

A background image of a spectrum analyzer showing a colorful frequency spectrum with vertical bars in shades of purple, blue, green, and yellow.

Making the noises right

Noise can have a seriously detrimental impact on health. Construction sites pose a particular risk, and designers have an important role to play in helping to manage this.

Noise at work can lead to impaired hearing, or even deafness. As such, employers have a duty to protect workers from its effects.

The construction industry exposes workers to particularly high noise levels – and, consequently, to a potential health hazard. As a designer, you can play a major part in helping to manage this hazard. This guide tells you how.

Measuring noise

Noise is measured in decibels (dBA), which are logarithmic units. This means that just a slight increase in decibels causes the level of noise to increase a great deal. For example, 73dBA is twice as loud as 70dBA – or, to put it another way, $70\text{dBA} + 70\text{dBA} = 73\text{dBA}$.

Life outside the tick box.



The level at which we talk is 60dBA. There is a consensus that, if you have to shout to be heard by someone who is about two metres away, the noise over which you are shouting is approaching hazardous levels.

Noise dies off the further you are from the source. So, noise levels at three metres from an item of plant are four times greater than they are at a distance of 20 metres.

Hazards and duties associated with noise

Noise has a cumulative effect on a person's hearing. Prolonged exposure to noise above 80dBA can lead to impaired hearing or, in the worst case, deafness. When the average exposure is above this level, employers are required to offer hearing protection. When it exceeds 85dBA, hearing protection is mandatory. These, together, are known as 'action levels'.

Noise on construction sites

Construction activity, by its very nature, poses a significant noise risk. As Table 1 demonstrates, most of the machines used on a construction site produce noise that exceeds action levels. This means that anyone working close to construction operations is at risk of having their hearing damaged.

What is more, there are certain conditions that can increase the intensity of noise. Spaces that are enclosed by hard walls and roofs (such as those built from brick, concrete or steel) provide one such set of conditions, as the reflection of noise from these enclosing surfaces can lead to reverberation.

High-intensity noise (i.e. noise above 100dBA) is very damaging, even if only experienced for a very short duration. Therefore some construction processes, such as shot-firing with cartridge guns, should be avoided at all costs.

Controlling the hazard by design

As construction sites present so many noise hazards, designers should always assume that noise will be an issue. Having done this, you should take steps to manage exposure to it. The most effective way of doing this is to design out noisy processes. Failing that, you should consider ways of reducing their cumulative effects.

Removing the noise hazard

Although exposure to noise is an inevitable part of construction, there are some processes that are no longer necessary. Designers should be aware of these, and avoid specifying work that requires them to be carried out. Examples of processes to avoid or minimise include:

- **Scabbling 'green' concrete to achieve a bonding surface. Instead, specify:**
 - Retarding and washing off the joint interface
 - Cast-in proprietary joint formers

Where these options are not possible, allow for the use of remote-controlled scabbling machines, or the use of scabbling equipment in a separate area with appropriate ear defenders

- **Saw-cutting joints in concrete. Instead, specify cast-in crack-inducers**



Removing the noise hazard (cont.)

- **Chasing walls for services. Instead:**
 - In new buildings, specify built-in ducting
 - In existing buildings, consider over-coating existing plaster (if it is sound enough to do so) and build ducts in
 - In either case, consider surface-mounting the services in a visually-acceptable manner
- **Site shot-firing. Instead, build proprietary ties into masonry joints**
- **Site drilling. For example, specify cast-in anchors instead of the drill-and-fix type**
- **Site grinding and cutting. For example:**
 - Detail mesh reinforcement to suit designed bay sizes, rather than having this cut to fit on site
 - Specify non-standard blocks as specials, to be cut off site under controlled conditions
 - The use of noisy rollers. Instead, specify road and slab bases that do not require the use of rollers – for example, dry-lean concrete
 - The vibro-compaction of ground

Lessening the effects of noise

If it is not possible to remove a noise hazard, there are ways in which designers can help to reduce the health risks associated with it.

You can reduce a worker's continuous exposure to noise by specifying processes of a shorter duration. For example, you could design the position of construction joints to limit the size of concrete pours to those that are achievable within two hours.

By specifying quieter construction methods, such as the quieter methods of driving piles, you can also reduce the levels of exposure to noise.

When it comes to noise intensity, designers have a further part to play. If possible, you should limit the execution of noisy operations in spaces that are enclosed by hard surfaces. Such spaces include:

- **The inside of box-girders – where the use of grinding welds and power tools is common**
- **The inside of concrete structures – as commonly encountered in refurbishment work**
- **Sewers, box-culverts and manholes**
- **Cofferdams**

Some plant has been designed with noise-reduction attachments. You should find out about these items and, where possible, modify your designs to suit their use.



Table 1: Likely noise levels of construction plant or machines
(Source: Noise in Construction [HSE] & OSHA)

Plant or machine	Likely noise level (dBA)**
Asphalt pavers	< 85
Concrete drills	> 85
Concrete grinders/cutters	~ 100
Concrete scabblers	100
Pile drivers (traditional methods)	> 100
Pneumatic hammers and breakers	> 100
Sandblasting plant	> 85
Shot-firing gun (cartridge tools)	> 120*
Dumpers	> 85
Excavators (e.g. JCBs)	> 85
Rollers	> 85
Concrete vibrators	> 85
Normal conversation (for comparison)	~ 60

* Short, very loud (impact) noises do the most harm

** The second action level for noise is 85dBA

Useful resources

L108 Controlling Noise at Work

INDG 362 (Rev1) Noise at Work: Guidance for Employers on the Control of Noise at Work Regulations 2005 HSE

www.hearingconservation.org.uk