

# Can heat pumps be quiet?

Build It has partnered with Quiet Mark to bring you an in-depth guide to how efficient modern heat pumps can deliver a comfortable, low-noise living environment in your home

## MEET OUR EXPERT PANELISTS



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## Q What can be done at the design stage to minimise heat pump noise?

**Martyn Bridges:** Firstly, it's important to differentiate between the most common types of heat pump in UK properties. A GSHP uses a collection loop buried in the ground, which heats up the refrigerant within the unit. So, it's rare to receive noise complaints about GSHPs.

ASHPs, meanwhile, feature an externally-sited fan and compressor, plus a circulation pump. The very small number of noise issues people have generally stem from these parts of the system. The maximum noise of a heat pump measured from 3m away must be no more than 42dBA, which is about the same as a bird singing. Our 7400 heat pump achieves 38.5dBA at a 3m distance.

**Mark Wilkins:** Good system design should consider the installation site, clearance around the unit and any materials or structures that may reflect noise. To further reassure homeowners, MCS accredited installers can carry out a Noise Impact Assessment that will help to establish the ideal location for the heat pump.

Specifying a low-noise model in the first place is a key step. Quiet Mark's stamp of approval allows you to easily identify the quietest, highest-performing options on the market. For instance, in operation, Vaillant's Quiet Mark-accredited aroTHERM plus has a sound power of just 54dB, which is only slightly more than a refrigerator.

**Neil Sawers:** While an ASHP's fan does produce some noise, it should be very quiet. The compressor's lower frequencies are easier to hear, but manufacturers take steps to reduce this, such as transferring sound through the structure of the heat pump to minimise impact on the end user. Nevertheless, it may be preferable to fit the unit away from outdoor seating areas or windows in regularly-occupied living areas. Bear in mind, too, that for a heat pump to achieve MCS certification, it needs to adhere to certain sound characteristic standards – and MCS approval is a requirement if you want to access the government's Boiler Upgrade Scheme.

## Q What's involved in assessing heat pump sound levels?

**Hamid Salimi:** The MCS020 noise assessment, which is part of permitted development rights, is quite thorough. It ensures the outdoor unit is quiet enough so that it doesn't make noise when heard from the



assessment position – which is defined as 1m away from a habitable room at the neighbouring property.

**Neil Sawers:** Here in the UK, manufacturers are also required to test their heat pumps' sound levels, at a flow rate of 55°C, in accordance with British Standards. This test produces a weighted sound power level, which can be used to calculate real-world sound pressure (in dBA), depending on the number of reflective surfaces within 1m of the heat pump and the distance the unit is from the assessment position. The maximum sound pressure level permitted under the Town and Country Planning Act is 42dBA, irrespective of distance to the heat pump.

In some scenarios, it can be tricky for the on-site engineer to measure sound performance effectively. So, at Grant UK we use a calculator that accounts for all of this, plus whether there is a barrier around the appliance, which cuts out the risk of installer error.

**Brian Beattie:** Many market-leading heat pumps have been secondary-tested and received the Quiet Mark stamp of approval. This is only available to models with the lowest levels of noise operation.

## Q Where's the best place for my heat pump?

**Hamid Salimi:** Heat pumps are usually installed outside in the garden but close to the property's wall. As they're quiet, they can be fitted near to the living room – but both the internal and external units should both be a good distance away from bedrooms. The indoor unit is typically fitted in either the kitchen, airing cupboard, utility room or loft. Specifying a Quiet Mark model will give you most flexibility in terms of positioning.

**Brian Beattie:** For an ASHP, it's important to ensure the external unit is in an area with good air flow, as this allows the fan to operate at a low noise level. It may also be advisable to locate it away from living areas – partly because it means engineers can easily gain access for future maintenance without disturbing occupants.

**Martyn Bridges:** UK homes are typically quite small, so there may not be a great deal of choice in terms of where the heat pump is sited. Installers aim to choose the most discreet, practical and unobtrusive location. Near a kitchen window or utility is typically ideal, as these rooms are vacated at night. Some models can fit beneath the typical cill height of a downstairs window.

**Neil Sawers:** Every installation is different, so it's worth discussing the possibilities with your engineer. Many customers prefer to keep the heat pump out of areas where children play, as well as away from opening windows, doors and outdoor entertaining areas. For instance, provided the necessary pipework can be accommodated, the external unit could be positioned next to an outbuilding rather than the main house's wall.

## Q What other measures can be taken to abate noise from a heat pump?

**Neil Sawers:** The installing engineer should prepare a suitably firm, flat foundation for the heat pump unit that supports its weight while also reducing the transmission of noise and vibration. This could be a flat-trowelled concrete base 150mm deep, or thick paving slabs laid on compacted hardcore. We'd also recommend the

heat pump is raised up from the base surface by around 100mm on anti-vibration feet, such as Grant UK's easy-install flexi foot kits. Ensuring the heat pump is correctly setup, commissioned and maintained is also critical.

**Martyn Bridges:** Established manufacturers such as Worcester Bosch have designed out many of the noise issues associated with heat pumps. But we can provide add-ons to further reduce noise, such as fitting a sound diffuser that will knock off around 4dBA. We can also provide a sound-insulating hood that dampens noise from the fan and compressor. If noise is an important consideration for you, it's worth selecting a heat pump range that offers these kind of optional accessories.

**Brian Beattie:** A heat pump should be sized to maintain the desired ambient temperature in your home. When it warms living spaces from cold, it will need to run harder, which can create more noise from the compressor and fan – especially with radiator-based systems, which use higher operating temperatures. This might be addressed at design stage by slightly oversizing the heat pump. The speed of the unit's compressors and fans will then modulate to meet demand and not use any more energy than required.

Once a heat pump is installed, it's difficult to reduce noise. Relocating the unit can cost close to the original price of installation. Warmflow's heat pumps feature a quiet operating mode, which can be put on a built-in timer to reduce the noise of the units by lowering the fan and compressor speeds. In addition, our heat pumps include resonance avoidance settings to isolate and avoid the compressor speeds that cause most noise at a given installation site.

**Hamid Salimi:** An undersized system could get louder if outdoor temperatures are low. So, the heat pump must be correctly sized and properly setup post-install. Other measures include hiding the unit behind a fence or fitting it with an acoustic cover. However, this can reduce performance. Features such as compressor jackets, anti-vibration mounts and well-engineered bearings on the moving parts will all help. We also recommend servicing and cleaning the heat pump (especially the outdoor coil) on a regular basis. If it gets clogged up, the system could get slightly louder as the fan will speed up to deliver the required heat transfer through the coil.



Above: Grant's Aeron3 13kW and 17kW air source heat pumps both hold Quiet Mark certification. Here, the external unit has been installed behind fencing for even greater acoustic protection

During the colder months, your home's heating is likely to be on for long periods of the day. So, self-builders are understandably keen their central heating system isn't going to disturb them when they're running. For many of us, the time feels right to move across to low-energy, low-carbon solutions – indeed, the government's Boiler Upgrade Scheme is specifically designed to encourage uptake of technologies such as heat pumps. But how can these renewable options support a healthy, low-noise home?

Right: The Quiet Mark-certified 7400iAW is Worcester Bosch's quietest outdoor heat pump unit, with ultra low-noise in operation enhanced by an additional diffuser

Well, it might surprise you to learn that heat pumps are usually quieter than fossil fuel boilers. Depending on the manufacturer, specific appliance and how it's installed, a ground source heat pump (GSHP) may only reach 42dB (decibels); while a typical air source heat pump (ASHP) operates at around 40 to 60dB. To put that in context, 40-45dB would be similar to a quiet office or library, and 50dB to the sound level a typical fridge emits. Even so, if you want to ensure long-term comfort, it pays to put time into the planning stages of your heat pump installation. Here's the expert view on what you need to know.

## QUICK GUIDE HOW QUIET MARK ASSESSES HEAT PUMPS

Build It understands how noise at home can increase stress levels, disturb sleep, reduce productivity and ultimately deeply impact how you enjoy your living environment. So, we've partnered with Quiet Mark, the international certification programme associated with the UK Noise Abatement Society charitable foundation, to create this guide to low-noise heat pumps.

Through scientific testing, expert acoustic assessment and continuous data analysis, Quiet Mark seeks to help consumers and specifiers choose quieter technology and effective solutions to create a serene environment that supports wellbeing at home, work and in every living space. It identifies the quietest products in a wide range of categories, such as building materials, home technology and appliances – including boilers and heat pumps – and only certifies the best-performing products in each.

For more information and to find Quiet Mark approved solutions for your home visit [www.quietmark.com](http://www.quietmark.com)