reduce noise' on HSE's noise website for general advice on controlling exposure to noise in the workplace.

Product	Activity or process	Example noise levels*, dB(A)	Established noise control methods	Further information (links)
Flat products (e.g. slabs, fence posts, panels) Reinforced concrete products (e.g. beams, steps)	Mould filling, demoulding and stacking using vibrating tables or conveyors.	95–110 (steel tables) 86–93 (tables/conveyors with rubber covering)	Use self-compacting concrete (see below). Use resilient material (e.g. rubber) on tables. Clamp the mould to the table. Fit tunnels or enclosures over conveyors. Enclose the undersides of conveyors and tables. Maintenance of enclosures, skirts, etc. Maintenance of vibrator motors and mountings. Use wood, fibreglass or rubber moulds instead of metal to reduce impact noise. Adjusting the frequency of the vibrating table.	
	Use of self-compacting concrete (SCC)	Relatively quiet process: no vibration required	SCC (concrete to which chemical plasticisers are added) is increasing in popularity in the UK. Its use has the potential to eliminate the main source of noise (due to vibration). SCC should be discussed during visits to raise its profile and encourage innovation.	European guidelines for self-compacting concrete [2.17MB] (See chapter 12 for information on pre-cast products)
Blocks, tiles, slabs	Vibratory presses	96–110 (no noise reducing features) 84–93 (outside press enclosure) 86–88 (unloading stations) 71–79 (inside control rooms)	Fit an enclosure (with all controls outside) or provide a separate control room (noise refuge). Isolate vibrating parts from the floor and enclosure. Maintain vibrator motors and mountings. Silencers for compressed air exhaust. Secure all parts and fittings to prevent rattling. Use resilient material (e.g. rubber) for stops.	Example: use of plastic components in a block-making machine

Product	Activity or process	Example noise levels*, dB(A)	Established noise control methods	Further information (links)
	Rumblers/tumblers	84–95	Line barrel of tumbler with rubber lining. Isolate plant from other processes and/or use plastic curtains to separate it from employees.	
	Saws	81–96	Use noise-reduced saw blades.	Example: reduced stone cutting noise
Extruded tiles	Extrusion plant Pallet /mould conveyors	86–93	Extrusion plant: • Use noise-reduced blow-off jets/air knives. • Use silencers on compressed air exhausts. Conveyors: • Control speed to minimise collisions between pallets (may require training). • Use an impact absorbing material (e.g. polyurethane) on convenor guide rails etc.	
General	Chutes and skips		Provide chutes and skips with rubber lining. Minimise dropping distances for waste material.	Avoiding impacts Example: Reducing noise in gravel chutes
	Mixing machines		Provide noise havens for all control consoles.	
	Cleaning equipment	up to 105 (ultra-high pressure water jetting) can be > 120 dB (using Chipping hammers)	Avoid or minimise the need for using noisy equipment by washing down before the 'mix' goes off. For water jetting, locate the compressor in an acoustic housing and restrict the operating pressure.	MPA Guide to Cleaning Concrete Pan Mixers.pdf (mineralproducts.org)
	Materials handling		Where heavy quarry-type vehicles are employed, use acoustic cabs.	Example: Reducing noise in trucks & cabs

* These sample L_{Aeq} values are indicative only and will vary depending on equipment type and conditions of use.

Agriculture

This table identifies high risk activities or processes when working with agriculture sector and lists examples of established noise control methods. See 'how do I reduce noise' on HSE's noise website for general advice on controlling exposure to noise in the workplace.

High risk processes/ equipment	**Established measures for noise control**
Use of tractor without a 'Q' cab	Consider replacing with 'Q' cab tractor where used for field work on arable enterprises >100 ha. Where not reasonably practicable or being used for other operations (yard, road etc) hearing protection must be worn
Use of a 'Q' cab tractor with missing doors or windows or with significant breaches of the cab by additional services	You must maintain all noise control equipment including fitting of windows in 'Q' cabs. Hearing protection must be worn until items are replaced or the openings blocked to restore noise protection to original level.
Pig feeding	Consider timed/automatic valves on swill outlets to troughs and other automated feed systems. Where entry is required during feeding time mark area as hearing protection zone and ensure hearing protection is worn
Barn machinery	Fit noise refuges at operator stations on large installations. Fit automatic cut-offs to roller mills etc. Where not reasonably practicable and entry is required during feeding, mark area as hearing protection zone and ensure hearing protection is worn.
Forestry and arboriculture equipment (e.g. chainsaws, chippers/shredders, brush cutters) and amenity/landscape equipment (e.g. mowers, strimmers)	Selection of low or lower noise equipment. Wearing of suitable hearing protection

Air Transport

This table identifies high risk activities or processes when working with air transport sector and lists examples of established noise control methods. See ‘how do I reduce noise’ on HSE’s noise website for general advice on controlling exposure to noise in the workplace.

High risk processes/equipment	Established measures for noise control	Sector and other guidance
Loading aircraft etc with aircraft engine operating or auxiliary power unit (APU) or ground power unit (GPU) in use	General risk assessment-based approach i.e., limit persons/time spent etc. Manage control use of APU/GPU. Use stand alone generator fitted with enclosure (i.e. HUSH pack generator set). Otherwise use hearing protectors.	HSG209 Aircraft turnround

Ceramics

This table identifies high risk activities or processes when working with ceramics sector and lists examples of established noise control methods. See 'how do I reduce noise' on HSE's noise website for general advice on controlling exposure to noise in the workplace.

High risk processes/equipment	Example noise levels*, dB(A)	Established measures for noise control
Clay Stockpile raw material handling	>90	Where heavy quarry type vehicles are employed, use acoustic cabs Noise havens containing all control consoles
Body preparation (high speed blungers, ball mills, pug mills, vibrating screens)	>90	Where possible, separate body preparation from other activities. In large works, consider using video cameras or other means of remote viewing/monitoring of conveyors etc. Provide noise refuges etc. Options which may be reasonably practicable include: enclose drives for high speed blungers, use rubber linings for ball mills, enclose screens and relocate vacuum pumps on pug mills
Making machine pumps and motors presses (dust, ram) auto towing machines	>90	Variety of pumps used. Noise levels can be reduced significantly by simple enclosures lined with sound absorbent materials. Replace vacuum pumps by rotary pumps where possible
Glaze spraying (sanitary ware and tableware	>90	Pressures selected for sanitary ware spraying should be the minimum commensurate with satisfactory performance. Automatic tableware spraying machines can be sited away from other work areas. In both cases, careful selection of spray nozzles can reduce noise levels.
Sanitary ware reclaim	>90	Segregate from other work areas. Use noise absorbent lined hoods
Kiln fans	>90	Locate away from occupied areas , provide partial enclosures or screening
Vibromills	>90	Segregate from other areas. Fit acoustic enclosures and noise dampening to the bowls
Grinding and polishing of imperfections	>90	Noise levels vary considerably depending on amount of grinding. Traditional methods use small grinding wheels. Using abrasive belts or single arm linishing belts greatly reduce noise levels.

* Noise levels are indicative only and will vary depending on equipment type and conditions of use.

Construction

This table identifies high risk activities or processes when working with construction sector and lists examples of established noise control methods. See 'how do I reduce noise' on HSE's noise website for general advice on controlling exposure to noise in the workplace. Health risks, such as noise should be assessed at the design stage of the project. Effort should be made to eliminate or control construction noise by using off-site manufacturing or assembly processes.

High risk processes/ equipment	**Example noise levels*, dB(A)**	**Established measures for noise control** (see also material for Construction in the HAV Operational Guidance)	**Sector guidance**
Tunnelling by hand with clay spade or jigger pick	95-117	Use mechanised tunnelling techniques in all but the smallest tunnelling jobs)[3]; if hand digging is used then use lower noise emission tools: silenced body/damped picks; silence pneumatic tool exhaust; maintain equipment/air lines; operate in accordance with manufacturers' instructions.	https://www.hse.gov.uk/vibration/hav/campaign/construction/tunnelling.htm British Tunnelling Society's CoP Tunnelling and Pipejacking: Guidance for Designers
Scabbling	94 -105	Scabbling purely for architectural aesthetic effect is not acceptable. Specify finishes that do not require scabbling. Some finishes can be designed into shuttering using special moulds; design to allow larger concrete pours/consider work sequencing; specify/use non-mechanical scabbling methods; use lower noise emission tools. Surface preparation to ensure good concrete bond can be achieved by other methods e.g. cast in proprietary joint formers, or chemical retardants and water jetting.	
Breaking concrete, asphalt, etc. with hand operated breakers	96-105	**Breaking concrete/masonry and other breaking work** Plan cast in ducts, detail box-outs to minimise the breaking of new concrete. Use boom-mounted hydraulic breaker on construction plant with noise-protected cabs; use lower noise emission tools: silenced body/damped chisel; maintain equipment/air lines; operate in	DSA-Guidance-Control-of-Noise-Hand-arm-Vibration-exposure-2020.pdf (drillandsaw.org.uk) Pile cropping. A review of current practice (HSE Inspector information leaflet, Aug 02)

3 Where design solutions for elimination/reduction of risk from noise exposure exist, but have not been implemented, inspectors should consider C(DM) duties.

High risk processes/ equipment	**Example noise levels*, dB(A)**	**Established measures for noise control** (see also material for Construction in the HAV Operational Guidance)	**Sector guidance**
		accordance with manufacturers' instructions. Use alternative cutting, coring bursting methods suggested by DSA. . **Pile Cap Removal** Pile cap removal using hand-operated breakers is **not acceptable.** Consider alternative solutions e.g., pile head removal using bursters/crushers; Elliot method, Recipieux method, or use hydraulic pile croppers and design pile spacing and pile re-bar for mechanised cropping. - NB A limited amount of dressing of the pile cap with handheld breakers may still be required.	
Abrasive disc cutters/angle grinders	98-104	Consider elimination of need for on-site cutting by design/prefabrication; sharpen cutters/ replace discs regularly; maintain equipment and operate in accordance with manufacturers' instructions; minimise numbers exposed.	
Striking (dismantling) proprietary falsework (using metal hammers to free collars)	107 (L_{Cpeak} 136 dB(C) at 2m from activity)	Maintain the falsework legs properly - follow manufacturer's instructions on cleaning and lubrication to reduce effort required to release legs. Use a purpose made spanner whenever possible. Minimise use of hammers, if hammers must be used use plastic/rubber hammers and wear hearing protection, shield others from the noise.	
Dump Trucks /Site dumpers	93-95	Purchase/hire lower noise emission plant; maintain plant; damp vibrating panels; consider lining load section; use noise reduction techniques for cab etc. (dump trucks); consider retrofitting silencers/diffusers to exhaust (*may also be applicable to other construction plant)*	Example: Reducing noise in a dump truck Reducing noise when loading dump trucks
Cartridge tools	143-157 L_{Cpeak} dB(C)	Minimise numbers exposed and shield others (e.g. with portable enclosure); where used on steel plates, use damping (e.g. sandbags).	

High risk processes/ equipment	**Example noise levels*, dB(A)**	**Established measures for noise control** (see also material for Construction in the HAV Operational Guidance)	**Sector guidance**
Concrete pumping	91-93	Hire in quieter plant. For independent pump, enclose pump/motor (consider need for ventilation!) silence exhaust; maintain plant and operate in accordance with manufacturers' instructions	
Powerpacks/compressors	85-91	Locate away from occupied areas; provide acoustic enclosure (consider need for ventilation!); use low noise emission equipment (e.g. "hush packs"); keep access panels closed; maintain equipment/air lines; operate in accordance with manufacturers' instructions.	
Media blasting	96-100	Minimise numbers exposed; provide local enclosure, maintain equipment/air lines; operate in accordance with manufacturers' instructions.	
Driven piling	115-132	Consider alternative design solutions to minimise noise; consider using quieter methods: (e.g. vibration methods instead of drop hammer); enclose noise source; use damping on sheet piles; minimise numbers exposed.	

* Noise levels are indicative only and will vary depending on equipment type and conditions of use.

Docks

This table identifies high risk activities or processes when working at docks and lists examples of established noise control methods. See ‘how do I reduce noise’ on HSE’s noise website for general advice on controlling exposure to noise in the workplace.

High risk processes/equipment	Established measures for noise control
Loading car delivery vessel car decks i.e. unaccompanied freight	Risk based approach to manage time spent/persons exposed/vehicle running times etc.

Engineering

This table identifies high risk activities or processes when working with Engineering sector and lists examples of established noise control methods. See 'how do I reduce noise' on HSE's noise website for general advice on controlling exposure to noise in the workplace.

High risk processes/ equipment	**Example noise levels*, dB(A)**	**Established measures for noise control** (see also material for 'heavy fabrication' in the HAV Operational Guidance)	**Sector guidance**
Minimise the need for re-work		Cut accurately and avoid heat distortion to minimise the need for corrective hand re-work. Use laser profilers, etc.	
Air carbon arc gouging	105-120	Eliminate need for it i.e. use single sided welding, non-welded restraining aids etc., consider process substitution i.e. oxy-fuel gouging, gouge during break times to minimise risk to others.	SIM 3/2001/14
Use of chipping tools	122-128	As above, also increase accuracy of cut, cut angled edges in preparation for welding etc. **NB** When used on ship structure noise transmitted via the vessel can be significant source of exposure to others.	SIM 3/2001/14
Abrasive blasting	up to 110	Fit silencer to compressed air exhaust port, enclose compressor or site from work area, prevent compressed air leaks, use "quiet blasting nozzles" or enclosed (mechanically propelled) blasting equipment **NB** Current standard for blasting helmets does not consider hearing protection, exclude any protection they provide.	
Grinding	85-109	Where possible eliminate cosmetic dressing, use low noise, flexible or laminated grinding discs; high frequency grinders (as opposed to grinders with universal motors); silenced pneumatic grinders; the lowest spindle rating needed, place magnetic mats on external surfaces of workpiece.	SIM 3/2001/14
Hammering steel	95-100	Eliminate their use i.e., correct weld distortion using hydraulically actuated straightening devices, use magnetic, hydraulic or screw fairing aids instead of welded lugs and wedges. Use soft faced, recoilless hammers; vibration damping i.e., damping sheets or magnetic mats.	
Metal cutting saws	100	Purchase quieter machines when replacing machinery. Keep the blade sharp, use damped saw blades; noise/vibration absorbing material on feed table surface, damp the machine subframe, enclose the cutting area, locate the saw in a separate room.	
Power presses and	95	Purchase quieter machines when replacing machinery. Use anti-vibration mountings; quiet tooling; damped machine panels; acoustically treated discharge chutes; noise enclosures.	Examples:

CNC punch presses			Dynamic absorption of power press vibration Use of absorption in a noise control programme Flexible PVC enclosure of automatic punch presses Anti-vibration treatment of high-speed presses Controlling noise in a press shop Rubber damping landing chutes
Riveting	100-110	Consider use of radial and orbital riveting machines instead of conventional cold impact riveting machines. Fit a silencer to air exhaust on pneumatic machines; cushion impact noise by using a damping compound between actuator ram and tool ram. Replace “percussion “riveting with “squeeze” riveting.	Example: Acoustic enclosure of small plant
Shears (high-speed continuous)	100	Unattended machines: fit with a noise hood together with hold-down rollers to reduce vibration of the feed stock. Manually fed machines: fit wear resistant rubber material to the clamp base, reduce the clamp descent rate. Distance scrap metal falls should be reduced to the minimum; chute can be lined with rubber material. Designers may be able to improve the noise performance of these machines by setting the blade at a slight angle to the vertical.	
Ultra high-pressure water jetting	105	Limited scope for reducing noise levels other than locating the compressor in acoustic housing. Correct use of hearing protection essential, should be compatible with waterproof clothing worn i.e., fit below hood of jacket. Often hearing protection will be worn by the operator but not others in immediate are who are also at	

* Noise levels are indicative only and will vary depending on equipment type and conditions of use.

Food and drink

This table identifies high risk activities or processes when working with food and drink manufacturing sector and lists examples of established noise control methods. See 'how do I reduce noise' on HSE's noise website for general advice on controlling exposure to noise in the workplace.

High risk processes/ equipment	**Example noise levels*, dB(A)**	**Established measures for noise control**	**Sector and other guidance**
Glass bottling	90-95 (dairy) 85-95 (brewing & soft drinks) 100 (high speed bottling, 400-800 bottles per minute)	Replace glass bottles with plastic ones. Design out noise at source: specify acceptable noise level when purchasing machinery. Reduce inter-bottle impact: slow down speed of line and increase spacing of bottles. Dampen impact surfaces: fit dampening material at impact points. Fit acoustic enclosure over bottle conveyor. Provide acoustic barrier around cap feeder bowl and fit noise reducing mountings. Limit worker exposure time: job rotation	HSG 232 Sound Solutions in Food and Drink: reducing noise in food and drink manufacturing.
Product impact on hoppers	95 (confectionery) >90 (frozen food) >100 (animal feed)	Design out noise at source: specify acceptable noise level when purchasing machinery. Reduce product-hopper impact: reduce drop height of product. Reduce or fill in gaps at feed and take-off of pelletisers. Reduce impact noise: (i) use hopper made of sound-deadened steel (ii) line inside of hopper with impact deadening material (iii) line outside of hopper with noise dampening material (iv) line guards/panels with noise dampening material (can produce 5dB noise reduction)	
Wrapping, cutting wrap, bagging etc (e.g. sweets)	85-95	Design out noise at source: specify acceptable noise level when purchasing machinery. Reduce drop height of product. Enclosure: (i) line cover panels with noise dampening material (ii) fill any gaps in cover panels with noise attenuating material	

High risk processes/ equipment	Example noise levels*, dB(A)	Established measures for noise control	Sector and other guidance
		(iii) fit full acoustic enclosure over bagging line Regularly maintain machinery. Limit worker exposure time: job rotation Provide noise refuges for workers	
Bowl choppers (meat)	>90	Design out noise at source: specify acceptable noise level when purchasing machinery. Maintenance: regularly maintain rotating parts, machine mountings and sharpen blades Fit acoustic hood/enclosure over bowl chopper. Fit noise-dampening material to bowl or panels. Segregate bowl choppers from quieter machinery/areas exposure time: job rotation. Limit worker exposure time: job rotation. Provide noise refuges for workers.	
Bowl choppers (meat)	>90	Design out noise at source: specify acceptable noise level when purchasing machinery. Maintenance: regularly maintain rotating parts, machine mountings and sharpen blades. Fit acoustic hood/enclosure over bowl chopper. Fit noise-dampening material to bowl or panels. Segregate bowl choppers from quieter machinery/areas exposure time: job rotation. Limit worker exposure time: job rotation. Provide noise refuges for workers.	
Pneumatic noise and compressed air	85-95	Design out noise at source: specify acceptable noise level when purchasing machinery. Use low-noise air nozzles. Fit manifolds/silencers on exhausts. Move compressor outside or to a people-free area or enclose compressor (but ensure no overheating). Regularly maintain potentially noisy equipment.	

High risk processes/ equipment	Example noise levels*, dB(A)	Established measures for noise control	Sector and other guidance
Milling operations	85-100	Design out noise at source: specify acceptable noise level when purchasing machinery. Locate mill in a separate room away from workers. Enclose hammer mills, roller mills and mixers with acoustic enclosures. Fit noise dampening material to panels. Reduce drop height of pellets and line hoppers with impact absorbing material. Acoustically lag the outside of pipes carrying particulate product (e.g., with half cylinder sheet steel lined with 50mm mineral wool slabs which can provide 10-15dB noise reduction). Limit worker exposure time: job rotation. Provide noise refuges for workers.	
Saws / cutting machinery	85-107 (meat)	Design out noise at source: specify acceptable noise level when purchasing machinery. Ensure preventative maintenance/inspection is carried out on blade alignment, blade sharpening, lubrication, floor mountings etc. Use noise dampening on saw blades. Limit worker exposure time: job rotation.	
Blast chillers / freezers	85-107	Design out noise at source: specify acceptable noise level when purchasing machinery. Replace plant with a less noisy model. Enclose plant with acoustic panelling (e.g., sheet steel outer skin, perforated steel inner skin, 75mm mineral wool slabs between can provide >20dB noise reduction). Limit worker exposure time: job rotation. Noise refuges for workers.	
Manually pushing wheeled trolleys/racks	Up to 107 (from wheels/wheel bearings especially those subject to high/low	Design out noise at source: specify good quality wheels/bearings when purchasing trolleys. Regularly maintain wheels/bearings. Improve flooring to reduce damage to wheels/bearings and cut down noise. Use conveyors to move product where possible. Improve layout to minimise movement of product.	

High risk processes/ equipment	Example noise levels*, dB(A)	Established measures for noise control	Sector and other guidance
	temperatures in ovens/freezers)		
Packaging machinery	85-95	Design out noise at source: specify acceptable noise level when purchasing machinery. Install noise reducing enclosures. Fit silencers to noisy exhausts. Limit worker exposure time: job rotation.	

* Noise levels are indicative only and will vary depending on equipment type and conditions of use.

Foundries

This table identifies high risk activities or processes when working with foundries sector and lists examples of established noise control methods. See 'how do I reduce noise' on HSE's noise website for general advice on controlling exposure to noise in the workplace.

High risk processes/equipment	**Established measures for noise control** (see also material for 'Foundries' in the HAV Operational Guidance)	**Sector and other guidance**
Compressed air lines (various processes)	Segregation/enclosure of compressors, provision of low noise nozzles and exhaust silencers; regular maintenance; rectification of leaks ...	
Induction furnaces	Current control to prevent resonance; isolation/segregation of process	
Arc air gouging in fettling	Avoid use of this process where practicable; segregate if possible; hearing protection	SIM 3/2001/14
Moulding machines	Various noise control measures, e.g., local enclosures.	
Rumbling machines	Elimination by better casting quality; segregation and other measures depending on specific machine.	
Mechanical shake-out	Enclosures; noise damping materials on machine; hearing protection	
Fettling	Elimination by better casting design; better design of tool; avoidance of use of chipping hammers.	
Knock-out	Segregate this process from others, mechanisation.	

Glass (Flat and Container)

This table identifies high risk activities or processes when working with glass container manufacturing and lists examples of established noise control methods. See 'how do I reduce noise' on HSE's noise website for general advice on controlling exposure to noise in the workplace.

High risk processes/equipment	**Example noise levels*, dB(A)**	**Established measures for noise control**
Most noise in Glass container manufacturing is generated by pneumatic noise and/or glass to glass contact (cullet and product).		
Batching/mixing plant, Storage hopper vibrators and vibratory conveyors	96	Noise haven containing all control consoles.
Basement, Fans, cullet transport and tipping, dumper trucks,	90 to 100	Inlet and outlet silencing on fans, enclosure of fans and drive motors. Provision of cabs on dumpers and other vehicles.
Furnace area, Furnace combustion air fans, furnace cooling fans	92 to 105	Silencing of fans. Noise haven containing all control consoles.
IS Machine area, Pneumatic noise, cullet, mechanical noise, cooling fans	90-105	Pneumatic noise from blanks and moulds cooling, air exhausts and exhausts of forming air. Minimum air pressures, inlet and outlet silencers, wide bore pipe for ducting air exhaust from occupied area. Proper timing of forming air. Cushion cullet chutes and maintain machinery. Automatic spraying or permanent coatings reduce manual lubrication at machines.
Line reject container chutes at delivery end of Lehr	85 to 95	Chutes for reject containers can be lined to eliminate glass to glass and metal contact and reduce reverberation, e.g. use old conveyor belting. Enclosure may also be necessary.
Inspection / Packing	88 to 92	Line reject container chutes (e.g. old conveyor belting), to eliminate glass to metal contact and reduce reverberation. Conveyors designed to regulate bottle flow reduce glass to glass contact. Covering of conveyors has been attempted without great success for quality inspection reasons.
Palletiser	85 to 95	Fit silencers to pneumatic exhaust

* Noise levels are indicative only and will vary depending on equipment type and conditions of use.

Motor Vehicle Repair

This table identifies high risk activities or processes when working with Motor Vehicle Repair sector and lists examples of established noise control methods. See ‘how do I reduce noise’ on HSE’s noise website for general advice on controlling exposure to noise in the workplace.

High risk processes/ equipment	**Example noise levels* L_{Aeq}, dB(A)**	**Established measures for noise control**
Vehicle body repair	85-107	Get suppliers of machinery and equipment to specify noise levels at operators’ position and choose quiet machines or equipment (especially air saws and chisels which can generate noise levels up to 107 dB and air grinders and orbital sanders up to 97 dB). Isolate bodywork in separate rooms or fix ceiling high partitions.

* Noise levels are indicative only and will vary depending on equipment type and conditions of use.

Paper and Printing

This table identifies high risk activities or processes when working with Paper and Printing sector and lists examples of established noise control methods. See 'how do I reduce noise' on HSE's noise website for general advice on controlling exposure to noise in the workplace.

High risk processes/equipment	**Established measures for noise control**
Buckle Folders	Enclosure at all buckle plates.
Paper making machines	Provision of hood (acts for both noise and heat control).
Corrugators	Enclosure.
Vacuum pumps and compressors	Site away from work rooms; shield or enclose.
Sheet-fed printing machines	Ensure adequate spacing and housing.

Quarries

This table identifies high risk activities or processes when working in Quarries sector and lists examples of established noise control methods. See 'how do I reduce noise' on HSE's noise website for general advice on controlling exposure to noise in the workplace.

High risk processes/equipment	**Established measures for noise control**
Blasting	Blast design, adequate covering of detonating cord, in-hole initiation, shock tube initiation.
Drilling	On hand-operated machines: fitting of mufflers, hearing protection. On drilling rigs: hydraulically driven motors, mufflers, and exhaust silencers (and remote positioning of exhaust), control cabins for operators.
Excavators and draglines	The cabins of new machines offer good noise protection. On older machines soundproofing may be required, and maintenance.
Wheel loaders, dump trucks etc	Insulation and covers around engines and fans; good soundproofing of driver's cab, keeping windows and doors closed (air conditioning may then be required in hot weather), silencers on intake silencer.
Crushing/milling	Resilient mountings, chute linings, acoustic curtains, lagging, covers etc can bring about useful reductions in noise levels. May need separate soundproofed cabin for operator.
Screening	Use of synthetic screen mats to replace traditional metal plate or woven wire; chute linings and enclosures are usually practicable.
Conveying/feeding	Noise problem possible at the feed or discharge end. Efficient maintenance helps the problem, also reducing the drop height and preventing material hitting empty bins and hoppers. Also, use of spiral chutes or lined cascade towers.
Heating/drying	Fitting enclosures to burners and fans. Silencers on inlet & outlet sides of fans. Anti-vibration mountings can prevent reverberations around structure. Remote operation may be practicable.
Saws	Use of dampened saw blades with enclosures; reducing speed of the blade; remote and automatic control of the machines.

Rubber

This table identifies high risk activities or processes when working in Rubber sector and lists examples of established noise control methods. See ‘how do I reduce noise’ on HSE’s noise website for general advice on controlling exposure to noise in the workplace.

High risk processes/ equipment	**Example noise levels* L_{Aeq}, dB(A)**	**Established measures for noise control**
Grinders/ granulators	96-115	Specify low noise design, special segmental or helical cutters etc, use tangential feed, fit resilient backing to knives, reduce rotor speed, lag or damp the machine casing, form sound trap in feed aperture or hopper, use feed conveyor in an acoustic tunnel, enclose the machine.
Two roll mills & Internal mixers	90-104 & 84-100	Specify low noise gearboxes, fit helical gears, lag and/or damp the gearbox casing, enclose gearbox and drive, use individual rather than line shaft drives, fume control systems should be designed and installed to reduce noise, isolate, and damp guards, and other vibrating parts. Fit suitable silencers, pipe exhaust away from operator position, specify low noise gearboxes, lag, or damp gearbox casing, isolate and damp thin metal panels, isolate, i.e., u se anti-vibration mounts, enclose the gearbox, use belt conveyors instead.
Injection moulding machines	97-100	Specify low noise design, use slow speed pumps, provide damping for control valves, insert hydraulic silencers, mount pumps and motors on anti-vibration mounts and incorporate flexible hoses in pipelines, enclose hydraulic power packs, convert injector guards to acoustic guards, fit low noise nozzles to blow guns etc.
Wire twisting machines	91-97	Use resin bonded fibre gears, damp and acoustically lag machine panels and guards, enclose the machine, specify low noise design.
Tyre curing presses	83 -97	Use low noise nozzles, link blow off nozzle operation to machine work cycle and control by on/off switches, fit suitable silencers to pneumatic system exhausts, duct air away from operator, eliminate steam leaks.
Tyre buffing machines	85-92	Change process — use peeling to remove bulk of rubber, use buffing brushes rather than rasps, silence air exhausts, silence extraction system and choppers, enclose the buffing machine.
Tyre skiving	85-92	Specify low noise tools and select carefully. , use electrically powered tools, fit silencers to the exhaust ports of pneumatic tools, cable driven tools are more difficult to manoeuvre than pneumatic tools so particular care is needed in locating and supporting them

* Noise levels are indicative only and will vary depending on equipment type and conditions of use.

Stone Masonry

This table identifies high risk activities or processes when working in Stone Masonry sector and lists examples of established noise control methods. See 'how do I reduce noise' on HSE's noise website for general advice on controlling exposure to noise in the workplace.

High risk processes/ equipment	**Established measures for noise control**
Chipping hammers	Segregate the process where possible, hearing protection.
Saws	Controls include segregation, enclosures, dampened saw blades, reduced blade speed, remote/automatic machine operation.

Textiles

This table identifies high risk activities or processes when working in Textiles sector and lists examples of established noise control methods. See ‘how do I reduce noise’ on HSE’s noise website for general advice on controlling exposure to noise in the workplace.

High risk processes/ equipment	**Established measures for noise control**
Worsted and cotton preparation and spinning (especially gill boxes and double twisting): Weaving, Textile finishing (especially crimping), Woven carpet and rug manufacturers, Rope/twine manufacturers, Narrow fabrics (especially braiding), Knitting (some processes, e.g. sock knitting	For all textile machinery some reductions in noise can be achieved by running the machinery no faster than is necessary, preventive maintenance programmes, and buying or hiring quieter replacements when machinery is replaced. For many processes in textiles, control of risk of hearing damage will rely on full and proper use of personal hearing protection for all of the time working in high noise supported by suitable health surveillance and appropriate information, instruction and training for workers and their supervisors.

Appendix 6. Specialist Noise Inspectors' guide to enforcing on Third-Party Noise Consultants

NOTE: Only use this guide to enforce on third party noise consultants.

Introduction

This appendix sets out a process and initial enforcement expectations for inadequate service provision by third-party noise consultants.

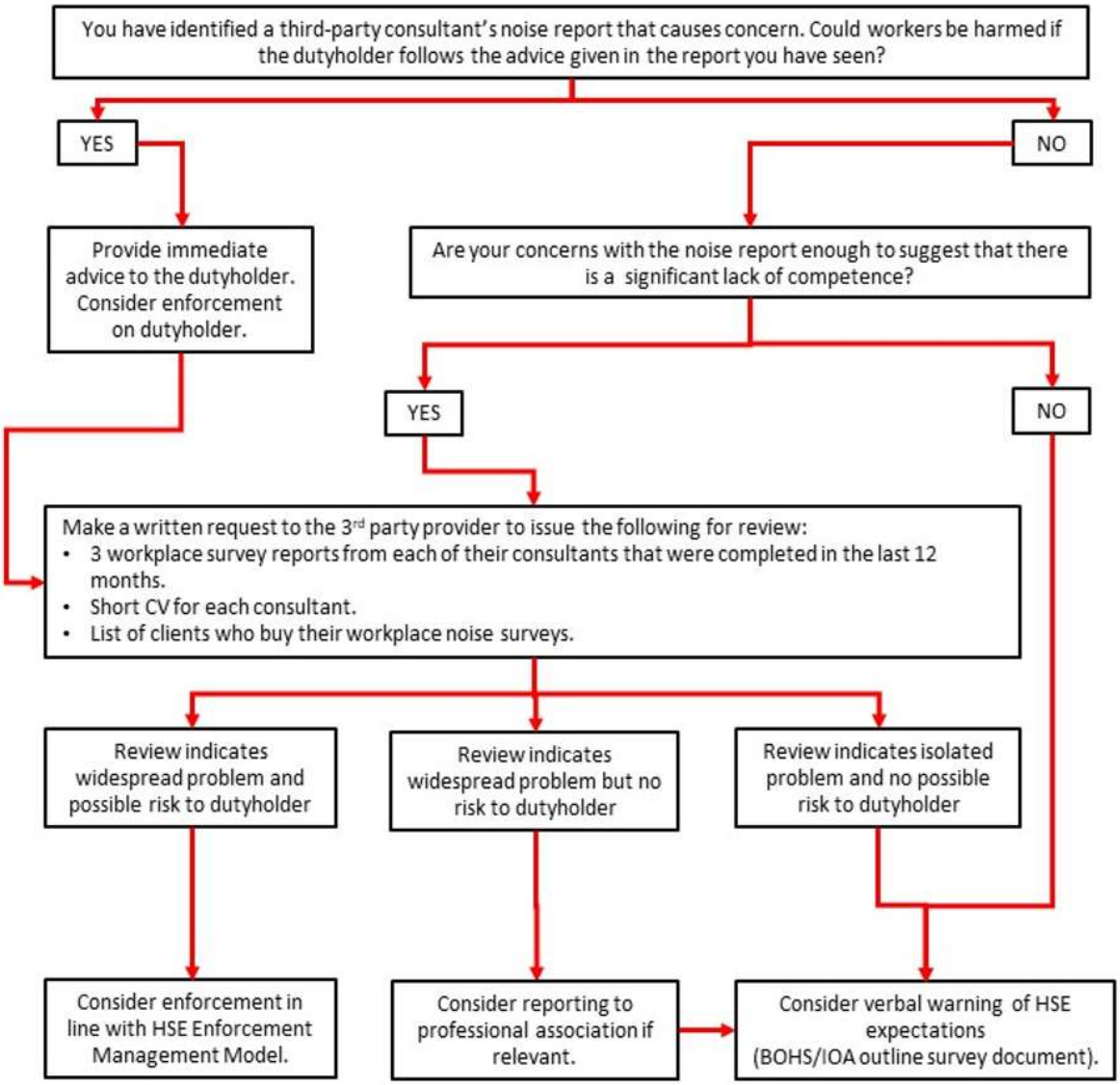
Noise and Vibration Specialists should lead or supervise any review of a third-party noise consultant.

A competent person is someone who has sufficient training and experience or knowledge and other qualities that allow them to assist the dutyholder properly. The level of competence required will depend on the complexity of the situation and the help the dutyholder needs.

Starting Point

The flow chart (Figure A6.1) explains the process for reviewing third-party noise consultants and their reports. The process applies only to reports that are a cause for concern. Specialist Noise Inspectors will have to exercise their judgment in identifying reports of consultants whose work warrants this level of examination.

FIGURE A6.1 – Flow chart for the review of third-party noise survey reports that cause concern.



Review the competency of the third-party consultant. Review; experience, level of supervision, formal training, familiarisation with standards, understanding of basic acoustic principals, and professional membership.

Assess workplace noise survey reports against the Report Matrix shown in Table 1(1). You will have to establish if the report, paid for by the duty holder, is a base level, intermediate or comprehensive report. If no written agreement is available, assess against the base level expectations unless it is clear the consultant has attempted to provide a higher-level document.

Table A6.1. Report Matrix

Report Matrix – What should be covered in a workplace noise survey report			
Areas covered	**Type of Report**		
	Base Level Report	**Intermediate Report**	**Comprehensive Report**
Assessor's details and qualifications	X	X	X
Description of work task or activity being assessed	X	X	X
Measurement results & data	X	X	X
Measurement Information	X	X	X
Calculations of exposure	X	X	X
Assessment of exposure against action values	X	X	X
Advice on hearing protection zones	X	X	X
Calculations and advice on hearing protection	X	X	X
Advice on over protection from hearing protection	X	X	X
Advice on Buying Quiet	X	X	X
Advice on who may need health surveillance	X	X	X
Advice on fit and wear of hearing protection		X	X
Advice on Information, Instruction & Training		X	X
HSE expected control measures not evident on site		X	X
Ranked list of technical noise controls			X
Noise control calculations and measurements			X
Noise control measures specific to your site			X
Advice on sourcing quieter machinery			X
Advice on practicability of control measures			X
Advice on machinery and noise maintenance			X

Base Level Report	Intermediate Report	Comprehensive Report

A detailed outline of what is expected in a workplace noise survey report can be found here.

Enforcement – Risk to the dutyholder's workers

Risk to workers due to the dutyholder following poor third-party noise consultant's advice falls into two categories; serious ill health risks associated with hearing loss, or serious safety risks associated with hearing and understanding warning signals. Table A6.2 details the risk gap for these two categories.

Table A6.2 Risk Gap Analysis for third party noise consultants

CATEGORY	APPLICATION/ INTERPRETATION	Risk Gap Analysis for EMM Table 2.2		
		BENCHMARK STANDARD	LIKELIHOOD	RISK GAP
SERIOUS HEALTH RISK (Disabling hearing loss before retirement)	Dutyholder following Poor consultancy practice exposes workers to noise at the ear, above the upper exposure action value*	Nil/Negligible	Possible	Extreme
SERIOUS SAFETY RISK (Personal Injury)	Dutyholder following Poor consultancy practice exposes a worker to a safety risk#	Nil/Negligible	Possible	Extreme

***** e.g., underspecifying hearing protection, incorrect specification of hearing protection zones, or failing to identify noise as a hazard.
# e.g., overspecification of hearing protection so audible warning signals cannot be correctly distinguished above background noise levels or failing to correctly assess the audibility of acoustic warning signals.

Guidance on establishing audibility of warning signals can be found here(2).

Enforcement against the third-party consultant should be taken under Section 3 (1) or (2) of the Health & Safety at Work etc. Act 1974;

> (*1*)*It shall be the duty of every employer to conduct his undertaking in such a way as to ensure, so far as is reasonably practicable, that persons not in his employment who may be affected thereby are not thereby exposed to risks to their health or safety.*
>
> *(2)It shall be the duty of every self-employed person who conducts an undertaking of a prescribed description to conduct the undertaking in such a way as to ensure, so far as is reasonably practicable, that he and other persons (not being his employees) who may be affected thereby are not thereby exposed to risks to their health or safety.*

In this instance, the standard is **Established**. The customer is acting on advice given in a noise survey report to control a specific health or safety risk, so the Initial Enforcement Expectation (IEE) is assessed against Table 5.1 of the Enforcement Management Model (EMM).

The **Initial Enforcement Expectation**, for both categories, is an **Improvement Notice** and Consider Prosecution of the third-party noise consultant.

Consider a **Prohibition Notice** if the third-party noise consultant consistently gives poor advice that creates a risk (e.g., to stop a consultant from practicing until they improve their competency because they consistently under-specifying hearing protection to duty holders).

Consider enforcement against the duty holder if the risk identified requires immediate action (e.g., stopping the use of a noisy machine or task where acoustic warning signals are inaudible, until more suitable hearing protection is found).

Enforcement – Poor Standard of third-party consultant reporting

You can act when a third-party noise consultant's report is poor but would not result in a risk to the dutyholder's workers.

Where a third-party noise report undermines the management of an employer's health or safety system, but does not cause a health or safety risk, it can be considered an **Administrative Arrangement**, and can be assessed against Table 5.2 of the EMM.

Table A6.3 Initial Enforcement Expectation for workplace noise reports that are poor but do not create a safety or health risk

CATEGORY	Initial Enforcement Expectation Table 5.2 of EMM		
	Descriptor	Standard	IEE
Multiple instances of poor reporting or competency that does not result in possible risk or harm	Inadequate	Interpretative	Verbal Warning
Single instance of poor reporting or competency that does not result in possible risk or harm	Minor	Interpretative	Verbal Warning

Verbal advice can be issued by email or in person. Specialist Noise & Vibration Inspectors should; formulate or supervise verbal warnings, make a record of any site visits or advice given, and lodge a record of the intervention here.

If possible, consider reporting poor performing third-party consultants to the relevant agency (e.g. BOHS, IOA, ANC, IOSH, and Trading Standards).

References

(1) Report expectations IOA website BOHS website TBC

(2) https://www.hse.gov.uk/foi/internalops/og/og-00117.pdf

Appendix 7. Limited glossary of acoustic terms

A-weighted Hearing is more or less sensitive to sound pressure at different frequencies. By applying an adjustment at each frequency we can produce a sound level that is closer to how you experience noise. A-weighting is typically used as it adjusts the sound levels at each frequency so it is closer to how you hear the noise rather than just the measured noise level.

C-weighted Used for high level measurements and peak sound pressure levels. The C-weighting correlates well with the human response to high noise levels.

dB The unit of measurement for sound. Sound is a variation in pressure and because your hearing is sensitive enough to determine differences in air pressure from a bees wing up to a Saturn rocket the pressure range is very large. The DeciBel applies a logorithic function to the sound pressure so it can be compressed into a useable scale. But because it is logarithmic it also means that calculating sound levels is not linear. For example 10dB + 10dB is not 20 dB but 13dB. Every time you double the sound energy, you add 3dB. The deciBel is named after Alexander Graham Bell.

Frequency Frequency (f) the number of times that a periodic function or vibration occurs or repeats itself in a specified time, often 1 second - cycles per second. It is usually measured in Hertz (Hz). Rumbling sounds are usually consider lower frequency while squeals are usually considered higher frequency.

Hz/kHz The measurement unit for frequency. Hertz. The hertz is equivalent to one cycle per second. Hertz are named after Heinrich Hertz.

L_{CPeak} Peak Sound Pressure Level that is C-weighted, is the maximum instantaneous sound pressure during a measurement period or noise event. It is the absolute instantaneous sound pressure during a given time interval. It should not be confused with the L_{max}.

LEP,d Daily Personal Noise Exposure (LEP,d) is the time-averaged, A-weighted noise level for a nominal 8-hour working day, also known as LEX,8h, used for assessing the noise exposure of a worker during a working day. If the noise exposure of workers varies markedly from day to day, the personal noise exposure may also be assessed over a week rather than a day and is noted as the LEP,w. If the L_{eq} (equivalent continuous sound level) is measured over 8 hours, then the L_{Aeq}, the LEP,d and the LEX,8h will all be the same.

L_{eq}/L_{Aeq} Equivalent (eq) Continuous Sound Level (L) is the average sound level. which over a given period of time has the same total energy as the fluctuating noise and is also known as the time-average sound level. When described as L_{Aeq}, the equivalent continuous sound level has been A-weighted. Each frequency of sound measured can have an L_{eq} and the average of all frequencies of sound measured can be added up to provide an L_{eq}. For most of the work we do the L_{Aeq}, and L_{Ceq} refer to a single value which is the addition of sound at all frequencies, when A-weighted or C-weighted. If you see an L_{Aeq} or L_{eq} it should also include information on how long it was measured, and how far it was from the noise source e.g. $L_{Aeq(30\ mins)}$ 87dB at the operators ear.