

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 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](#) Plastics

[Table E3](#) Woodworking

[Table E4](#) Concrete and Cement Products

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 E6](#) Air transport

[Table E7](#) Ceramics

[Table E8](#) Construction

[Table E9](#) Docks

[Table E10](#) Engineering

[Table E11](#) Food and drink

[Table E12](#) Foundries

[Table E13](#) Glass (flat and container)

[Table E14](#) Motor vehicle repair

[Table E15](#) Paper and printing

[Table E16](#) Quarries

[Table E17](#) Rubber

[Table E18](#) Stonemasons

[Table E19](#) Textiles

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.

High risk activity / process	Example noise levels, dB	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 [†]	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)

[†] 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)
Band resaws	95 – 105	<p>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.</p> <p>Noise enclosure of band-resaws is considered to be reasonably practicable.</p>	<p>Woodworking Information Sheet 4 - http://www.hse.gov.uk/pubns/wis4.pdf</p> <p>Noise control in sawmilling (from HSG172) (http://www.hse.gov.uk/noise/goodpractice/sawmilling.htm)</p>
Planer thicknesser	97 – 101	<p>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.</p>	<p>Air turbulence noise (http://www.hse.gov.uk/noise/goodpractice/airturbulence.htm) - (from paragraphs 204 – 206 of L108)</p> <p>Example: Removing woodworking machine noise by adjustment, Sound Solutions #57) (http://www.hse.gov.uk/noise/casestudies/soundsolutions)</p>
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 [‡]	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)

[‡] 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 [‡]	Established noise control methods	Further information (links on HSE website)
	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	
	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	

Product	Process	Example noise levels, dB [‡]	Established noise control methods	Further information (links on HSE website)
	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) [§] ; 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) ^{Error! Bookmark not defined.} ; 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 ^{Error! Bookmark not defined.} ; 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)

[§] 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
Abrasive disc cutters/angle grinders 98-104 dB	Consider elimination of need for on-site cutting by design/prefabrication ^{Error! Bookmark not defined.} ; 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.	
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 ^{Error! Bookmark not defined.} ; 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/)

High risk processes/equipment, typical noise level (sample L_{Aeq})	Established measures for noise control	Sector and other guidance
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
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	

High risk processes/equipment, typical noise level (sample L_{Aeq})	Established measures for noise control	Sector and other guidance
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	
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	

High risk processes/equipment, typical noise level (sample L_{Aeq})	Established measures for noise control	Sector and other guidance
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.	

High risk processes/equipment, typical noise level (sample L_{Aeq})	Established measures for noise control	Sector and other guidance
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.	

High risk processes/equipment, typical noise level (sample L_{Aeq})	Established measures for noise control	Sector and other guidance
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.	
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)