

HEAT PUMP ONLY AS GOOD AS ITS INSTALLATION

There has been a rapid growth in the number of heat pumps installed over recent years. Although an ongoing BRANZ study shows that many installations meet the regulations, there is still room for improvement.

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Greater electricity use is being driven by increasing use of heat pumps, for both heating and cooling, and bigger and better entertainment appliances, but exactly how much more power these appliances use is unknown.

To date, there has also been little information on heat pump installation quality, performance and temperatures. Overseas studies have shown that the quality of the heat pump's installation strongly influences its efficiency. It can also affect the weathertightness of the building and shorten the life of the heat pump.

A 3-year BRANZ project is monitoring household temperatures and the energy use of heat pumps. It is also gathering information on the social aspects of households with heat pumps and large entertainment appliances.

Results from first year of study

One year into the project, the installation quality of heat pumps in the first set of houses studied can be reported. These houses were in Northland, Auckland, Waikato, Manawatu-Wanganui, Wellington, Otago and Southland. The remaining areas of New Zealand will be studied in year 2.

Of the 85 houses in the first-year sample, 67% had heat pumps that were more than 1 year old, and the rest were evenly split (6 months to 1 year and less than 6 months old). There were 99 heat pumps assessed because some houses had more than one.

Outdoor installations

Checks of the exterior ducting, flashings and waterproofing revealed that 93% of installations met the recommendations for these areas. However, few heat pumps had sealed gaps around the pipes coming out of the ducting

(see Figure 1). The pipes mostly went straight through the external wall and then down the outside of the building.

Some outdoor units (10%) were unstable. Often they had been connected to a bracket to keep the unit off the ground, but the bracket hadn't been connected to something solid, for example, concrete (see Figure 2). Although clearance of the unit from the ground wasn't part of the check, many were found to have little clearance (see Figure 3), often much less than the 100 mm recommended.

Indoor installations

Indoor units were generally installed with no ducting visible and in a tidy manner (91%). A number of units were not installed in the ideal position; instead, the easy access option was taken. No units were confirmed as being insecure.

In many houses (45%), it was not possible to see the drainage hose. This could be because it:

- is draining into an existing drain, possibly on the roof
- has not been installed
- is draining under the house.

The last two reasons could cause moisture issues in the house.

Having the drainage hose directed on to a concrete path was typical, but is unattractive and could be a slipping hazard.

Compliance knowledge lacking

Over half the participants (52%) in the study did not know about the requirement for an Electrical Certificate of Compliance for the electrical work, and in some cases the heat pump had not been earthed. All hard wiring must be completed by a registered electrician and have an Electrical Certificate of Compliance.



Figure 1: No sealant in the gap at the end of the ducting.



Figure 2: Unit not fixed to the ground.



Figure 3: No clearance under the unit.

Around a third of participants knew they had this certificate for their heat pump installation.

Isolator switches and separate circuits

A number of houses that did not have an isolator switch. Discussions with electricians on whether a circuit breaker would meet the regulations instead were not resolved. These rules need to be clarified.

Inverter units with a heat output of 5 kW or more are required to have a dedicated circuit. Of the heat pumps checked, 35% were not installed on a separate circuit, and for another 19%, an electrician could not tell if they were on a separate circuit or not.

For the 45% of heat pumps that were on separate circuits, they tended to be either installed:

- when the house was built
- close to the distribution board
- on a disconnected circuit – often the underfloor heating or night-store heater(s) had been removed and the circuit reused for the heat pump(s).

Where the circuit already existed, the condition of the wiring is unknown.

Installing the heat pump on a power point was common. However, if there is no isolating switch, it is impossible to turn the heat pump off without affecting electricity to other parts of the house.

Simple guide needed

Users were mostly happy with the instructions they received at the time of installation, but some felt that the detailed instructions were too much to take in at once. A number of users (22%) did not have the maintenance and servicing requirements explained to them. This is a concern because heat pumps need maintenance and most users haven't owned one before.

There needs to be a simple guide on what occupants can expect their heat pump installation to look like. It should include what information they should receive from their installer so they can use their heat pump correctly. This would also help tenants in rental

properties, as they often don't have the manual for reference.

Because tenants often didn't know about maintenance and servicing requirements, we found some very dirty filters. This would likely result in inefficient heat pumps.

What will happen in year 2?

The second year installation check will investigate and record in more detail the problems highlighted so far (for example, clearance from the ground and sealing of ductwork). With the larger number in the sample, it will be possible to break down the results into heat pump age, make, in-situ performance and geographical location. Comparisons will also be made between the size of the installed heat pump and the size suggested by the heater sizer in the *EECA Good practice guide*.

This information will ensure our houses are heated effectively and update existing information on where electricity is being used.

The EECA Good practice guide is available from www.eeca.govt.nz. ■