

Health Protection



GUIDELINES ON NOISE CONTROL FOR CONSTRUCTION SITES



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Aim

The aim of this leaflet is to provide information to architects developers, contractors, sub-contractors and those generally working on building sites on measures to prevent noise nuisance affecting neighbouring property.

Jersey Legislation

The Statutory Nuisances (Jersey) Law 1999 was passed by the States and is now in force. This legislation is likely to impact significantly on current practice in the construction industry on the Island.

The legislation is likely to impact in the following areas by permitting this Department to require:-

1. The Limiting of hours of operation of noisy work.
2. Adjusting the time of noisy work.
3. Requiring the use of best available technology to limit noise by the use of quiet equipment.
4. Setting noise levels for the work.
5. Protecting noise sensitive areas by the use of noise barriers.
6. Keeping noise sensitive areas aware of what is going on.

As a ready reference the Department recommends British Standard BS 5228 Noise and vibration control on open and construction sites Part 1 1997 (HMSO cost: £100.00, Tel: 0207 242 6393) (see also overleaf) which relates specifically to construction sites and the noise emitted from such works which goes over the points raised above in more detail. However, the normal business hours which this Department would be likely to require would be:-

8.00 am to 6.00 pm Monday to Friday
8.00 am to 1.00 pm Saturday
with no working on Sundays or Bank Holidays.

The above detail is a general guideline of what this Department would expect from a particular site, but each site is different, circumstances surrounding the works

may require a particularly different approach to particular aspects of work which may be construed as noisy operations. Certain quieter works eg painting etc could be carried on outside these hours as long as noise is not heard outside the site boundary resulting in complaint. Often problems occur with sub-contractor who work on a Sunday and may not be aware of the requirements regarding working hours.

Generally speaking with regard to the hours of operation it is anticipated that the likely deviations to that mentioned above would be where there are significant safety considerations to be resolved and /or requirements by the Parish relating to road closures etc. There are also contingencies for the circumstances such as broken down concrete lorries failing to arrive and the completion of operations on site beyond the normal expected finish time. Generally people are more inclined to accepting working over time as opposed to early starts.

In summary the legislation will require all companies to plan well ahead and consider noise, consider the hours of operation in which noisy work will be undertaken, the plant to be used on site, the site layout, contact with neighbours and keeping them informed of what's happening on the site. **It is strongly recommended noise conditions are incorporated in contracts prior to the tendering process.** Example of model conditions for contracts can be found in Appendix 2.

NB Contractors should seek advice from the Environmental Health Officer in situations likely to cause a noise nuisance.

European directives

European directives in relation to construction site noise have been restricted to limiting the levels of noise permitted to be made by machines and plant. These levels are enforced in the UK through regulations made by the UK government. These regulations are of most interest to the manufacturers of plant and machinery, but it should be noted that the permitted levels of noise are gradually decreasing over time. European directives generally do not apply to Jersey, however would constitute good practice.

At the time of writing, these noise limits cover:

- compressors
- welding generators
- power generators and tower cranes
- jack hammers
- tracked machines
- wheeled dozers, excavators and loaders.

It constitutes good practice to hire or purchase the quietest machinery available to reduce noise.

British Standard 5228: 1997

BS 5228 [Noise and vibration control on open and construction sites](#) is in five parts. The different parts are:

Part 1	Basic information and procedures	1997
Part 2	Guide for construction and demolition	1997
Part 3	Code for surface coal extraction	1997
Part 4	Code for piling operations	1992
Part 5	Code for surface mineral (excluding coal) extraction	1997

The current British Standard gives much more detail than can be summarised in this guide and should be consulted where necessary. Parts 1, 2 and 4 are likely to be the most useful for the majority of construction work.

The British Standard gives detailed guidance on the following:

- best practice for controlling noise emissions from construction sites
- methods for calculating and measuring noise
- factors to be considered when setting noise limits or targets
- protection from noise for those working on site
- the importance of fostering good public relations between the site and its neighbours.

There is also a leaflet produced by CIRIA on construction site noise called [Project Report 70, How much noise do you make? A guide to assessing and managing noise on construction sites](#). This leaflet can be obtained from: CIRIA, 6 Storey's Gate, Westminster, London SW1P 3AW, Tel: 0207 222 8891 Fax: 0207 222 1708 Email: enquires@ciria.org.uk

Typical sound pressure levels: (SPL)

Sound pressure in weighted decibels dB(A)	Situation
140	- Peak action level, immediate irreversible damage - Jet at 30 m
130	- Threshold of pain - Pneumatic breaker (unsilenced) at 1 m
120	- Pneumatic digger - 600 hp scraper at 2 m
110	- Rock drill - Diesel hammer driving sheet steel at 10 m
100	- Scrabbling - 7 hp road roller on concrete at 10 m
95	- Concrete pouring
90	- Second action level (UK Noise at Work Regulations 1989)
85	- First action level (UK Noise at Work Regulations 1989) - Drilling/grinding concrete
80	- Scaffold dismantling at 10 m - 8 hp diesel hoist at 10 m
70	- 5 hp power float at 7m
60	- Typical office
50	- Living room

(A) refers to the noise levels actually being heard by the human ear. The dB scale is a log scale so an increase of 3 dB represent a doubling of sound energy.

Sources of noise

On a building site the worst noise comes from contractors' plant and mostly from machines used for demolition, piling and excavation. Noise from concrete mixing is often troublesome. Hammering, cutting metal/paving slabs and drilling are also noisy, not only in new buildings but also when extending occupied buildings, as the noise can be transmitted through the structure to rooms remote from the noise source. Complains are also occasionally received about excessive noise from radios on site.

The nuisance caused by noise depends on the sort of noise as well as how loud it is. Intermittent noise is usually more disturbing than continuous noise, and a high-frequency noise is more worrying than a low frequency one. The high-pitched noise of sawing, for instance, is more troubling than equally loud noise from an excavator.

Maximum desirable noise levels for construction sites

Noise from construction and demolition sites should not exceed the level at which conversation in the nearest building would be difficult with the windows shut. The noise can be measured with a simple sound level meter giving a direct reading in decibels dB(A) (A weighting: what is actually heard by the human ear). Noise levels, between say 08.00 and 18.00 hours, outside the nearest window, of the occupied room closest to the site boundary should not exceed:

70 decibels dB(A) in rural, suburban and urban areas away from main road traffic and industrial noise.

72 decibels dB(A) in urban areas near main roads.

These limits are for daytime working outside living rooms and offices. In noise sensitive situations, for example, near hospitals and educational establishments - and when working outside the normal daytime hours - the allowable noise levels from building sites will be less: such as the reduced values given in the contract specification or as advised by the Environmental Health Officer.

The recommended noise levels should be observed on all jobs with some exceptions for emergency work necessary for safety or public health.

Noise from building operations can be controlled

1. By reducing the actual cause of the noise at source
2. By screening the noise
3. By locating noisy plant as far as practicable from those who might be disturbed

1. By reducing the actual cause of the noise at source (see also Appendix 1 for examples of noise sources and possible remedies)

- a) Very noisy processes can often be avoided if alternative and quieter constructional methods are considered at design stage. For instance, it may be feasible to use bored piles, or to drive piles by vibration, by a drop hammer enclosed within an acoustic cover, or by hydraulics, rather than by pneumatic diesel hammer or a steam winch. High tensile bolts can be used to assemble steel frames instead of rivetting, reuse of existing foundations rather than breaking out, electrically powered plant rather than plant with its own engine and dismantling rather than demolition.

If noisy processes cannot be avoided the best way to reduce noise is to use 'sound reduced' plant, together with in some cases acoustic screens.

- b) Noise from engines and machinery can be reduced by the more efficient silencing of exhaust systems and better fitting working parts, such as gears. Anti-vibration mountings at the engine supports and covers lined with sound absorbent material to form an acoustic shield also help. Removable parts, especially thin metal plates, should be 'damped' to stop them vibrating and rattling.

These measures really add up to better design of contractors' plant and most manufacturers now recognise that quietness in operation is an important factor when comparing different makes of machine. Some equipment can be made quieter by fitting a muffler. If hiring equipment always ask for new/quieter machinery. Make sure all machines or engines are properly enclosed. Compressor covers should not be left open. Pneumatic breakers should have acoustic jackets, also turn plant off when not required, or throttle back to idling speed. Proper servicing of all plant will keep noise down. Exhaust silencers and mufflers must be kept in good condition.

It may be acceptable to use a different method of work that will actually make more noise, but will take a shorter time. However, this will need

to be checked with the engineer and the Environmental Health Officer and should also be discussed with neighbours. The possible effects of any change on noise exposure for site workers should also be assessed.

- c) Pneumatic concrete breakers, for instance, are available with different types of silencing devices. Mufflers, acoustic shields or exhaust silencers can be incorporated in the design of the breaker. The muffler or silencer need not be heavy or bulky, or interfere with the operator's view of the work. Tests by the Building Research Establishment (BRE) show that noise from pneumatic concrete breakers can be effectively reduced without any loss in performance.

Silencing will not make the job longer but the silencer must be carefully matched with the breaker and be specially designed for it. Manufacturers will recommend the type of muffler or silencer most suited to their tools.

- d) Compressors feeding air to concrete breakers must also be 'sound-reduced'. There are several types on the market. Acoustic linings are applied to the canopy, chassis and undersides of the compressor, including all covers and grilles. Covers should be kept closed at all times during use. The cooling system is specially designed to permit the compressor to operate with the covers closed. Don't leave compressors (and other plant) running unnecessarily.

2. By screening the noise (Acoustic screens and enclosures)

Effective screening depends on the extent to which the noise source can be enclosed without hampering the operation of the equipment. In the BRE tests timber-framed screens and sheds were lined with plywood and faced with a sound absorbent layer. Using a breaker fitted with a suitable muffler or silencer inside an open shed with a screen in front of the open side, the noise was reduced by 20 decibels. This represents a 75 per cent reduction in loudness as judged by the ear, compared with the unsilenced unscreened breaker.

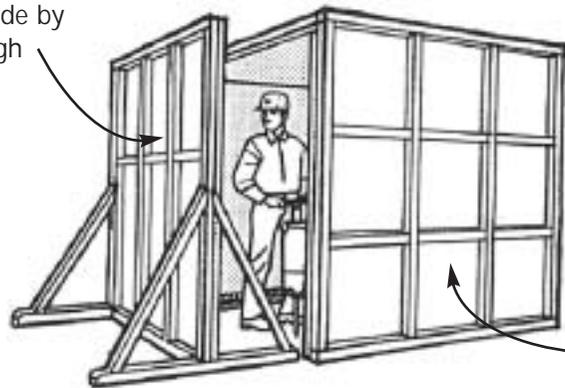
The silencer on the tool inside the enclosure not only reduces the transmitted noise level, but also helps to make life tolerable for the operator. Even so, he should still wear ear protection. He should also wear goggles to protect his eyes and sometimes a dust mask may be necessary. Artificial lighting in the enclosure may also be required. Acoustic screening can be used to quieten other types of plant, such as air compressors and electricity generators. Diesel and petrol engines can also be screened. Reciprocating hammers used for pile driving can be partially screened.

An example of an enclosure could be of 6 mm plywood or other solid material weighing about 5 kg/m² on simple framing. There must be no gaps at joints or corners. There is no worthwhile advantage in using a heavier construction for portable enclosures. The inside should be lined with sound absorbent material for example, 50 mm of foamed polyurethane. If glass fibre or mineral wool blankets are used they usually need protecting by a wire mesh or a perforated sheet. Sheet coverings should have at least 10 per cent of the surface perforated and the distance between perforations should not exceed 13 mm. The lining prevents a build-up of noise inside the enclosure and improves conditions for the operator, it does not reduce the noise transmitted through the screen or shed. Gaps between the shed and the ground must be closed with a flap or special tough grade of black polythene sheeting or other similar flexible material.

Acoustic screens and sheds can also be made of wood wool slabs. Units may be made which can be bolted together, and are easily dismantled and reassembled.

Acoustic screen

2 metres wide by
2 metres high



Acoustic shed
2 metres wide by
2 metres high

(Ref: DOE Advisory Leaflet 72 Noise Control on Building Sites)

3. By locating noisy plant as far as practicable from those who might be disturbed

The characteristics of the site and construction will restrict what can be done but it is clearly desirable to locate noisy static plant as far as practicable from people living and working nearby. It is frequently possible to take advantage of the screening effect of buildings under construction. Noisy compressors and generators,

for example, can be put in a basement, the shell of which has been completed. When using compressors or generators in enclosed areas, see that the exhaust gases are discharged directly to the outside air - or that there is good cross ventilation to prevent the build-up of poisonous carbon monoxide fumes. Access to the site can often be arranged at points where the noise of vehicles will cause least disturbance.

In demolition work, form a break in solid connections (eg concrete paving) between the working area and adjoining buildings to reduce the transmission of vibration and structure-borne noise.

Can the plant be located as far away as possible from noise-sensitive areas? Or pointed away from sensitive areas? Use screens and enclosures to contain the noise. The site boundary hoarding will contribute to this. Can strategic use be made of stockpiles of materials? Remember that noise levels will be intensified when plant and/or machinery are working together in confined spaces.

Consider moving those likely to be affected away from the site. In the case of, say, sheet piling in a partly residential area, this may mean moving the residents to a hotel for a weekend when all the work will be carried out. Costs and other inconvenience usually make this a last resort.

If work is proposed in an occupied office building it is important to try and get agreement with local residents to prevent noise disturbing those working and those living near by.

If noisy processes must be used the contractor should explain to nearby people, either by letter, or public meeting for large scale operations, the problems to be overcome and what can be done to avoid disturbing the public more than is necessary. A contact mobile number is also recommended in case of complaints. Such an effort can be amply rewarded in goodwill.

It is the responsibility of the contractor to notify all those who may work on the site (eg sub-contractors) of the noise reduction arrangements.

Health and Safety and occupational noise

The Health and Safety Inspectorate at the Department of Employment and Social Security, P O Box 55, Philip Le Feuvre House, La Motte Street, St Helier, JE4 8PE Tel: 280000 are the competent authority with regard to occupational noise.

Appendix 1

Some noise sources and possible remedies

(Ref: DOE Advisory Leaflet 72 Noise Control on Building Sites)

Machine	Source of noise	Possible remedies (discuss with manufacturer)	Possible alternatives
Pile driver	Pneumatic or diesel hammer or steam winch	Enclose hammer head and top of pile in acoustic screen; 'dampen' sheet steel piles to reduce vibration and resonance.	Use a vibrator, auger or hydraulic pile driver. There is also a special system of constructing concrete-retaining walls in a deep trench instead of sheet piling. The sides of the trench are retained with a suitable slurry until the concrete is poured.
	Impact on pile	Use resilient pad between pile and hammer head.	
Excavator, scraper, shovel, loader and dumper	Engine	Fit more efficient silencer on exhaust	Enclose engine compartment but allow for engine cooling. Dampen metal panels. Before modifying machine get advice from manufacturer.
Generator or compressor	Generator or compressor	'Dampen' metal casing	Use electric motor in preference to diesel or petrol engine. If there is no mains supply a sound-reduced generator or compressor can be used to supply several pieces of plant. Hydraulic and electric tools are also available. A thermic lance can be used to burn holes in concrete and to cut through large sections of concrete; any reinforcement helps the burning process.
Concrete breakers	Power unit	Fit more efficient silencer on engine exhaust. Dampen metal casing and line with sound absorbent material. Before modifying machine obtain advice from manufacturer.	
	Tool	Fit a muffler or silencer on pneumatic tools - this will reduce the noise without impairing efficiency.	
	Bit	Little noise once surface is broken, use sound damped or muffled steels	
Riveter	Impact on rivet	Enclose working area in acoustic screen.	Design for high tensile steel bolts instead of rivets.
Cartridge gun	Explosion of cartridge	Use a sound reduced gun.	Drilled fixings.
Pump	Engine pulsing	Enclose in acoustic screen (allow for engine cooling and exhaust).	
Concrete mixer	Engine	Fit more efficient silencer on diesel or petrol engine.	Use electric motor in preference to diesel or petrol engine. Use ready mixed concrete.
	Filling	Don't let aggregates fall from an excessive height.	
	Cleaning	Don't hammer the drum.	

Appendix 2

Example Model Conditions relating to prevention of Noise and Dust nuisance from Construction Sites

A. Model Conditions: Noise control

1. Without in any way limiting the liabilities or obligations imposed upon the Contractor elsewhere in the Contract, the following shall apply to the Site, and to the Contractor's offices, workshops, maintenance compounds and batching plants associated with the Site:-

- a) All vehicles and mechanical plant used for the purpose of the Works shall be fitted with effective exhaust silencers and shall be maintained in good and effective order so that extraneous noise from mechanical vibration, creaking, squeaking, etc., shall be reduced to a minimum.
- b) All compressors shall be "sound reduced" models fitted with properly lined and sealed acoustic covers which shall be kept closed whenever the machines are in use and any ancillary pneumatic percussive tools shall be fitted with mufflers or silencers of the type recommended by the manufacturer.
- c) Machines in intermittent use shall be shut down when not in use or throttled down to a minimum as necessary.
- d) No noise should be audible beyond the site boundary outside those hours listed below:
 - Monday to Friday between 0800 and 1800 hours and
 - Saturday between 0800 and 1300 hours
 - No working Sundays or bank holidays

Any consent for working outside these hours will be given only after consultation with the Environmental Health Officer. Fourteen days notice is normally required from the Contractor when seeking such consent.

- e) Blasting shall not be permitted.

2. The Contractor shall furnish such information as may be requested by the Environmental Health Officer in relation to noise levels emitted by constructional plant installed on the Site, and shall afford all reasonable facilities to enable them to carry out such site investigations as may be necessary.

3. Except as described in paragraph 4 below, no plant or equipment shall give rise to noise levels in excess of those given in Table 1 or 3dB(A) above the ambient equivalent noise level with no construction works in progress, whichever is the higher, at points as stated in the Contract eg (site boundary or boundary of closest domestic premises). Noise levels shall be monitored by the method set out in Appendix B of BS 5228, Part 1:1997 Noise and Vibration control on construction and open sites. Code of Practice for basic information and procedures for noise and vibration control. (HMSO cost: £100.00, Tel: 0207 242 6393)

4. The Contractor may request permission to carry out works which give rise to noise levels exceeding those in Table 1 provided that at least 24 hours notice of the exact time and date of those works is given, in writing, to the Environmental Health Officer, together with the measures proposed by the Contractor to alleviate the discomfort caused by their works on affected occupants of adjacent buildings. In the event of an emergency work the contractor should notify the Environmental Health officer on the next working day. To avoid complaint the contractor should where practicable notify those living close by of the proposed work.

MAXIMUM NOISE LEVELS OF CONSTRUCTION PLANT AND EQUIPMENT TAKEN AT THE BOUNDARY OF THE SITE

Period	hours	No. of hours over which 1 Hourly Leq is applicable	Noise dB(A) 1 hour	Peak Noise dB(A)
Monday to Friday	0800 to 1800	10	72	75
Saturday	0800 to 1300	5	72	75
No working Sundays/bank holidays unless prior approval				

Note:

- a) Peak Noise Levels refer to levels recorded on a BS5969 Type 1 precision sound level meter set to slow response.
- b) Leq Noise values are the equivalent continuous sound level values, measured at the site boundary

6. The contractor shall notify those who might be affected by the operation (eg public living close by) prior to work beginning and at regular intervals for example letter drops, or by notification in the Jersey Evening Post or possibly public meetings if necessary.

B. Model Conditions: Dust control and restrictions

The Contractor's attention is drawn to the complaints caused by small amounts of dust. The Contractor shall carry out all precautions to prevent this nuisance These include:

- a) Damping down all aggregates and granular materials in the compound or on the site. Care must be taken to avoid causing a water pollution incident if waste is going to a surface drain. Further advice can be obtained from the Water Resources Section, telephone 725511.
- b) The filtering of a cement storage and dispensing equipment to prevent the release of any dust.
- c) Where necessary, the use of extractors screens or curtains around any plant/site that emits dust.
- d) The use of plant that does not emit smoke.
- e) Storing all aggregates, cement and other materials likely to cause dust in appropriate temporary storage units within the site compound.
- e) It is recommended that wheel wash facilities are provide, and road used by constructor vehicles are kept clean to prevent dust problems to neighbouring premises, especially in urban areas.
- f) Reduce the speed of vehicles driving on and off site.

For further information on the reduction of Construction Site Noise please contact:

**Health Protection,
Public Health Services,
Le Bas Centre,
St Saviours Road,
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