

TOPIC INSPECTION PACK

NOISE

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1 INTRODUCTION

This document provides guidance for inspectors on the inspection of work activities involving risks from noise, and on enforcement of the Control of Noise at Work Regulations 2005. It is supplemented by supporting information in a series of appendices.

1.1 Noise-induced hearing loss

Exposure to high levels of noise causes gradual damage to hearing, which adds to the increasing deafness that is normal as people age. As noise-induced hearing loss (NIHL) develops 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 www.hse.gov.uk/noise/demonstration.htm.

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

1.2 Scale of the problem

There are estimated to be more than a two million people in Great Britain exposed to noise at work above the lower exposure action value (see below) and more than one million exposed above the upper exposure action value. Noise-induced hearing loss is the second most common reason for occupational health-related employers' liability insurance claims.

2 THE CONTROL OF NOISE AT WORK REGULATIONS 2005

2.1 Exposure action and limit values

The duties of employers under the Noise Regulations are dependent upon the daily personal noise exposure ($L_{EP,d}$)¹ or the peak sound exposure (L_{Cpeak})² of employees and, sometimes, upon other evidence of risk from noise. This Topic Inspection Pack deals mainly with daily personal noise exposure, except for section 7 (Enforcement Guidance), where guidance is given on Prohibition Notices in relation both to daily exposure and peak noise. Any concerns relating to the peak sound exposure should be discussed with a Noise and Vibration Specialist Inspector (see section 8).

Table 1: Exposure action and limit values (Control of Noise at Work Regulations 2005)

Lower exposure action values	$L_{EP,d}$ of 80 dB,	L_{Cpeak} of 135 dB
Upper exposure action values	$L_{EP,d}$ of 85 dB,	L_{Cpeak} of 137 dB
Exposure limit values	$L_{EP,d}$ of 87 dB,	L_{Cpeak} of 140 dB
Note: When assessing personal noise exposure or peak sound exposure, no account is taken of the protection afforded by any personal hearing protection which may be being worn. However, when assessing whether compliance with the exposure limit values is achieved, such protection can be taken into account.		

¹ Daily personal noise exposure ($L_{EP,d}$) is assessed based on A-weighted sound pressure levels and durations of exposure, and expressed in decibels (dB)

² Peak sound exposure (L_{Cpeak}) is assessed based on instantaneous C-weighted peak sound pressure, and expressed in decibels (dB)

2.2 Duties of employers

HSE guidance on the Regulations can be found in Part 1 of publication L108.

Table 2: Summary of duties of employers (Control of Noise at Work Regulations 2005)

Requirement	Circumstances	Regulation
Risk assessment		
Conduct noise risk assessment, assess likely exposure and identify means required for compliance.	Lower exposure action values liable to be exceeded	Reg 5(1) Reg 5(2) Reg 5(3)
Record significant findings of risk assessment and produce action plan for compliance with Regs 6, 7 and 10	As indicated by the risk assessment	Reg 5(6)
Control of risk and exposure		
Eliminate risk from noise exposure at source or reduce it to ALARP	Any level of exposure (but subject to reasonable practicability)	Reg 6(1)
Reduce noise exposure to ALARP (programme of organisational/technical measures, other than PPE)	Upper exposure action values likely to be exceeded	Reg 6(2)
Ensure employees are not exposed above the exposure limit values		Reg 6(4)
Personal hearing protection		
Make personal hearing protectors available on employees' request	Lower exposure action values likely to be exceeded	Reg 7(1) Reg 7(4)
Provide suitable personal hearing protection	Upper exposure action values likely to be exceeded	Reg 7(2), Reg 7(4)
Designate, mark and control hearing protection zones	Upper exposure action values likely to be exceeded	Reg 7(3)
Ensure personal hearing protectors are fully and properly used	Where hearing protectors supplied under Reg 7(2)	Reg 8(1)(a)
Ensure personal hearing protectors are maintained	Where hearing protectors supplied under Regs 7(1) or 7(2)	Reg 8(1)(b)
Other		
Ensure noise controls are fully and properly used and maintained	Where action is taken to comply with Reg 6	Reg 8(1)
Place employees under suitable health surveillance (including audiometry and keeping of health records). If hearing damage is found, ensure employee is informed, review risk assessment and review control measures.	There is a risk to health from noise (likely daily personal noise exposure frequently above upper exposure action value)	Reg 9
Provide information, instruction and training	Lower exposure action values likely to be exceeded	Reg 10

3 WHEN TO FOCUS ON NOISE

Where the daily personal noise exposure is likely to be above the upper exposure action value, the risk of serious ill-health is significant and you should treat noise as a matter of evident concern (see OC 18/12).

Where noise exposure is between the lower and upper exposure action values there is a lesser but still quantifiable risk, and employers should be encouraged to take action to reduce risks and exposures so far as is reasonably practicable.

Many of the activities listed in Appendix E will result in daily personal exposures above the upper exposure action value unless exposure times are very short.

The information in Section 4 below may help you decide if the upper exposure action value is likely to be exceeded.

As a **rough guide**, it is likely that the upper exposure action value ($L_{EP,d}$ of 85 dB) will be exceeded if:

- You have to raise your voice 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 two hours;

4 RISK AND EXPOSURE ASSESSMENT

The employer's risk assessment should establish whether the lower or upper exposure action value is likely to be exceeded and, if this is the case, the risk assessment should result in an action plan for control of risk and compliance with the Noise Regulations. For most occupational noise exposures the $L_{EP,d}$ will be the measure of exposure of most importance.³

The absence of a suitable risk assessment should not preclude the taking of action on noise since the employer's risk assessment is only one piece of information that an inspector can use to form an opinion on whether an action value is likely to be exceeded. An inspector's own observations and knowledge, supplemented perhaps by sample noise measurements, can be used to form an opinion on whether there is a risk to be managed.

When estimating $L_{EP,d}$ you need information on the noise level or levels to which employees are exposed, and the duration of the exposure(s) during the working day. You can:

- refer 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;
- draw comparison with your experience of noise exposures and records of noise risk assessments in similar premises;

³ The peak noise level can be significant for some highly impulsive or impactive sources, such as explosives, firearms, drop forges and some punch presses. L108 Appendix 2 contains further information, but a Noise and Vibration Specialist Inspector should be consulted if enforcement action for peak noise is envisaged.

- use a sound level meter (measure the A-weighted L_{eq}), determine the typical exposure duration and estimate the exposure using the ready reckoner (<http://www.hse.gov.uk/noise/dailyexposure.pdf>) or calculator (<http://www.hse.gov.uk/noise/calculator.htm>) on the noise section of the HSE website; or
- use the 'rough guide' above to decide whether the upper exposure action value is likely to be exceeded.

Note that when determining daily personal noise exposures, for comparison with the upper and lower exposure action values, no account should be taken of the effect of any personal hearing protection.

The noise risk assessment (required by Regulation 5) is not an end in itself, but should result in an action plan to achieve compliance with the regulations. Where there is evidence of failure to comply with the Noise Regulations, formal enforcement of Regulation 5 alone will not usually be the appropriate action.

5 CONTROL AND MANAGEMENT OF RISK

5.1 Control by organisational or technical measures

The noise controls described in the Tables in Appendix E have been established as good practice 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) through interventions to ensure that the employer adopts suitable controls to eliminate the risk from noise, or to make the exposure as low as is reasonably practicable (ALARP).

5.2 Personal hearing protection

Although personal hearing protection (earmuffs or ear plugs) are relied on extensively by employers, their use should only be relied on as a short-term measure until the noise has been controlled by technical or organisational means. Long-term use of hearing protection is appropriate to protect against the residual risk if the upper exposure action value is still likely to be exceeded after the exposures have been reduced to as low a level as is reasonably practicable (ALARP).

5.3 Health surveillance

A suitable health surveillance programme (audiometry) must be in place for employees who are at risk from noise (Regulation 9). HSE's guidance (L108) states that this is expected where exposures frequently exceed the upper exposure action value. 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. A health record should be kept for each employee under health surveillance. The employer should also have a clear policy for the future management of affected employees.

Any concerns over:

- the quality of service provided by an occupational health provider or the feedback provided to the employer;

- an employer’s failure to take account of recommendations and/or information supplied by the health surveillance provider on management of affected employees; or
- inadequate health records,

should be referred to an Occupational Health Inspector.

6 RISK CONTROL INDICATOR

The risk control indicator (RCI) used to assess an employer’s performance in managing risks from noise is reproduced from Operational Guidance in Table 3. Not all the elements of the risk control indicator will be relevant in all circumstances.

Table 3: Risk control indicator

Noise	Has exposure to noise been reduced to ALARP by organisational and technical means (or is a viable plan in place to achieve this); is any continuing and residual risk managed through providing suitable personal hearing protection, with systems to ensure full and proper use; are management arrangements in place including a positive purchasing policy for quiet equipment; is a suitable health surveillance programme in place?
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The risk control indicator assessment scale is reproduced in Table 4.

Table 4: Risk control indicator scale

Risk Control Indicators – Assessment Scale	
Each risk control indicator should be assessed against the following 1-6 scale.	
1	High standards. Some aspects meet best practice.
2	Good standards. Minimum legal requirements have been met.
3	One or more minor shortcomings. As these shortcomings are not serious, they can be dealt with informally with oral advice.
4	Standards are patchy. It is necessary to address one or more shortcomings by giving formal instructions for remedial action to be taken. Formal instructions may be implemented by, e.g., obtaining a verbal undertaking from the company to take specific action, sending a letter, or physical removal / disposal of items.
5	Standards generally unsatisfactory. Typically, there is at least one contravention that gives rise to a discernible risk gap.
6	Standards unacceptable. Unless applying the EMM identifies duty holder factors that provide strong mitigation, issuing a notice and / or prosecution is likely to be appropriate.

The aide-mémoire for noise topic inspection (Appendix A) may be used to ensure the necessary information is gathered to assess performance against the above indicator.

7 ENFORCEMENT GUIDANCE

When applying the Enforcement Management Model (EMM) to noise, the benchmark is set at ‘Nil/Negligible risk of serious health effect’ (see Appendix B). This benchmark is in line with HSE’s objective for the elimination of noise-induced hearing loss. Appendix B shows that the

risk gap is 'substantial' for unprotected daily personal exposures above 80 dB and 'extreme' above 85 dB. The Initial Enforcement Expectation is an Improvement Notice requiring control of exposure where exposure exceeds the upper exposure action value **and** exposure is not ALARP (Reg 6(2)).

For exposures between the lower and upper exposure action values the Initial Enforcement Expectation is a letter where it is reasonably practicable to reduce the risk further (Reg 6(1)); and an Improvement Notice where a dutyholder has failed to provide hearing protection at any employee's request.

The current Noise Regulations were introduced in 2006, however there have been regulations on noise at work since 1990 and information and guidance on noise control has been available since many years before that. **Formal enforcement action should therefore be taken where non-compliance is encountered, unless there are strategic or duty holder factors indicating that this would not be appropriate.**

The emphasis for enforcement of the Noise Regulations should be to secure elimination of risk from noise, or reduction of exposure and risk to ALARP, by organisational and technical measures, where the exposures are likely to exceed the upper exposure action value. Enforcement of regulation 6(2) will usually be appropriate, together with enforcement of Regs 7 to 10 as required.

In many cases inspectors will find Appendix E helpful for identifying risk control measures appropriate to the work activity. Inspectors should look out for updates in the guidance in Appendix E, and for new industry-specific guidance, or should obtain advice from Noise and Vibration Specialist Inspectors.

Although the regulations provide for a limit on daily personal exposure to noise, it is not appropriate to concentrate formal enforcement solely on this aspect. Where the limit value is being exceeded it is preferable to secure a reduction in exposure to ALARP through enforcement of regulation 6(2) where applicable, and the immediate provision and use of hearing protection through regulations 7(2) and 8(1)(a). Where daily personal exposures appear to be very high (in the region of 100 dB or above) there may be some doubt as to whether personal hearing protection is capable of allowing the exposure limit value to be met, and inspectors should seek advice from a Noise & Vibration Specialist Inspector.

Prosecution should be considered where the extent of risk, and strategic and duty holder factors, indicate such action would meet the principles and expectations of the HSC enforcement policy statement. Furthermore, prosecution should be considered where the *Control of Noise at Work Regulations 2005* set a defined standard for risk control measures (i.e. where the duty is not qualified by "reasonably practicable"), and this standard has not been met. Examples of this include where suitable personal hearing protection has not been supplied to employees whose daily personal noise exposure is likely to be at or above the upper exposure action values, or where there has been a failure to maintain personal hearing protection or anything provided for the purposes of noise control. It is advised that a Noise and Vibration Specialist Inspector is consulted if prosecution is proposed.

7.1 Initial Enforcement Expectation

The following guidance to Initial Enforcement Expectations has been prepared on applying the EMM framework to health risks from noise. It refers to Initial Enforcement Expectations, prior to consideration of any dutyholder and strategic factors that may modify the enforcement decision.

Table 5: Initial enforcement expectation – Improvement Notices

	Situation	Initial Enforcement Expectation
1 (Control)	Exposure is likely to exceed the upper exposure action value ($L_{EP,d}$ of 85 dB) and it is reasonably practicable to reduce the exposure by organisational and/or technical measures. See L108 paras 65-69.	Improvement Notice HSWA S.2 Noise Regulations r.6(2) <i>Require a programme of work to reduce exposures to ALARP</i>
2 (Control)	Exposure is likely to exceed the lower exposure action value ($L_{EP,d}$ of 80 dB) but be below upper exposure action value ($L_{EP,d}$ of 85 dB) and it is reasonably practicable to eliminate or reduce the risk, e.g. by changing the work process. See L108 paras 65-66.	Letter HSWA S.2 Noise Regulations r.6(1) <i>Require the necessary changes</i>
3 (Control)	Exposure is above the exposure limit value ($L_{EP,d}$ of 87 dB). See L108 paras 78-80.	Consider whether exposure is ALARP – if not see item 1. If personal hearing protection has not been supplied, see item 5. If personal hearing protection has been supplied but is not being fully and properly used, see item 6. See also item 3 in Table 6 (Prohibition Notices)
4 (Hearing protection – supply of)	Exposure is likely to exceed the upper exposure action value ($L_{EP,d}$ of 85 dB) and no hearing protection provided or hearing protection is not suitable. See L108 paras 82-87.	Improvement Notice HSWA S.2 Noise Regulations r.7(2), 7(4) <i>Require provision of suitable hearing protection</i> Consider prosecution
5 (Hearing protection – supply of)	Exposure is likely to exceed the lower exposure action value ($L_{EP,d}$ of 80 dB) but be below upper exposure action value ($L_{EP,d}$ of 85 dB), and no personal hearing protection is provided. See L108 paras 82-87.	Letter (Improvement Notice if workers have requested hearing protection and it has not been provided). HSWA S.2 Noise Regulations r.7(1), 7(4) <i>Require personal hearing protection is supplied to employees who request it</i> Consider whether breach originates from a failure to provide II&T on availability of hearing protection, see item 11.

	Situation	Initial Enforcement Expectation
6 (Hearing protection – use of)	Personal hearing protection is not being fully or properly used where it has been supplied under r.7(2). <i>See L108 para 98.</i>	Improvement Notice HSWA S.2 Noise Regulations r.8(1)(a) <i>Require full and proper use of personal hearing protection</i> Consider whether breach originates from a failure to provide II&T on use etc. of hearing protection, see item 11, and the need for hearing protection zones, see item 7. Consider prosecution
7 (Hearing protection zones)	Hearing protection zones (HPZ) are not designated or adequately signed, i.e. in areas of the workplace where work is going on during which particular employees must use hearing protection (r.7(2)) or areas of the workplace where the upper exposure action values would be likely to be exceeded if personnel spent a significant portion of their working day within them. <i>See L108 para 89.</i>	Letter HSWA S.2 Noise Regulations r.7(3) <i>Require clearly marked hearing protection zones and management of access</i> Improvement Notice if of the opinion that lack of HPZ is likely to lead to unprotected daily noise exposure above upper exposure action value, but consider whether action under r.7(2) or r.8(1), see items 4 and 6, is (more) appropriate.
8 (Hearing protection zones)	The use of personal hearing protection within designated hearing protection zones (HPZ) is not being observed and/or access to zones is not restricted where practicable. <i>See L108 para 91.</i>	Improvement Notice HSWA S.2 Noise Regulations r.7(3) (likely also that action under r.7(2) or r.8(1) is appropriate, see items 4 and 6) <i>Require that access to HPZ is restricted and no employee enters zone unless wearing personal hearing protectors</i>

	Situation	Initial Enforcement Expectation
9 (Maintenance and use of equipment)	Noise control equipment provided (e.g. enclosures, silencers) is not fully and properly used and/or is not adequately maintained; Personal hearing protection provided is not adequately maintained. <i>See L108 paras 95-101.</i> (for full and proper use of personal hearing protection, see item 6)	Improvement Notice HSWA S.2 Noise Regulations r.8(1) <i>Require full and proper use and/or maintenance of noise control equipment provided, and maintenance of hearing protection provided, as relevant</i> Consider whether breach of failure to use noise control equipment originates from a failure to provide relevant II&T, see item 11. Consider prosecution where risk gap is extreme, i.e. exposure likely to exceed 85 dB.
10 (Health surveillance)	Exposure frequently is likely to exceed the upper exposure action value ($L_{EP,d}$ of 85 dB), or employees are otherwise at risk, and; (i) there is no health surveillance, or health surveillance systems inadequate; or (ii) the employer is failing to act on the results. <i>See L108 paras 105-106.</i>	Improvement Notice Noise Regulations r.9(1) or 9(4) <i>Require a suitable system of health surveillance or require appropriate action in the event of identifiable hearing damage</i> Consider whether breach originates from a failure to provide II&T on noise risks/health surveillance (e.g. employees not attending appointments), see item 11. Inspectors are advised to consult an OHI if considering enforcement action under 9(1) where the adequacy of health surveillance is the issue, or under r.9(4)
11 (Information, instruction & training)	Exposure is likely to exceed the lower exposure action value ($L_{EP,d}$ of 80 dB), employees have not been provided with suitable and sufficient information, instruction and training. <i>See L108 paras 115-119.</i>	Letter (Improvement Notice if lack of II&T is implicated in breaches of r.7(1), 8(1) or 9, see items 5, 6, 9 and 10) HSWA S.2 Noise Regulations r.10 <i>Require suitable and sufficient information, instruction and training</i>
12 (Risk assessment)	Exposure appears significant (e.g. <i>Rough guide, see section 3</i>). No risk assessment or risk assessment is not suitable and sufficient and employer taking no action.	Improvement Notice HSWA S.2 Noise Regulations r.5 It will usually be appropriate also to enforce other regs within the Noise Regulations.

Table 6: Initial enforcement expectation – Prohibition Notices

	Situation	Initial Enforcement Expectation
1	Exposure is likely to exceed upper exposure action value ($L_{EP,d}$ of 85 dB) (demonstrating risk), and HSE sector has agreed with the industry that the work method is no longer acceptable and will be prohibited where seen.	Prohibition Notice HSWA S.2 Noise Regulations r.6(1)
2	Transient site (e.g. construction). Exposure is likely to exceed the upper exposure action value ($L_{EP,d}$ of 85 dB) and no personal hearing protection is provided.	Prohibition Notice HSWA S.2 Noise Regulations r.7(2)
3	Exposure is above the exposure limit value ($L_{EP,d}$ of 87 dB, L_{Cpeak} of 140 dB), dutyholder cannot supply personal hearing protection for immediate control of risk, and work likely to continue under these conditions unless inspector intervenes.	Prohibition Notice HSWA S.2 Noise Regulations r.6(4) <i>Inspectors are advised to consult a Noise & Vibration Specialist Inspector if considering issuing a Prohibition Notice in this situation</i>

8 SPECIALIST SUPPORT

Specialist advice and support for inspectors is available and you should always ask for advice if in doubt.

Noise and Vibration Specialist Inspectors can:

- advise on reasonably practicable control measures, particularly in complex or novel situations, but also whenever advice is required;
- provide evidence of daily personal noise exposure ($L_{EP,d}$), particularly where there are highly variable exposure patterns, and evidence of high peak noise exposure (in some situations this will be provided by HSL staff⁴);
- advise on compliance with the Noise Regulations; and
- provide expert evidence.

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

- advise on the quality and suitability of health surveillance services;
- provide clarification on the requirements of the Noise Regulations relating to health surveillance; and
- advise on the appropriate management of employees diagnosed with NIHL or otherwise at particular risk from noise.

⁴ Inspectors wishing to call on support from HSL on matters relating to noise should in the first instance contact a Noise & Vibration Specialist Inspector, who will act as Technical Customer for any such work, see Science and Innovation Programme - Guide to Procedures - Chapter 4 - Procedures for commissioning support (http://intranet/science/mainstream_st_proc/chapter4.htm).

Occupational Health Inspectors and Medical Inspectors can also provide expert evidence.

Lists of people providing specialist support to inspectors can be found via the “Specialist Support” link on the HSE Intranet home page.

APPENDIX A

Intervention aide-mémoire

Table A1 Topics to consider during noise inspections, and applicable legislation and guidance

Issue	Legislation	Expectation	References and related guidance
Noise risk management system	HSWA S.2 Noise Regulations r.6 Noise Regulations r.8	Does the employer demonstrate a commitment to minimising risks from noise by (as appropriate): <ul style="list-style-type: none"> • allocating responsibility to a senior manager; • a suitable and sufficient risk assessment and action plan (see below); • 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; • a system for preventive and reactive maintenance of noisy machinery and work equipment; • a system for preventive and reactive maintenance of noise control equipment (silencers, noise enclosures, refuges, etc.); • provision of appropriate information, instruction and training (see below); 	
Risk assessment and action plan	HSWA S.2 Noise Regulations r.5	Has the employer made a suitable and sufficient risk assessment, i.e.: <ul style="list-style-type: none"> • identified employees at risk from noise; • made a valid estimate of their exposures, compared with the lower and upper exposure action values and (taking account of any hearing protection) the exposure limit value; • identified the important sources of noise and considered the available and appropriate options for controlling risk; • produced a suitable action plan to control the risk (and comply with Regs 6 – 10) with clear priorities and timescales; • made arrangements to monitor progress against the action plan; • demonstrated that noise risks are considered at the design and specification stage for new processes and projects; • made suitable arrangements for review of the assessment and action plan. 	L108 Part 2 L108 Appendix 1 INDG62(rev1)

Issue	Legislation	Expectation	References and related guidance
Noise exposure control	HSWA S2 Noise Regulations r.6(1) Noise Regulations r.6(2) Noise Regulations r.6(3) Noise Regulations r.6(4)	<p>Where exposure is likely to exceed the upper exposure action value, has the employer reduced exposure and risk to ALARP by:</p> <ul style="list-style-type: none"> • identifying and adopting reasonably practicable measures for eliminating or reducing noise exposures using technical or organisational means (see general guidance and sector-specific good practice in Appendix E to judge reasonable practicability); • or have they plans to do so, with an appropriate timescale. <p>Has the employer 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)</p>	L108 Parts 3 and 4 Appendix E
Workplace design for reduced noise exposure	HSWA S2 Noise Regulations r.6(1) Noise Regulations r.6(2) Noise Regulations r.6(3)	<p>In addition to these measures outlined in Appendix E, in general there will always be benefits to be gained in considering and applying general principles of workplace design for reducing noise exposure. For example:</p> <ul style="list-style-type: none"> • appropriate use of acoustic absorption within buildings can reduce or limit the effects of reflected sound (specialist help will be needed to put this in to effect); • careful planning could segregate noisy machines from other areas where quiet operations are carried out; • the number of employees working in noisy areas should be kept to a minimum; • screens, barriers or walls can be placed between the source of the noise and the people to stop or reduce the direct sound; • noise refuges can be a practical solution in situations where noise control is very difficult, or where only occasional attendance in noisy areas is necessary; • increasing the distance between a person and the noise source can reduce noise exposure considerably. 	<p>Workplace design (L108 paragraphs 198-200, 212-219, 234) (http://www.hse.gov.uk/noise/goodpractice/workplacedesign.htm)</p> <p>Example: Coating pans (http://www.hse.gov.uk/noise/casestudies/coatingpans.htm)</p> <p>Example: Flexible acoustic screening material, Sound Solutions #4 (http://www.hse.gov.uk/noise/casestudies/soundsolutions/)</p> <p>Example: Acoustic refuges, Sound Solutions #11 (http://www.hse.gov.uk/noise/casestudies/soundsolutions/)</p> <p>Example: Use of absorption in a noise control programme, Sound Solutions #46 (http://www.hse.gov.uk/noise/casestudies/soundsolutions/)</p>

Issue	Legislation	Expectation	References and related guidance
Selection of tools and machinery	HSWA S2 Noise Regulations r.6(1) Noise Regulations r.6(2) Noise Regulations r.6(3)	<p>Employers should demonstrate a positive purchasing policy which makes sure noise is taken into account when selecting machinery.</p> <p>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, employers should:</p> <ul style="list-style-type: none"> • ask about likely noise levels for the intended use(s); • check that manufacturers' noise data is representative of likely noise levels for the intended use(s); • use the noise information to compare machines before making the final choice; • look for warnings in the instruction book to see if particular uses of the tool or machines are likely to cause unusually high noise; • be aware that even where manufacturers declare that their tools or machines produce less than 70 dB, levels may sometimes be much greater in your workplace. 	<p>Low noise machines (L108 paragraphs 72-74, 201-202) (http://www.hse.gov.uk/noise/goodpractice/lownoisemachines.htm)</p> <p>Noise at work – advice for employers - http://www.hse.gov.uk/pubns/indg362.pdf</p> <p>L108 Part 4: Selecting Quieter Tools and Machinery</p>
Limiting exposure duration	HSWA S2 Noise Regulations r.6(1) Noise Regulations r.6(2) Noise Regulations r.6(3)	<p>Restriction of the time spent in noisy areas, or doing noisy tasks, can be effective in reducing noise exposures, as can ensuring that noisy devices are only used when they are actually needed.</p> <p>Where some employees do noisy jobs all day or week, and others do quieter ones, job rotation should be considered. This might need you to train employees to carry out other jobs. This system will reduce the noise exposure of some employees while increasing that of others, so care and judgement is needed. Employees will need to be rotated away from noisy jobs for a significant proportion of time to make an appreciable difference to their daily exposure.</p> <p>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.</p>	<p>HSE Noise exposure ready-reckoner - http://www.hse.gov.uk/noise/dailyexposure.pdf</p> <p>HSE noise exposure calculators - http://www.hse.gov.uk/noise/calculator.htm</p>

Issue	Legislation	Expectation	References and related guidance
Hearing Protection	HSWA S2 Noise Regulations r.7	<p>(a) Where exposure to noise is likely to exceed the lower exposure action value (80 dB) but is below the upper exposure action value (85 dB):</p> <ul style="list-style-type: none"> • Are employees provided with suitable hearing protectors on their request? <p>(b) Where exposure to noise is likely to exceed the upper exposure action value (85 dB):</p> <ul style="list-style-type: none"> • Are employees provided with suitable hearing protectors? • Are they fully and properly used? Is supervision adequate? • Are hearing protection zones appropriately designated and signed and managed? • Are hearing protectors properly stored and adequately maintained? <p>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.</p> <p>Personal hearing protection use should be targeted at particular noisy jobs and activities. It must be supplied by the employer to any employee whose daily personal noise exposure is likely to exceed 85 dB, or who is likely to be exposed to peak sound pressure levels above 137 dB. The employee must use the protection provided. The employer should ensure that, through the use of hearing protection, the employee's effective noise exposure is reduced at least to below the upper exposure action values (85 dB for daily exposure, 137 dB for peak noise).</p> <p>Important factors to consider in the selection and use of hearing protection include:</p> <ul style="list-style-type: none"> • Types of protector, and suitability for the work being carried out; • Noise reduction (attenuation) offered by the protector, including taking account of 'real-world' factors, and also ensuring that not too much protection is provided; • Compatibility with other safety equipment; • Pattern of the noise exposure; • The need to communicate and hear warning sounds; • Environmental factors such as heat, humidity, dust and dirt; • Cost of maintenance or replacement; • Comfort and user preference; • Medical disorders suffered by the wearer. <p>The use of personal hearing protection should be managed through the provision of appropriate information, instruction and training for employees, supervision and the use of appropriately defined and demarcated Hearing Protection Zones.</p>	<p>L108 Part 5</p> <p>L108 Appendix 3</p> <p>Hearing protection – general advice - http://www.hse.gov.uk/noise/hearingprotection.htm</p> <p>HSE hearing protection calculator - http://www.hse.gov.uk/noise/hearingcalc.xls</p> <p>Hearing protection – Over-protection (L108 paragraphs 287 – 288) (http://www.hse.gov.uk/noise/goodpractice/hearingoverprotect.htm)</p> <p>Hearing protection – real-world factors (L108 paragraphs 282 – 286) (http://www.hse.gov.uk/noise/goodpractice/hearingrealworld.htm)</p> <p>Hearing protection – advice on issuing (L108 paragraphs 301 – 305) (http://www.hse.gov.uk/noise/goodpractice/hearingadvice.htm)</p> <p>Noise at work – advice for employers - http://www.hse.gov.uk/pubns/indg362.pdf</p> <p>Protect your hearing or lose it (advice for employees) - http://www.hse.gov.uk/pubns/indg363.pdf</p>

Issue	Legislation	Expectation	References and related guidance
Information, instruction and training	HSWA S2 Noise Regulations r.6(3)(d) Noise Regulations r.10 HSWA S7	<p>Has the employer provided employees at risk from noise with adequate information, instruction and training on:</p> <ul style="list-style-type: none"> • 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 and when in a HP 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. <p>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 being fully and properly used, that noise control equipment is being used, and that procedures for low noise working are being followed.</p>	<p>What do I need to tell my employees? - http://www.hse.gov.uk/noise/tell.htm</p> <p>Employee and safety representatives - http://www.hse.gov.uk/noise/safetyrep.htm</p> <p>Noise at work – advice for employers - http://www.hse.gov.uk/pubns/indg362.pdf</p> <p>Protect your hearing or lose it (advice for employees) - http://www.hse.gov.uk/pubns/indg363.pdf</p>

APPENDIX B

Enforcement Management Model (EMM)

Application to noise

Introduction

1. This Appendix to the Noise Topic Pack provides guidance to inspectors on applying the EMM to health risks from noise. It supersedes and replaces OC 246/33. General guidance on applying the EMM principles to health risks, including occupational health descriptors is in [OC 130/5](#).

2. 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 can be considered as a level at which the onset of hearing disability occurs. Evidence has shown that at this level of hearing loss there is a definite interference with social function (Medical Research Council National Hearing Survey, 1989). This level of hearing loss therefore represents a **serious health effect**.

3. Permanent 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. However, from the available evidence the peak noise exposures which may result in possible, probable or remote likelihood of a serious health effect cannot be accurately predicted. It is therefore not currently possible to apply the EMM to acoustic trauma caused by high peak sound pressures.

Benchmark

4. 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 (25 dB or greater loss averaged over 1, 2 and 3 kHz) before retirement age. This benchmark standard is considered to be met if there is full compliance with the Noise Regulations.

Risk matrix

5. 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' standard. 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 aging. The data used relates to a normal unselected population.

6. At the age of 60, 25 - 30% of the population are likely to have a 25 dB or greater hearing loss from aging alone, and with a daily personal exposure ($L_{EP,d}$) of 80 dB this proportion is assumed not to increase. Exposure below the lower exposure action value of 80 dB therefore represents a '**nil/negligible**' risk of the serious health effect from occupational exposure. At a daily personal exposure of 85 dB (the upper exposure action value)

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 aging alone⁵. At a daily personal exposure of 92 dB 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 aging alone⁶.

DESCRIPTOR	APPLICATION/ INTERPRETATION	LIKELIHOOD			
		PROBABLE	POSSIBLE	REMOTE	NIL/ NEGLIGIBLE
SERIOUS HEALTH EFFECT	NOISE-INDUCED HEARING LOSS 25 dB+	$L_{EP,d}$ of 92 dB and above	$L_{EP,d}$ of 85-91 dB	$L_{EP,d}$ of 80-84 dB	$L_{EP,d}$ below 80 dB

Risk Gap

7. The risk matrix, when used with Table 2.1 in the EMM, will indicate an **extreme** risk gap for any daily personal exposure above the upper exposure action value (85 dB). An Improvement Notice is therefore the Initial Enforcement Expectation where daily exposure is likely to exceed 85 dB **and** there is a breach of the Regulations (e.g. risk/exposure has not been reduced to ALARP, suitable hearing protection has not been provided). For enforcement guidance see section 8 of the main part of this Topic Inspection Pack.

8. For a daily exposure between the lower and upper exposure action values (80 to 85 dB) there is a **substantial** risk gap. As the matrix is based on an 'Interpretive' standard this should result in an Initial Enforcement Expectation of a letter/inspection form, where the Regulations have not been complied with (e.g. it is reasonably practicable to reduce risk further by straightforward and low cost actions).

9. The primary question when considering enforcement action is not only whether the exposure action values are exceeded but whether the exposure and risk are ALARP. When making decisions about the risk gap inspectors should consider formal enforcement action where information on likely exposures and established industry good practice for noise risk control (see Appendix E) suggests that the exposure is likely to be above the upper exposure action value and is not ALARP.

Relevant standards

10. The principal standards are:

Title	Authority
The Control of Noise at Work Regulations 2005	Defined
L108 'Controlling noise at work', Health and Safety Executive, 2005	Established
Risk matrix in HSE's Noise Topic Inspection Pack, Appendix B	Interpretive
Robinson DW (1988) Tables for the estimation of hearing impairment due to noise for otologically normal persons and for a typical unscreened population as a function of age and duration of exposure. HSE Contract Research Report No. 2/1988	Interpretive
Davies A (1989) Medical Research Council National Hearing Survey 1989	Interpretive

⁵ 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.

⁶ 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 C

Example Improvement Notices

The enforcement guidance table in section 7 of this Inspection Topic Pack can be used to determine the initial enforcement expectation and which of the following example Improvement Notices might be appropriate. Notices must be tailored to the circumstances found on site.

Notice 1. Elimination or control of exposure to noise

This Notice is appropriate for situation 1 described in Table 5 of the Enforcement Guidance section of the Noise Topic Pack, i.e.:

- exposure is likely to exceed the upper exposure action value ($L_{EP,d}$ of 85 dB); and,
- it is reasonably practicable to reduce the exposure by organisational and/or technical measures.

Contravention

*Health & Safety at Work etc. Act 1974, Section 2(1)
Control of Noise at Work Regulations 2005, Regulation 6(2)*

Reason

*Persons employed by you engaged in [**work activity, process or machine**] are exposed to noise such that their daily personal exposure is likely to be at or above the upper exposure action value and you have failed to establish and implement a programme of organisational and technical measures to reduce their exposure to noise to as low a level as is reasonably practicable.*

When drafting a Schedule for this Notice, inspectors should consider the most appropriate actions for compliance, taking account of the principles of prevention, the actions listed in Regulation 6(3) and established industry good practice (see Appendix E).

Schedule

In order to comply with this Notice you should take the following action:

1. *Determine those organisational and technical measures appropriate to the activity that will reduce your employees' noise exposures to as low a level as is reasonably practicable [**Optional: including consideration of (specific control measure(s) e.g. from Appendix E of Noise Topic Pack)**];*
2. *Determine what arrangements are required to ensure the effective organisation, implementation, monitoring and review of the measures;*

AND

3. *Implement those arrangements.*

Or alternatively, comply by any other no less effective means.

Notice 2. Hearing protection (not supplied)

This Notice is appropriate for situation 4 described in Table 5 of the Enforcement Guidance section of the Noise Topic Pack, i.e.:

- exposure is likely to exceed the upper exposure action value ($L_{EP,d}$ of 85 dB); and
- no personal hearing protection has been provided or hearing protection is not suitable.

note: if personal hearing protection is not being worn by employees it will be necessary to establish whether the breach lies in failure to supply (Regulation 7), in which case this notice is appropriate, or in failure to ensure it is worn once supplied (Regulation 8), in which case see notice 3.

Contravention

*Health & Safety at Work etc. Act 1974, Section 2(1)
Control of Noise at Work Regulations 2005, Regulations 7(2) & 7(4)*

Reason

You have failed to provide suitable personal hearing protectors to those of your employees whose daily personal noise exposure is likely to be at or above the upper exposure action value.

Schedule

In order to comply with this Notice you should take the following action:

- 1. You should provide suitable personal hearing protectors to all employees whose daily personal noise exposure is likely to be at or above the upper exposure action value of 85 dB.*
- 2. In selecting suitable hearing protectors to provide you should:*
 - (a) ensure that the protectors can be expected if fully and properly worn to reduce the effective daily personal noise exposure of the employees at least to below the upper exposure action value, and*
 - (b) take account of;*
 - (i) compatibility with clothing and other safety equipment*
 - (ii) the pattern of the noise exposure*
 - (iii) the need to communicate and hear warning sounds*
 - (iv) environmental factors such as heat, humidity, dust and dirt*
 - (v) comfort and user preference*
 - (vi) medical disorders suffered by the user*

Or alternatively, comply by any other no less effective means.

Notice 3. Hearing protection (not being worn)

This Notice is appropriate for situation 6 described in Table 5 of the Enforcement Guidance section of the Noise Topic Pack, i.e.:

- personal hearing protection has been supplied under r.7(2) (i.e. to employees whose daily personal noise exposure is likely to be at or above the upper exposure action value, an $L_{EP,d}$ of 85 dB); and,
- it is not being fully or properly used (fully meaning worn all the time when required to be worn; properly meaning properly fitted and used).

note 1: if personal hearing protection is not being worn by employees it will be necessary to establish whether the breach lies in failure to supply (Regulation 7), in which case see notice 2, or in failure to ensure it is worn once supplied (Regulation 8), in which case this notice is appropriate. There is no duty on the employer under Regulation 8(1) where personal hearing protection has not been supplied in the first place.

note 2: you should determine whether failure on the part of employees to wear hearing protection arises in part from failure to provide information, instruction and training as required under Regulation 10(1); and consider enforcement action.

note 3: you should further consider whether the setting up of hearing protection zones would be helpful to the employer in managing the use of hearing protection.

Contravention

Health & Safety at Work etc. Act 1974, Section 2(1)

Control of Noise at Work Regulations 2005, Regulation 8(1)(a)

[if appropriate, Control of Noise at Work Regulations 2005, Regulation 10(1)]

[if appropriate, Control of Noise at Work Regulations 2005, Regulation 7(3)]

Reason

You have failed to ensure that personal hearing protection provided by you to those employees whose daily personal noise is likely to be at or above the upper exposure action value is being fully and properly used by them.

[if appropriate You have failed to provide those employees with suitable and sufficient information instruction and training in the use of personal hearing protection.]

[if appropriate You have failed to designate demarcate and identify appropriate areas within your workplace as Hearing Protection Zones.]

Schedule

In order to comply with this Notice you should take the following action:

1. *Devise effective arrangements to ensure that employees to whom you have provided personal hearing protection because their daily personal noise exposure is likely to be at or above the upper exposure action value make full and proper use of the personal hearing protection. In devising your arrangements you should consider the following:*

- a) *a clear commitment to the use of hearing protection in your safety policy;*

- b) signs and warning notices to ensure awareness of where and when hearing protectors should be used, including the designation, demarcation and identification with appropriate signs of Hearing Protection Zones;*
- c) clearly set out responsibilities on who is responsible for the hearing protection programme, for making arrangements for ensuring users know where and how to use protectors and for their distribution;*
- d) information, instruction and training for all employees including the risks to their hearing, how to obtain and make full and proper use of hearing protection;*
- e) records which should include details of the issue of hearing protectors and any problems people encounter when using them;*
- f) monitoring, supervision and the taking of remedial action if employees are not wearing hearing protection fully or properly.*

AND

2. Implement those arrangements

Or alternatively, comply by any other no less effective means.

Notice 4. Hearing protection zones not being observed

This Notice is appropriate for situation 8 described in Table 5 of the Enforcement Guidance section of the Noise Topic Pack, i.e. the use of personal hearing protection within designated hearing protection zones (HPZ) is not being observed and/or access to zones is not restricted where practicable.

note: you should determine whether failure on the part of employees to observe the requirements of Hearing Protection Zones arises in part from failure to provide information, instruction and training as required under Regulation 10(1); and consider enforcement action.

Contravention

Health & Safety at Work etc. Act 1974, Section 2(1)

Control of Noise at Work Regulations 2005, Regulation 7(3)

[if appropriate, Control of Noise at Work Regulations 2005, Regulation 10(1)]

Reason

You have failed to ensure that access to Hearing Protection Zones within your workplace is restricted and that no employee enters a Hearing Protection Zone unless that employee is wearing personal hearing protection.

Schedule

In order to comply with this Notice you should take the following action:

1. *Devise effective arrangement to ensure that no employee enters a Hearing Protection Zone unless that employee is wearing personal hearing protection. In devising your arrangements you should consider the following:*

a) *the marking of Hearing Protection Zones with signs at the entrance to zones and within zones as appropriate (using signs specified for the purpose of indicating that ear protection must be worn in paragraph 3.3 of Part II of Schedule 1 to the Health and Safety (Safety Signs and Signals) Regulations 1996);*

b) *information, instruction and training for all employees on the location of any zones, and the requirements for wearing personal hearing protection within them;*

c) *supervision to ensure that the requirements of Hearing Protection Zones are followed;*

d) *action by management to set a personal example in the use of personal hearing protection within zones.*

AND

2) *Implement those arrangements.*

Or alternatively, any other no less effective means of complying.

Notice 5. Use of noise control equipment

This Notice is appropriate for situation 9 described in Table 5 of the Enforcement Guidance section of the Noise Topic Pack, in the case where noise control equipment provided is not fully and properly used.

note: you should determine whether failure on the part of employees to fully and/or properly use noise control equipment arises in part from failure to provide information, instruction and training as required under Regulation 10(1); and consider enforcement action.

Contravention

Health & Safety at Work etc. Act 1974, Section 2(1)

Control of Noise at Work Regulations 2005, Regulation 8(1)(a)

[if appropriate, Control of Noise at Work Regulations 2005, Regulation 10(1)]

Reason

*You have failed to ensure that noise control equipment provided by you, including **[specific equipment]**, is fully and properly used.*

Schedule

In order to comply with this Notice you should take the following action:

1. *Devise effective arrangements to ensure the full and proper use of noise control equipment provided by you, including **[specific equipment]**. In devising your arrangements you should consider the following:*
 - a) *systems of work and work instructions aimed at ensuring the use of noise control equipment;*
 - b) *information, instruction and training for all employees on the use of noise control equipment;*
 - c) *monitoring, supervision and the taking of remedial action if employees are not making full and proper use of the equipment.*

AND

2. *Implement those arrangements.*

Or alternatively, any other no less effective means of complying.

Notice 6. Health surveillance

This Notice is appropriate for situation 10 described in Table 5 of the Enforcement Guidance section of the Noise Topic Pack, i.e. suitable health surveillance has not been provided to those employees whose noise exposure is frequently likely to exceed the upper exposure action value ($L_{EP,d}$ of 85 dB), or whose hearing is at risk due to noise exposure.

note: you should determine whether there is an issue with employees not attending for health surveillance appointments arising in part from failure to provide information, instruction and training as required under Regulation 10(1); and consider enforcement action.

Contravention

Health & Safety at Work etc. Act 1974, Section 2(1)

Control of Noise at Work Regulations 2005, Regulation 9(1)

[if appropriate, Control of Noise at Work Regulations 2005, Regulation 10(1)]

Reason

You have failed to ensure that those of your employees whose health is at risk because they are liable to be exposed to noise are under suitable health surveillance, including testing of their hearing.

Schedule

In order to comply with this Notice you should take the following action:

1. *Devise effective arrangements to ensure that relevant employees are under suitable health surveillance. In devising your arrangements you should consider the following:*
 - a) *Identification of those of your employees who are required to be under health surveillance, including:*
 - (i) *those whose daily personal noise exposure is frequently likely to be at or above the upper exposure action value; and*
 - (ii) *those not included in (a)(i) above whose daily personal noise exposure is likely to be above the lower exposure action value or only occasionally above the upper exposure action value and whose health is at risk due to noise exposure (according to, for example, past medical history, audiometric test results from previous jobs, other independent assessments, a history of exposure to noise levels exceeding the upper exposure action values, or a family history of becoming deaf early on in life);*
 - b) *The provision to those employees so identified of systematic audiometric testing (hearing tests) to relevant standards and quality, at suitable intervals, under the responsibility of a suitable person or persons;*
 - c) *Explanation of the results of the tests to each employee who undergoes testing;*
 - d) *Referral of individuals for further medical advice as necessary (for example to an occupational health professional)*
 - e) *The keeping of health records in respect of each of your employees who undergoes health surveillance;*
 - f) *Feedback to you of information on the hearing ability of your workforce in a form that does not reveal details of any particular individual's hearing threshold and does not*

compromise confidentiality, unless consent has been received from an individual for this type of information to be provided to you.

g) Information, instruction and training for employees on the need for health surveillance and your arrangements for providing it;

AND

2. Implement those arrangements.

Or alternatively, any other no less effective means of complying.

Notice 7. Information, instruction and training

This Notice is appropriate for situation 11 described in Table 5 of the Enforcement Guidance section of the Noise Topic Pack, i.e. daily personal noise exposure is likely to exceed the lower exposure action value ($L_{EP,d}$ of 80 dB) and employees have not been provided with suitable and sufficient information, instruction and training.

note: where failure to provide information, instruction and training is implicated in a breach of other regulations (e.g. r.7(1), 8(1) or 9) you should consider adding r.10(1) to that notice. In cases where you are not using formal enforcement to remedy the other breach(es), or there are multiple breaches, then it may be appropriate to enforce against r.10(1) on a separate notice.

Contravention

*Health & Safety at Work etc. Act 1974, Section 2(1)
Control of Noise at Work Regulations 2005, Regulation 10(1)*

Reason

You have failed to provide to those of your employees whose daily personal noise exposure is likely to be at or above the lower exposure action value and to their representatives suitable and sufficient information, instruction and training.

Schedule

In order to comply with this Notice you should take the following action:

1. *Provide each of your employees whose daily personal noise exposure is likely to be at or above the lower exposure action value, and their representatives, with information, instruction and training which shall include:*
 - (a) *the nature of risks from their exposure to noise;*
 - (b) *the measures you have taken or intend to take to reduce the risk and reduce their exposure to noise;*
 - (c) *the exposure limit values and upper and lower exposure action values;*
 - (d) *the significant findings of your risk assessment, including any measurements taken, with an explanation of those findings;*
 - (e) *the availability and provision of personal hearing protectors and their correct use;*
 - (f) *why and how to detect and report signs of hearing damage;*
 - (g) *the entitlement to health surveillance and its purposes;*
 - (h) *safe working practices that are to be adopted to minimise exposure to noise;*

and

 - (i) *the collective results of any health surveillance undertaken in a form calculated to prevent those results from being identified as relating to a particular person;*
 - (j) *their duties under the Control of Noise at Work Regulations 2005.*

AND

2. *Establish effective arrangements to ensure that the same information, instruction and training is provided to all employees who are assigned to work such that their daily exposure*

to noise is likely to be at or above the lower exposure action value and to ensure that it is updated to take account of any significant changes in the workplace.

Or alternatively, any other no less effective means of complying.

Notes (not part of the notice) [Relevant to all notices]

Further information relevant to this Notice can be found:

- on the HSE website at www.hse.gov.uk/noise
- in the free leaflet INDG362(rev1) 'Noise at work: guidance for employers on the Control of Noise at Work Regulations 2005' **[can be enclosed with the Notice]**
- in the free employees' pocket card INDG363(rev1) 'Protect your hearing or lose it!' **[can be enclosed with the Notice]**
- in the HSE publication 'Controlling noise at work: The Control of Noise at Work Regulations 2005 Guidance on Regulations' (HSE reference L108, ISBN 0 7176 6164-4).

A list of organizations and people who can assist you may be available from the following organizations:

Institute of Acoustics, (IOA)
77A St Peters Street, St Albans, Herts, AL1 3BN.
Tel: 01727 848195, Fax: 01727 850553
e-mail: ioa@ioa.org.uk
www.ioa.org.uk

Association of Noise Consultants (ANC)
105 St Peters Street, St Albans, Herts, AL1 3EJ.
Tel: 01727 896092, Fax: 01727 896026
e-mail: mail@association-of-noise-consultants.co.uk
www.association-of-noise-consultants.co.uk

Your Trade Association may also be a useful source of information and advice.

APPENDIX D

Further sources of guidance on noise

(Although some of these publications refer to the previous *Noise at Work Regulations 1989*, the practical guidance on controlling noise risks and noise exposures contained in them remains relevant).

Key publications

Main publications

SI 2005/No 1643 L 108	The Control of Noise at Work Regulations 2005 Reducing noise at work — The Control of Noise at Work Regulations 2005 - Guidance on Regulations
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General guidance

INDG362(rev1)	Noise at work: Guidance on the Control of Noise at Work Regulations 2005
INDG363(rev1)	Protect your hearing or lose it!
INDG 270	Supplying new machinery (not specifically for noise)
INDG 271	Buying new machinery (not specifically for noise)
GN PM 56	Noise from pneumatic systems
HSG 138	Sound Solutions - out of print, but available at www.hse.gov.uk/noise/casestudies/soundsolutions/

Operational Circulars

OC 633/10	Computer numerically controlled (CNC) punching
OC 634/8	Control of dust and noise exposure during direct pressure blasting
OC 668/22	Plasma cutting: Control of fume gases & noise
OC 668/25	Personal Protective Equipment for welding and allied processes: Practical guidance on assessment and selection
OC 668/30	Oxy fuel gas cutting: control of fume, gases and noise

HSE Guidance & Information Sheets and Sector guidance (not OCs)

Agriculture

AS 8 (rev 3)	Noise
MISC 165	Farmwise

Construction

HSG 150	Health and Safety in construction (section on noise)
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Engineering & Utilities

HSG 67	Health and Safety in Motor Vehicle Repair
HSG 129	Health and Safety in Engineering Workshops
Engineering sheet No 26	Noise in engineering
Engineering sheet No 27	Control of noise at metal cutting saws
Engineering sheet No 29	Control of noise at power presses
Engineering sheet No 39	Reducing noise from CNC punch presses

SIM 03/2001/14 Control of noise in heavy fabrication

Food and Drink

Food Sheet No 32 Reducing noise exposure in the food and drink industries
HSG232 Sound Solutions for the food and drink industries

Metals & Minerals

HSG 109 Control of noise in quarries
Foundries Sheet No 6 Hazards associated with foundry processes: fettling — noise hazards

Specialist Inspector report No 7 Noise in container glass manufacture

Specialist Inspector report No 33 The control of noise in the concrete industry

Information sheet (in production) — Noise in the concrete products industry

Music and Entertainment

Draft guidance website www.soundadviceconsultation.info (Final version due for publication February 2008)

Offshore

HSG182 Sound Solutions Offshore (out of print – consult HID Occupational Health Team)

Polymers and fibres

Paper and Board -Information sheet No 1 - Noise assessments in paper mills

Paper and Board -Information sheet No 2 - Noise mapping in paper mills

Noise in the plastics processing industry (out of print but the Knowledge Centre has copies)

ISBN 0 7176 1486 7 Printer's guide to health and safety

Woodworking

Woodworking sheet No 4 Noise reduction at band re-saws

Woodworking sheet No 13 Noise at woodworking machines

APPENDIX E

Established noise control methods for high-risk activities

This Appendix is provided as a separate document – see <<link>>

TOPIC INSPECTION PACK

NOISE

Revised May 2008

APPENDIX E

ESTABLISHED NOISE CONTROL METHODS FOR HIGH-RISK ACTIVITIES

This Appendix to the Noise Topic Inspection Pack provides information on established noise control methods for a range of high-risk activities, organised according to industry/sector. Inspectors should refer to the main Noise Topic Inspection Pack (<<link>>) for guidance on the inspection of work activities involving risks from noise, and on enforcement of the Control of Noise at Work Regulations 2005.

Table E1 contains generic information on noise control methods.

Tables E2, E3 and E4 were prepared in 2007:

Table E2 Concrete and cement products

Table E3 Woodworking

Table E4 Plastics

These three tables are also currently located at: www.hse.gov.uk/noise/goodpractice/ and appear in the appendices to SIM/03/2007/08.

The tables for other industries, listed below, will be converted into this format in due course, but are presently in the form used in the previous version of the inspectors' noise topic pack.

Table E5 Agriculture

Table E12 Foundries

Table E6 Air transport

Table E13 Glass (flat and container)

Table E7 Ceramics

Table E14 Motor vehicle repair

Table E8 Construction

Table E15 Paper and printing

Table E9 Docks

Table E16 Quarries

Table E10 Engineering

Table E17 Rubber

Table E11 Food and drink

Table E18 Stonemasons

Table E19 Textile

Table E1: GENERIC NOISE CONTROL MEASURES

Activity	Noise control measures (where reasonably practicable)
Air movement	Relocate/segregate static plant e.g. compressors, vacuum pumps, blowers etc to lesser or non occupied rooms. The process could be acoustically enclosed within an accessible and adequately ventilated noise reducing enclosure. Use of low noise emission portable generator sets and compressors e.g. 'hush packs'. Fans inlet/discharge fitted with flexible connections and silencers to reduce duct borne noise. Reduce excessive line air pressure or fit low velocity (quiet) nozzles to 'open ended' fixed position or portable blow-off pipes for removing swarf cuttings, wood chips, lubricants, water cooling, components ejection or segregation. Reduce impulsive noise emission from exhaust ports of pneumatic actuator/manifolds using porous metal or plastic port silencers; and maintain good connector seals to avoid noisy air leaks.
Conveying/transporting	Use damped/composite materials for rollers; Use of component guide/sequencing release mechanism to reduce component impact noise; Maintain adequate lubrication of bearings/rollers; Reduce the speed of conveying; Suspend conveying ductwork using anti-vibration hangers to reduce structure borne noise; external damping of ducting conveying materials; Fit sectional acoustic tunnel hoods over open conveyor lines; Add external damping compounds or rivet plates of sheet metal to lightweight flat surfaces e.g. non critical machine panel work, chutes, trolley tables, conveyor sides etc to reduce vibration and noise emission; Internally line material stock feeder tubes e.g. auto lathe bar stock.
Forming	Relocate or segregate machinery e.g. presses, moulding machines, corrugating machines, bowl polishers, blast chillers or freezers, block making machines, granulators, static compressors, blowers to lesser or non occupied rooms; Machinery could be acoustically enclosed within an accessible and adequately ventilated enclosure; Use hydraulic rams to realign distorted fabrications after welding, forming or alternatively, use magnetic damping mats or sandbags if realigning by hammering; Reduce noise emission cutting thin sheet metal e.g. motor vehicle panel work, using magnetic damping mats, sandbags etc also where feasible, eliminate noise by laser type profiling etc.
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 (possible pedestal grinders); Maintain sharpness of cutting tools, and/or reducing speeds with increased number of cutting teeth or blades; Avoid cut materials falling from excessive heights into un-damped collection bins, use of damped or deadened steel chutes, hoppers, bins. Clamp materials being cut along their length to minimise 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 quieter hydraulic crushing or bursting rather than percussive methods e.g. crushing concrete instead of using pneumatic or hydraulic breakers, or cutting using damped wall saws or diamond wire to profile area and using bursting methods to remove materials.

TABLE E2: PLASTICS

High risk activity / process	Example noise levels, dB ¹	Established noise control methods	Further information (links on HSE website)
Granulators (and other size reduction machines e.g. agglomerators, crumbers, shredders, pelletisers)	100 (granulators)	<p>Methods include:</p> <ul style="list-style-type: none"> • use feed conveyor to remove operator from higher noise areas • situate size reduction machines in separate rooms or buildings – provide for remote or automated feeding • lag or damp the machine casing • form sound trap in feed aperture or hopper • enclose the machine • fit segmental or helical cutters • use tangential feed • fit resilient backing to knives • reduce rotor speed 	<p>Example: Rubber granulator (http://www.hse.gov.uk/noise/casestudies/rubber.htm)</p> <p>Example: Enclosure for rubber grinding machine http://www.casestudy.mom.gov.sg/casestudy/case-study-detail.jsp?id=199</p> <p>Example: Strand pelletisers, Sound Solutions #39, (http://www.hse.gov.uk/noise/casestudies/soundsolutions)</p> <p>Example: Enclosure for pelletiser http://www.casestudy.mom.gov.sg/casestudy/case-study-detail.jsp?id=294</p> <p>Generally useful: “Noise in the plastics processing industry” (RAPRA 1985, out of print, the HSE Sector have a reference copy)</p>
	90 (agglomerators etc.)		
Injection moulding machines	97 – 100	<p>Methods include:</p> <ul style="list-style-type: none"> • use slow speed pumps • control release of exhaust air • mount pumps and motors on anti-vibration mounts and incorporate flexible hoses in pipe lines • enclose hydraulic power packs • convert injector guards to acoustic guards • fit low noise nozzles to blow guns etc. 	<p>Example: Controlling release of exhaust air http://www.casestudy.mom.gov.sg/casestudy/case-study-detail.jsp?id=200</p>

¹ Sample L_{Aeq} . The noise levels are indicative only and will vary depending on equipment type and conditions of use.

High risk activity / process	Example noise levels, dB ¹	Established noise control methods	Further information (links on HSE website)
Extruders	90	<p>Methods include:</p> <ul style="list-style-type: none"> • specify low noise design • for hydraulic systems see injection moulding machines above • fit silencers to drive motor air intakes and exhausts • enclose drive motor. 	
Mould cleaning guns	105	Replace nozzles with low-noise types (e.g. those which generate an induced secondary air flow). Reduction of up to 10 dB.	Example: Reduced noise from mould cleaning gun, Sound Solutions#16 (http://www.hse.gov.uk/noise/casestudies/soundsolutions)
Extrusion line cut off saws	100	<p>Methods include:</p> <ul style="list-style-type: none"> • replace guards with solid panels lined with acoustically absorptive material • fit acoustic strip curtain at product out-feed 	Example: Extrusion line cut-off saws, Sound Solutions #53 (http://www.hse.gov.uk/noise/casestudies/soundsolutions)
Ultrasonic welding machines	96 (typical)	Enclose with sound reducing material	Example: Enclosure of welding machine http://www.casestudy.mom.gov.sg/casestudy/case-study-detail.jsp?id=228

TABLE E3: WOODWORKING

High risk activity / process	Example noise levels, dB ²	Established noise control methods	Further information (links on HSE website)
Circular saws	97 – 102	When purchasing new blades obtain 'low noise blades'.	Noise control in sawmilling (http://www.hse.gov.uk/noise/goodpractice/sawmilling.htm)
Vertical spindle moulders	95 – 100	The use of limited cutter projection tooling will reduce noise levels and should have been in place since 2003 under PUWER.	Woodworking Information Sheet 18 - http://www.hse.gov.uk/pubns/wis18.pdf Woodworking Information Sheet 37 - http://www.hse.gov.uk/pubns/wis37.pdf
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 smoother profile blocks with low blade projection. Slotted or perforated table lips can reduce idling noise levels. Reductions in noise can be made 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 be of suitable design, form as complete an enclosure as possible, and be properly maintained and used.	Noise reduction at multi-spindle planing and moulding machines (http://www.hse.gov.uk/noise/goodpractice/planingmoulding.htm) Air turbulence noise (http://www.hse.gov.uk/noise/goodpractice/airturbulence.htm) - (from paragraphs 204 – 206 of L108)
Band resaws	95 – 105	Maintenance of machine (e.g. pulley scrapers, lubricating felt pads or sawdust extraction system) and blade, combined with blade adjustment, are extremely important for noise levels. Noise enclosure of band-resaws is considered to be reasonably practicable.	Woodworking Information Sheet 4 - http://www.hse.gov.uk/pubns/wis4.pdf Noise control in sawmilling (from HSG172) (http://www.hse.gov.uk/noise/goodpractice/sawmilling.htm)

² Sample L_{Aeq} . The noise levels are indicative only and will vary depending on equipment type and conditions of use.

High risk activity / process	Example noise levels, dB ²	Established noise control methods	Further information (links on HSE website)
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. <i>Not</i> to be used when the machine is used for planing when the timber is fed across the top of the cutter.	Air turbulence noise (http://www.hse.gov.uk/noise/goodpractice/airturbulence.htm) - (from paragraphs 204 – 206 of L108) Example: Removing woodworking machine noise by adjustment, Sound Solutions #57 (http://www.hse.gov.uk/noise/casestudies/soundsolutions)
Small hand fed thicknesser	104	Enclosure (can be as simple as a 15mm lined chipboard box).	
Chipper/hoggers		Segregation of machine from work areas, or enclosure of machine.	

TABLE E4: CONCRETE AND CEMENT PRODUCTS

Product	Process	Example noise levels, dB ³	Established noise control methods	Further information (links on HSE website)
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	Steel tables: 95 - 110 Tables/conveyors with rubber covering: 86 – 93	Use self-compacting concrete (see below) Use resilient material (e.g. rubber) on tables Clamp mould to table Fit tunnels or enclosures over conveyors Enclose 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	Noise control in the concrete products industry: General information (http://www.hse.gov.uk/noise/goodpractice/concretegeninfo.htm) HSE Specialist Inspector Report No. 33. The Control of Noise in the Concrete Industry (http://www.hse.gov.uk/noise/goodpractice/sir33.pdf)
	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 (vibration). SCC should be discussed at visits to raise the profile and encourage innovation.	European guidelines for self-compacting concrete - http://www.britishprecast.org/publications/documents/scc_guidelines_may_2005_final.pdf (See chapter 12 for information on pre-cast products)
Blocks, tiles, slabs	Vibratory presses	No noise reducing features: 96 - 110 Outside press enclosure: 84 - 93 Unloading stations: 86 - 88 Inside control rooms: 71 – 79	Fit enclosure (all controls outside) or provide separate control room (noise refuge) Isolate vibrating parts from floor and enclosure Maintenance of 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, Sound Solutions #32 (http://www.hse.gov.uk/noise/casestudies/soundsolutions)
	Rumblers/ Tumblers,	84 – 95	Line barrel of tumbler with rubber lining Isolate plant from other processes and/or use plastic curtains to separate from employees	

³ Sample L_{Aeq} . The noise levels are indicative only and will vary depending on equipment type and conditions of use.

Product	Process	Example noise levels, dB ³	Established noise control methods	Further information (links on HSE website)
	Saws	81 – 96	Use noise-reduced saw blades	Example: reduced stone cutting noise, Sound Solutions #52 (http://www.hse.gov.uk/noise/casestudies/soundsolutions)
Extruded tiles	Extrusion plant Pallet /mould conveyors	86 – 93	Extrusion plant: <ul style="list-style-type: none"> • use noise-reduced blow-off jets/air knives • use silencers on compressed air exhausts Conveyors: <ul style="list-style-type: none"> • control speed to minimise collisions between pallets (may require training) • use an impact absorbing material (e.g. polyurethane) on conveyor guide rails etc. 	
General	Chutes and skips		Provide chutes and skips with rubber lining Minimise dropping distances for waste material	Avoiding impacts (http://www.hse.gov.uk/noise/goodpractice/avoidingimpacts.htm) - (from paragraphs 207 – 208 of L108) Example: Reducing noise in gravel chutes, Sound Solutions #1 (http://www.hse.gov.uk/noise/casestudies/soundsolutions)
	Mixing machines		Noise havens containing all control consoles	
	Cleaning equipment	Chipping hammers: can be > 120 dB Ultra high pressure water jetting: up to 105 dB	Avoid or minimise the need for use of noisy equipment by washing down before the 'mix' goes off. For water jetting, locate compressor in acoustic housing, restrict operating pressure	
	Materials handling		Where heavy quarry type vehicles are employed, use acoustic cabs.	Example: Reducing noise in trucks/cabs, Sound Solutions #24 and #26 (http://www.hse.gov.uk/noise/casestudies/soundsolutions)

TABLE E5: AGRICULTURE

High risk processes/equipment	Established measures for noise control	Sector and other guidance
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	AS8rev3 Noise in Agriculture
Use of a 'Q' cab tractor with missing doors or windows or with significant breaches of the cab by additional services	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	Consider operator station noise enclosures on large installations. Fit automatic cut-offs to roller mills etc. Where not reasonable 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	

TABLE E6: AIR TRANSPORT

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 ear protectors.	HSG209 Aircraft turnround

TABLE E7: CERAMICS

High risk processes/equipment, typical noise level (sample L_{Aeq})	Established measures for noise control	Sector and other guidance
Clay Stockpile raw material handling above 90 dB	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) — above 90 dB	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 reasonable 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 — above 90 dB	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 — above 90 dB	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 — above 90 dB	Segregate from other work areas. Use noise absorbent lined hoods	
Kiln fans — above 90 dB	Locate away from occupied areas , provide partial enclosures or screening	
Vibromills — above 90 dB	Segregate from other areas. Fit acoustic enclosures and noise dampening to the bowls	
Grinding and polishing of imperfections — c. 90 dB	Noise levels vary considerably depending on amount of grinding. Traditional methods use small grinding wheels. Using abrasive belts or single arm finishing belts greatly reduce noise levels.	

Table E8: CONSTRUCTION (see also material for Construction in the HAV Inspection Topic Pack)

High risk processes/ equipment, typical noise level (sample L_{Aeq})	Established measures for noise control	Sector guidance
Tunnelling by hand with clay spade or jigger pick 95-117 dB	Use mechanised tunnelling techniques in all but the smallest tunnelling jobs ⁴ ; 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.	British Tunnelling Society's CoP (http://www.hse.gov.uk/vibration/hav/campaign/construction/tunnelling.htm) Tunnelling and Pipejacking: Guidance for Designers (http://www.hse.gov.uk/construction/pdf/pjaguidance.pdf)
Scabbling 94 -105 dB	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 dB	Breaking in new 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 accordance with manufacturers' instructions. . 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 hand held breakers may still be required.	Pile cropping. A review of current practice (HSE Inspector information leaflet, Aug 02) (http://www.hse.gov.uk/vibration/hav/campaign/construction/pilecropp.pdf) Information from Loughborough University (http://www.lboro.ac.uk/research/design4health/public_area/press_rel/pile_case/pile_case.html)
Abrasive disc cutters/angle grinders 98-104 dB	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 dB (L_{Cpeak} 136 dB at 2m from activity)	Maintain the falsework legs properly - follow manufacturers 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.	

⁴ Where design solutions for elimination/reduction of risk from noise exposure exist, but have not been implemented, inspectors should consider C(DM) duties, e.g. Regulation 11 duties with designers/specifier

High risk processes/ equipment, typical noise level (sample L_{Aeq})	Established measures for noise control	Sector guidance
Dump Trucks /Site dumpers 93-95 dB	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 (<i>may also be applicable to other construction plant</i>)	Sound Solutions case studies 24 & 31 (http://www.hse.gov.uk/noise/casestudies/soundsolutions/)
Cartridge tools C-weighted peak noise level 143-157dB	Minimise numbers exposed and shield others (e.g. with portable enclosure); where used on steel plates, use damping (e.g. sandbags).	
Concrete pumping 91-93 dB	For independent pump, enclose pump/motor (<i>consider need for ventilation!</i>) silence exhaust; use quieter plant; maintain plant and operate in accordance with manufacturers' instructions	
Powerpacks/compressors 85-91 dB	Locate away from occupied areas; provide acoustic enclosure (<i>consider need for ventilation!</i>); use low noise emission equipment (e.g. "hush packs"); keep access panels closed; maintain equipment/air lines; operate in accordance with manufacturers' instructions.	
Grit blasting 96-100 dB	Minimise numbers exposed; provide local enclosure, maintain equipment/air lines; operate in accordance with manufacturers' instructions.	
Driven piling 115-132 dB	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.	

TABLE E9: DOCKS

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

TABLE E10: ENGINEERING (SEE ALSO MATERIAL FOR 'HEAVY FABRICATION' IN THE HAV INSPECTION TOPIC PACK)

High risk processes/equipment, typical noise level (sample L_{Aeq})	Established measures for noise control	Sector and other guidance
General	Engineering Noise Task Group guidance Top 10 controls: (http://www.hse.gov.uk/pubns/top10noise.pdf) Determining the best option for control: (http://www.hse.gov.uk/pubns/noisesources.pdf)	
Air carbon arc gouging, 105-120 dB	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 dB	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 dB	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 ear protection, exclude any protection they provide.	OC 634/8
Grinding, 85-109 dB	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 dB	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 dB <	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.	Engineering Information Sheet EIS 27. HSG129 p 38-42 & 54.
Power presses and CNC punch presses, 95 dB	Purchase quieter machines when replacing machinery. Use anti-vibration mountings; quiet tooling; damped machine panels; acoustically treated discharge chutes; noise enclosures.	EIS 29 & EIS 39. Sound Solutions case studies 43,46,47, 49, 50 & 59 (http://www.hse.gov.uk/noise/casestudies/soundsolutions/)
Riveting, 100-110 dB	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.	Sound Solutions case study 40 (http://www.hse.gov.uk/noise/casestudies/soundsolutions/)
Shears (high-speed continuous), 100 dB	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.	HSG42

High risk processes/equipment, typical noise level (sample L_{Aeq})	Established measures for noise control	Sector and other guidance
Ultra high pressure water jetting 105 dB	Limited scope for reducing noise levels other than locating the compressor in acoustic housing. Correct use of ear protection essential, should be compatible with waterproof clothing worn i.e. fit below hood of jacket. Often ear protection will be worn by the operator but not others in immediate area who are also at risk.	

TABLE E11: FOOD AND DRINK

High risk processes/equipment, typical noise level (sample L_{Aeq})	Established measures for noise control	Sector and other guidance
Glass bottling 90-95 dB(dairy) 85-95 dB(brewing & soft drinks) 100 dB(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 Dampening of 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	HSG232 Sound Solutions in the Food and Drink Industry HSE Food Information Sheet 32, "Reducing noise exposure in the food and drink industries", http://www.hse.gov.uk/pubns/fis32.pdf
Product impact on hoppers 95 dB(confectionery) >90 dB(frozen food) >100 dB(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 dB	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 absorbing material (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 dB	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 dB	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, typical noise level (sample L_{Aeq})	Established measures for noise control	Sector and other guidance
Milling operations 85-100 dB	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 Enclose 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 dB (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 dB	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 dB (from wheels/wheel bearings especially those subject to high/low temperatures in ovens/freezers)	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	
Packaging machinery 85-95 dB	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	

TABLE E12: FOUNDRIES (SEE ALSO MATERIAL FOR FOUNDRIES IN THE HAV INSPECTION TOPIC PACK)

High risk processes/equipment	Established measures for noise control	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.	HSE Foundries Information Sheet 6
Knock-out	Segregate this process from others; mechanisation.	

TABLE E13: GLASS (FLAT AND CONTAINER)

High risk processes/equipment, typical noise level (sample L_{Aeq})	Established measures for noise control	Sector and other guidance
Most noise in Glass container manufacturing is generated by pneumatic noise and/or glass to glass contact (cullet and product)		
Batching/mixing plant, 96 dB. Storage hopper vibrators and vibratory conveyors	Noise haven containing all control consoles	Specialist Inspector Report No 7 Noise in Glass Container Manufacture.
Basement, 90 to 100 dB. Fans, cullet transport and tipping, dumper trucks	Inlet and outlet silencing on fans, enclosure of fans and drive motors Provision of cabs on dumpers and other vehicles	
Furnace area, 92 to 105 dB Furnace combustion air fans, furnace cooling fans	Silencing of fans Noise haven containing all control consoles	
IS Machine area, 90-105 dB Pneumatic noise, cullet, mechanical noise, cooling fans	Pneumatic noise from blanks and moulds cooling, air exhausts and exhaust 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 dB	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 dB	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 dB	Fit silencers to pneumatic exhaust	

TABLE E14: MOTOR VEHICLE REPAIR

High risk processes/equipment, typical noise level (sample L_{Aeq})	Established measures for noise control	Sector and other guidance
Vehicle body repair 85-107 dB	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.	HSG67 page 18

TABLE E15: PAPER AND PRINTING

High risk processes/equipment	Established measures for noise control	Sector and other guidance
Buckle Folders	Enclosure at all buckle plates	Printers guide to health and safety pages 59 - 62
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; ensure vacuum pumps and compressors are dealt with as above	

TABLE E16: QUARRIES

High risk processes/equipment	Established measures for noise control	Sector and other guidance
Blasting	Blast design, adequate covering of detonating cord, in-hole initiation, shock tube initiation ...	Control of Noise in Quarries HSG 109
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	
Compressors	Remote positioning of compressor units; provision of silencers	
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.	

TABLE E17: RUBBER

High risk processes/equipment, typical noise level (sample L_{Aeq})	Established measures for noise control	Sector and other guidance
Grinders/granulators, 96-115 dB	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	Noise control in the rubber industry — ISBN 0 11 885550 6 (out of print)
Two roll mills, 90-104 dB & Internal mixers, 84-100 dB	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. use anti-vibration mounts, enclose the gearbox, use belt conveyors instead of vibratory feeders.	
Injection moulding machines, 97-100 dB	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 pipe lines, enclose hydraulic power packs, convert injector guards to acoustic guards, fit low noise nozzles to blow guns etc.	

High risk processes/equipment, typical noise level (sample L_{Aeq})	Established measures for noise control	Sector and other guidance
Wire twisting machines, 91-97 dB	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 dB	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 dB	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 dB	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	

TABLE E18: STONE MASONRY

High risk processes/equipment	Established measures for noise control	Sector and other guidance
Chipping hammers	Segregate the process where possible, hearing protection	-
Saws	Controls include segregation, enclosures, dampened saw blades, reduced blade speed, remote/automatic machine operation ...	For useful info see: Control of Noise in Quarries HSG109

TABLE E19: TEXTILES

High risk processes/equipment	Established measures for noise control	Sector and other guidance
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 preventive maintenance programmes. However for many processes control of exposure will rely on an effective programme of personal hearing protection	TEXIAC Action on Noise Pack (distributed to HSE offices, further copies available from the Sector). (withdrawn)

