



HOT WATER CYLINDER RESTRAINTS

The recent earthquakes in Canterbury have highlighted the need to secure items that may be critical to occupants' survival after an earthquake. One such item is the hot water cylinder.

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Hot water cylinders are a very valuable source of freshwater when the town supply is cut off, as happened after the earthquake in some parts of Christchurch for several weeks.

The hot water cylinder represents a large inertial mass – a 135 litre cylinder weighs approximately 170 kg when full. Without restraint, these can be flung around by the force of the earthquake and damage other items, or the pipe connections can be fractured (see Figure 1).

Block base and restrain top

Timber blocking may be installed to prevent sliding of the base of the cylinder on its supporting structure (see Figure 2). A minimum of three blocks should be used, spaced as evenly as possible around the perimeter. Each block needs to be fixed down with two Type 17 screws 75 mm long and not less than 12 g or two 100 mm long nails. However, this is only half of the answer.

The hot water cylinder is also liable to topple if it is not restrained at or near the top. Very often, there is only a single wall to which the restraint can be attached. The simplest solution is to install a metal strap commonly available from a builders' merchant (see Figures 2 and 3).



Figure 1: Damage to wall linings from unrestrained hot water cylinder.

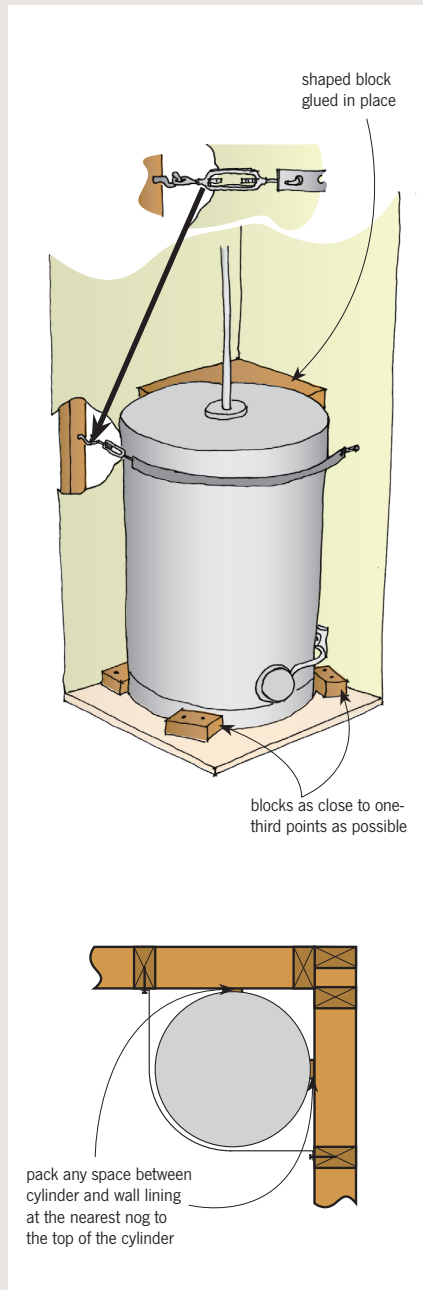


Figure 2: Recommended restraints for hot water cylinder in corner.

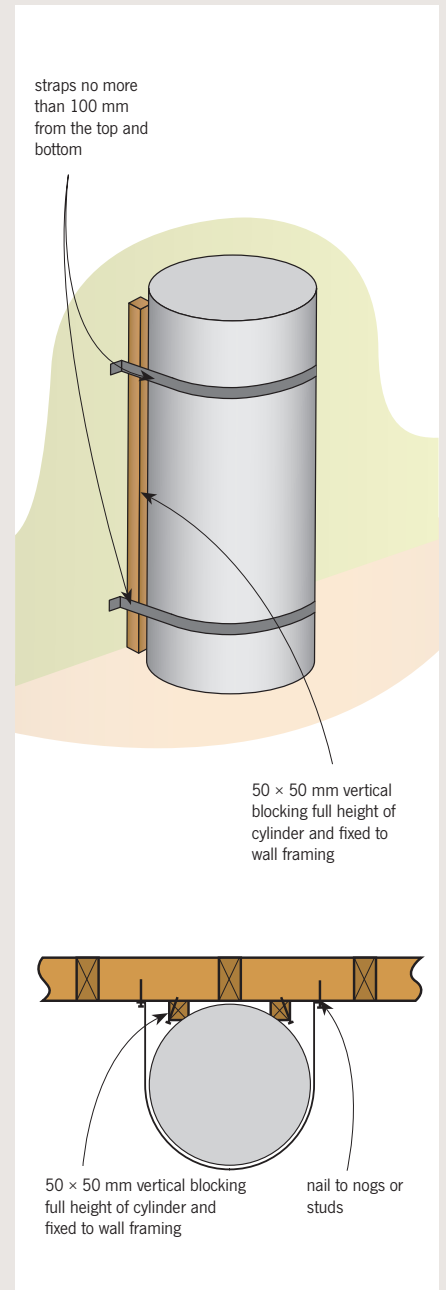


Figure 3: Hot water cylinder restraints on a flat wall (alternative to base blocks and strap at top).

It is important to have a solid substrate to which the restraint strap is attached, and studs or nogs should be located before fixing the strap.

Blocking needed at top as well

Wrapping the strap around the cylinder and fixing it to the wall on each side is *not* an adequate solution because the cylinder can still rock parallel to the wall during an earthquake.

It is important to fit timber blocking in conjunction with the metal strap (see Figures 2 and 3). This will allow the cylinder to be snugly restrained. As with the base restraint, adequate fixing strength is important to ensure satisfactory performance in an earthquake. Type 17 screws at least 50 mm long are recommended with a 30 × 2 mm square washer to sandwich the strap. Alternatively, a heavy duty hook may be fitted to the stud or nog and a

turnbuckle included in the strap for tensioning. A similar system may be installed near the base of the cylinder if there is no opportunity to fit the timber blocks on the supporting structure beneath.

Similar system for cylinders in corners

Where the cylinder can be restrained in a corner between two walls, a similar restraint system may be used. Again, it is important to pack the space between the cylinder and the walls to ensure that it is firmly sandwiched between the strap and the walls.

Retrofit possible

The restraint systems described can be installed on existing hot water cylinders, but it is simpler to have the restraint fitted during installation.

This allows good access to the back of the hot water cylinder to fit packing.

Curved timber packing blocks ensure an even bearing on the cylinder outer casing for restraint.

Heat pump water heaters

Heat pump water heaters are now becoming more common. These usually stand outside the house against the wall with rigid plumbing to the house.

Appropriate packing and blocking can be fitted in place before heat pumps are installed. This will ensure a satisfactory seismic restraint from the outset.

The method is essentially the same as for hot water cylinders, with the aim of preventing movement away from the wall or along the wall, so that the plumbing connections remain sound during an earthquake. ◀