



# FIXING EXTERIOR HOT WATER APPLIANCES AGAINST VENEER

**Gas water heaters are often placed on the outside of houses. To keep them stable during earthquakes they need restraints but this can be a challenge for brick veneer buildings.**

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**G**as water heating systems have been popular for providing hot water for households since the development of the natural gas fields in Taranaki during the late 1970s. This cheap natural gas made gas heating systems competitive with the traditional electrical hot water cylinders.

Often the water heaters are placed on the outside of the house so the expended gas can exhaust to the atmosphere without the need for flues. This also lessens the potential for a fire to start through malfunction of the appliance.

Such heaters are tall and narrow, making them susceptible to overturning in an earthquake if not properly restrained. Typical domestic water heaters have capacities of 130–160 litres, which translates to an approximate heater weight (including the metalwork) of 150–180 kg.

When calculated in accordance with the loading standard, NZS 1170.5: 2004 *Structural design actions – Earthquake actions – New Zealand Standard*, the possible acceleration forces on the heater could be as high as 2.26 times the weight of the heater, depending on the location of the property and the soil conditions beneath it. The force to be resisted by the fixings to the wall at the top of the heater will then be approximately 1.5–2 kN. This force could either be along the wall or at right angles to it or a mix of the two because the earthquake ground shaking is random in direction.

## Easy if can be fixed to wall framing

When the heater is able to be directly fixed to the wall framing, as is the case with sheet and weatherboard claddings, the force can be transferred to the framing using a strap around the heater, near the top, and coach screws into the studs. The assumption is that

the heater is adequately fixed to the ground. If this is not the case, the base of the heater must also be strapped to the foundation of the house.

## Plan to fix to brick veneer

However, care is required if the heater is fitted to the outside of a brick veneer house.→

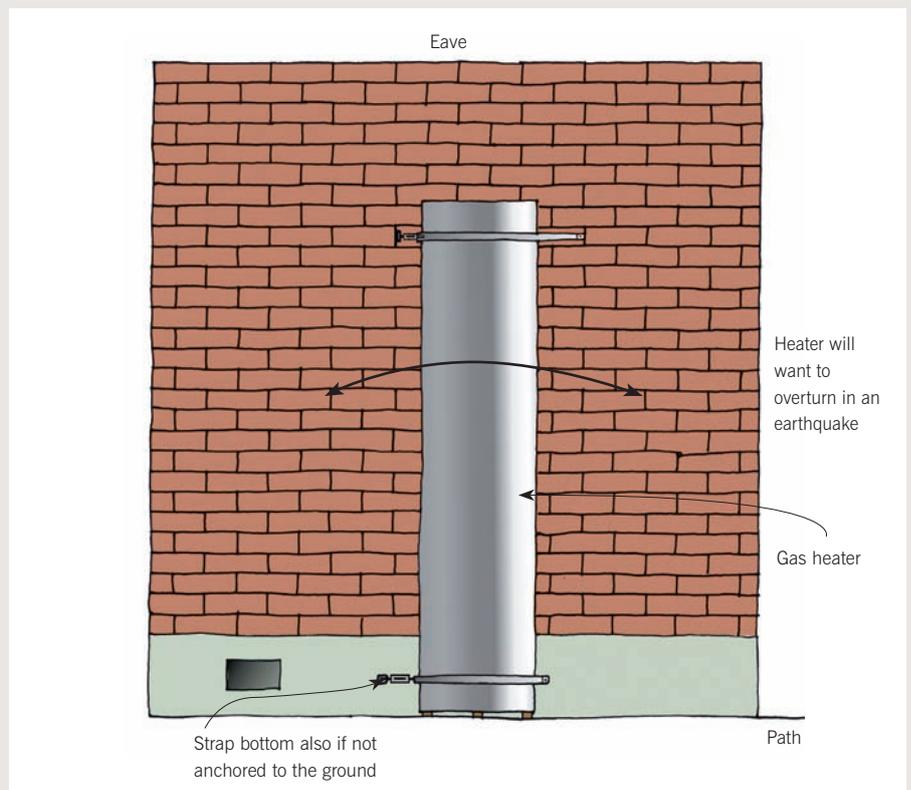


Figure 1: Fixing gas water heater through a new veneer.

The veneer is spaced off the framing making access to the framing difficult, especially in an existing house. Because the veneer is only a cladding element and is not expected to resist any loads other than its own self weight, fixing the heater directly to the veneer is not desirable but in some cases it may be unavoidable.

With planning it is relatively simple to fit an external gas heater to new houses. Fit 25 x 0.9 mm stainless steel straps, coach

screwed to the studs with 10 x 50 mm stainless steel screws on both sides of the heater unit. These can then pass through the perpend joints in the veneer (see Figures 1 and 2) as the veneer is constructed. Stainless steel will ensure continued corrosion resistance over the life of the installation. Once the heater is installed, a second length of stainless steel strap and turnbuckle, fitted between the protruding straps, can be used to secure the heater. If the heater is spaced off the wall, suitable packing will be required between the heater and the veneer to allow the strap to be properly tensioned.

### Difficult for existing brick veneer

Access to the studs in existing veneer situations is nearly impossible so it will be necessary to connect to the brick veneer. The ties that connect the veneer to the wall studs are designed to transfer only the face load from the veneer to the studs in the event of an earthquake. However, the additional earthquake load from the heater should be able to be spread over several ties because of the close fixing grid.

Most clay brick veneers have perforated bricks (i.e. there are holes in them that run from the top to the bottom faces). It is therefore important to make sure that the fixings securing the heater are correctly placed. Proprietary stainless steel anchors capable of transferring up to 2 kN of tension or shear load into the veneer will be required. These should be installed into the horizontal mortar joints for best holding power. An exterior strap system, similar to the new house construction described above, should be used (see Figure 3). ◀

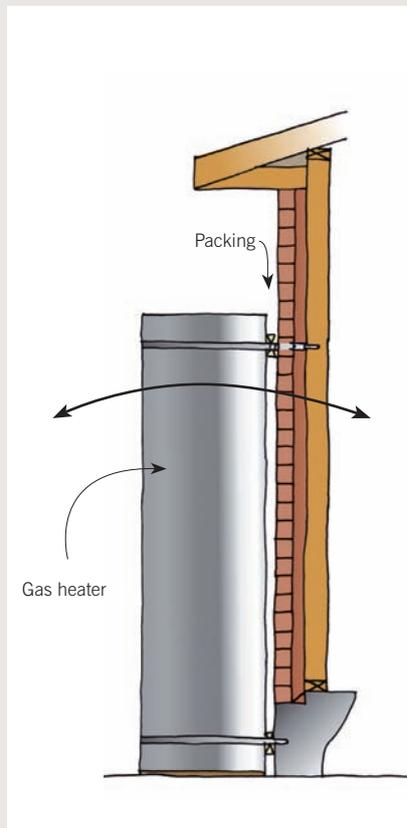


Figure 2: Section of fixing gas water heater through a new veneer.

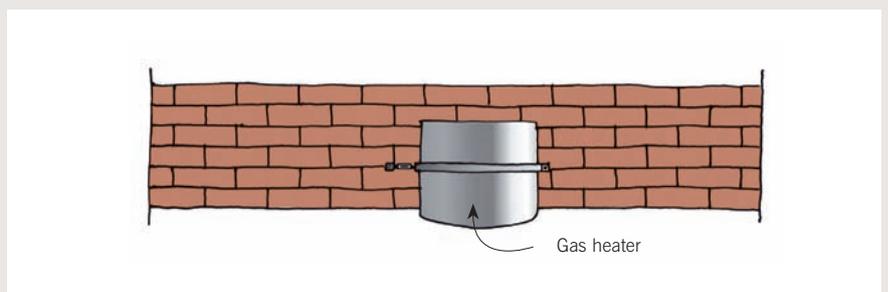


Figure 3: Fixing gas water heater to an existing veneer.