BUILD RIGHT

# Reducing noise from heat pumps

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Noisy heat pump outdoor units can rattle the neighbours, especially for those living in higher-density housing. There are, however, some straightforward steps to minimise unwelcome sounds.

**ONE OF** the main complaints from occupants living in medium-density housing in Aotearoa New Zealand has been noise and vibrations, particularly from the outdoor units of heat pumps.

### *Can be a noise nuisance*

Split-unit heat pump systems consisting of an indoor and outdoor unit are the most commonly installed systems in New Zealand. The outdoor unit consists of a compressor and fan, which produce both vibrations and sound. The sound may be transmitted directly through the air and indirectly through the building structure, while vibration transmits through the building structure.

If inappropriately located and installed, outdoor units can cause significant and undesirable noise disturbance. The noise is generally a problem during evenings when the ambient noise tends to be lower and at night when people are trying to sleep.

### *Reduce noise to improve quality of life*

By understanding how the noise produced by outdoor units creates problems for others, steps can be taken to mitigate the effects to both dwelling occupants and neighbours.

#### *Select an appropriate unit*

The first step is to select a heat pump with a low sound level output. Heat pumps should have a rating that will meet the local authority noise

emission limits, but this should be checked before purchase. The sound output or decibel rating will generally be specified on the unit.

The second step is to select an appropriately sized heat pump for the space required to be heated and cooled to avoid excessive load on the system during operation.

### *Carefully choose the outdoor location*

Before installing the system, consider the location of the outdoor unit to minimise the effect of noise to both the dwelling and to adjacent properties.

Do not locate an outdoor unit:

- close to or beneath a window in a bedroom or other regularly occupied room
- so that the unit is facing or directed towards bedroom windows or outdoor living areas of either the dwelling or adjacent properties.

The preferred location for an outdoor unit is as close to the location of the indoor unit as possible since when the outdoor unit is in operation, the indoor unit will also be producing fan noise.

### *Mounting and fixing outdoor units*

General installation for all outdoor heat pump units should include:

- mounting the outdoor unit on a concrete pad where possible or concrete paving slabs on a solid compacted base
- ensuring there is a minimum 100 mm ground clearance to the underside of the unit
- ensuring the unit is level, stable and fixed securely.

Outdoor units should be installed on isolation mounts or pads. Isolation mounts generally provide more effective vibration reduction than pads, but both will act as a buffer between any vibration produced and the surface on which the unit is mounted. Several proprietary products are available made from a range of absorbent materials including neoprene, cork, plastic and rubber.

Outdoor units should not be mounted on the walls, decks or roofs of timber-framed buildings as reverberation from the unit will be readily transmitted through the entire structure.

### *Use a fence to block sound transmission*

A fence can effectively block sound transmission. It should be made from minimum 20 mm thick timber or a material of equivalent density and not have any gaps between boards.

The outdoor heat pump unit should always be installed so that there is no line of sight between the unit and neighbouring bedrooms or outdoor living spaces.

Although a fence can block noise to an adjacent property, noise may sometimes be reflected off the fence back towards the dwelling.

### *Enclose the outdoor unit*

Partially or fully enclosing the outdoor unit can help reduce the level of sound transmission. An enclosure should be constructed from a relatively high mass material – for example, timber rather than sheet metal – and include a sound absorbent material such as fibreglass insulation or polyethylene foam. The sound absorbent material must be protected from UV light and weather. Polystyrene is not an effective material for reducing sound transmission from outdoor units.

Ensure that an air circulation space is maintained around the unit, particularly to the air inlet and outlets, in accordance with the manufacturer's recommendations.

### *Maintain the outdoor unit*

Regular maintenance of heat pumps is essential for good operation and will help keep noise levels as low as possible. Depending on use, heat pumps should generally be serviced every 12 months by a qualified person.

Maintenance of the outdoor unit to minimise noise levels should include:

- lubricating bearings and replacing them when worn
- inspecting the fan for damage and repairing as required
- replacing electrical and mechanical parts when they become noisy
- checking that casing screws and fixings are tight
- checking that the unit is securely fixed and levelled in both directions.

**For more** See *Heat pump configuration and installation* at www.level.org.nz.