



Measuring Noise in the Construction Industry

Protecting your
employees' hearing,
keeping the peace in
your community, and
safeguarding your
business's reputation

An eBook from the noise experts at

 **Cirrus**
Research plc

Introduction

The construction and demolition industries are a major source of pollution.

Vehicles, heavy machinery and equipment are the most common culprits, but site workers themselves also contribute; shouting and loud radios are other common causes of excessive noise on construction and demolition sites.

Excessive noise isn't just annoying and distracting. The list of health conditions it can cause is well-documented and includes **hearing loss** (noise-induced hearing loss or NIHL), **tinnitus**, **hyperacusis**, **hypertension**, **sleep disturbance**,

stress, and **poor mental health**. This is true for both occupational and environmental noise.

Environmental noise can also have a **negative impact on wildlife**, affecting migration patterns and other natural behaviours.

This eBook looks at some of the key issues surrounding noise levels in the construction and demolition industries. It suggests some simple ways in which businesses, site managers, and health and safety and environmental safety practitioners can measure, monitor and manage their noise levels.

The two types of noise

There are two main areas where noise has an impact and companies have a responsibility: **environmental noise** and **occupational noise**. Although the sources of these types of noise are likely to be the same from construction sites, the ways they are measured and their legal enforcement are different.

Environmental noise

Environmental noise (or noise pollution) is any noise that affects the surrounding environment. According to the World Health Organisation, **noise pollution is the second biggest cause of environmental health problems**, which makes it clear why it is important to reduce and control it effectively. Environmental noise can also lead to poor health in people and reputational damage to your business, especially if nuisance noise complaints are raised with local authorities.

Occupational noise

As the name suggests, occupational noise (or noise at work as it's often called) is the noise people experience while doing their everyday jobs. Naturally, building things or demolishing them is noisy work. According to the UK's **Health & Safety Executive**, construction is one of the highest-risk industries for noise₂. So, it's important to know what to look out for, how to measure noise and, most importantly, control it to reduce the risks to site workers.

Noise and the surrounding environment

Statutory requirements

The **Environment Protection Act 1990**₃ and the **Control of Pollution Act 1974**₄ set out the statutory position regarding construction site noise.

Section 60 of the Act gives local authorities the power to impose restrictions on building operations by way of a **statutory notice**. A statutory notice can impose methods of working as well as “permitted working hours”, limiting the time that work can be carried out.

Additionally, **Section 61** of the Act allows local authorities to enter into a binding agreement with construction contractors/developers, which is legally enforceable. These agreements often contain conditions that include measures to control the methods of work, the use of certain tools, silencing and screening methods, and measures on noise and vibration monitoring.

Why is noise good-practice important?

Excessive noise levels on construction and demolition sites represent a major hazard to site workers and can cause a significant amount of disturbance to local residents.

Noise causes more off-site complaints than any other issue and can quickly damage relations with local residents and tarnish a business’s reputation.

Where complaints are upheld, injunctions may be placed on businesses, limiting the amount of time in a day they can operate for. In more serious cases, residents may take civil action against offending organisations, which can cause irreparable reputational damage and delay projects indefinitely.



Monitoring environmental noise on construction sites

The need to measure and monitor noise levels is an essential part of site operations, regardless of any mitigation measures that have been put in place.

Where noise measurements are required, site operators, contractors and construction/demolition companies should ensure that those measurements meet the demands of not only the appropriate national regulations, guidelines and standards, but also those of the local authority. Failure to do so may result in a dispute over the relevance and accuracy of any measurements taken.

The noise measurement equipment

Generally, environmental noise measurements can be made using a handheld or tripod-mounted **sound level meter**. There are several different kinds of sound level meter available, varying hugely in price, from £30 to over £3000.

The British construction noise standard “Noise and Vibration Control on Construction and Open Sites”, sets out some of the criteria your sound level meter must meet in order for it to be used to measure and monitor construction noise levels.

Simply this means that your construction sound level meter must be at least **Class 2** and be able to measure L_{Aeq} (often written as **Leq**), which is the average noise level over a period of time. Additionally, it must also be able to measure the highest noise level, referred to as L_{Max} or **Maximum Hold**.

Where and how measurements should be taken

As part of your communication with the local authority, several suitable noise monitoring locations will have been agreed, usually on the boundary of your site's operation. The noise

monitoring equipment, specifically the microphone, should then be placed in a **free-field** location, approximately **1.2 to 1.5 meters above local site level**.

Free-field simply refers to an area where there are no walls, buildings or other objects close to the microphone. Because of the way sound waves travel, these obstructions can affect the noise levels that are captured by the microphone, therefore having a negative impact on the integrity of your data. It's best practice to avoid the effects of **local acoustic screening** and **acoustic reflections**.

For complete transparency, you should also take note of the calibration and battery levels at the start of each monitoring session.



Noise at work - health and safety

Statutory requirements

The **Control of Noise at Work Regulations 2005**₆ are enforced by the UK's **Health & Safety Executive** and define the noise level limits that employees can be exposed to over a working day.

The Regulations guide employers as to their **legal responsibilities** in keeping their workers safe from the dangers of excessive noise exposure.



Under the Regulations, employers are required to: their exposure.

- » Assess the risks to employees from noise
- » Take action to reduce the noise exposure that creates the risks
- » Provide employees with appropriate levels of hearing protection if their exposure cannot be reduced by any other action
- » Ensure that legal limits on noise exposure are not exceeded
- » Provide employees with information, instruction and training on the risk of hearing damage
- » Carry out health surveillance for employees where there is a risk to their health

Hearing protection should never be used as an alternative to controlling and reducing noise at source.

The Regulations provide a set of values that dictate the levels at which action must be taken to control and reduce noise, as well as limits which must not be exceeded under any circumstances.

Lower Action Values

Daily or weekly exposure: L_{Aeq} 80dB(A)

Peak sound pressure: L_{CPeak} 135dB(C)

Upper Action Values

Daily or weekly exposure: L_{Aeq} 85dB(A)

Peak sound pressure: L_{CPeak} 137dB(C)

Limit Values

Daily or weekly exposure: L_{Aeq} 87dB(A)

Peak sound pressure: L_{CPeak} 140dB(C)

Action levels and limit values

The Control of Noise at Work Regulations require specific action to be taken at pre-defined values. These limits, as set out in the Regulations, consider both a worker's average exposure and the highest noise they experience, which often includes peak, impact or explosive noises.

Every employer's **first responsibility is to reduce the risk of noise at its source**. This often involves things like buying quieter machinery and rotating workers' shift patterns to limit their exposure. After all possible preventative steps have been taken to control the noise at source, hearing protection should be used to protect workers and reduce

Measuring occupational noise on construction sites

Measuring occupational noise aims to assess the amount of noise an individual is subjected to during the course of their working day. Based on this, when occupational noise is measured, it's essential to **place the noise measurement equipment as close to the individual's ear as possible**, to gain a better understanding of the noise levels affecting them.

Exactly how this is done depends on the activities carried out by the individual being monitored. For many activities, there is often a defined space that is consistently used. For these sorts of tasks, using a handheld sound level meter is the most effective and appropriate way of measuring the noise levels. The person making the measurement can stand next to the individual being monitored to capture the required noise data.

However, construction and demolition sites are fast-paced environments where things can change quickly. It may not always be appropriate to use a sound level meter, either for practical or safety reasons. Additionally, there may be occasions where employees work irregular shift patterns or in multiple locations across a large site. In these situations, a **personal noise exposure meter** or **noise dosimeter** is the best instrument to use to gather the noise data required.

The noise measurement equipment

The requirements for noise measurement equipment used for occupational noise differ slightly to those for environmental noise. The specifications are given in the Control of Noise at Work Regulations and are as follows:

- » Sound level meters must meet at least **Class 2** of **BS EN 61672-1: 2013**, or at least **Type 2** of **BS EN 60804: 2001** (the former standard). Sound level meters must also be able to measure A-weighted noise levels as well as the C-weighted peak.
- » Noise dosimeters must meet the requirements of **BS EN 61252: 1997**. Noise dosimeters have no Class or Type.
- » Acoustic calibrators must meet at least **Class 2** of **BS EN 60942: 2003**.



About Cirrus Research

Established in 1970 in the UK, Cirrus Research is one of the world's leading names in acoustic measurement.

We are dedicated to the prevention and eradication of noise-induced hearing loss and environmental noise pollution. We achieve this by developing and supplying high-quality, simple-to-use and accurate acoustic measurement instrumentation and complementary products and services, that make the measurement of noise, vibration and other environmental conditions as easy and accessible as possible to individuals and organisations worldwide.



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References

¹ European Commission, available at https://ec.europa.eu/environment/noise/health_effects_en.htm

² Health & Safety Executive, available at <https://www.hse.gov.uk/construction/faq-noise.htm>

³ Environmental Protection Act 1990, available at <https://www.legislation.gov.uk/ukpga/1990/43/contents>

⁴ Control of Pollution Act 1974, available at: <https://www.legislation.gov.uk/ukpga/1974/40>

⁵ BS228 Code of Practice for Noise and Vibration Control on Construction and Open Sites

⁶ Control of Noise at Work Regulations 2005, available at: <https://www.legislation.gov.uk/uksi/2005/1643/contents/made>

