Factsheet

Installing a Heat Pump into an Existing Property V5

As the advantages of heat pumps are recognised, more people are installing them in new build properties where their benefits are well documented. It is also possible to install heat pumps into existing properties, but they have to be treated carefully as the insulation levels are generally not up to current Building Regulations.

Sizing:
The heat loss of the property is determined by how well the building is insulated. If the insulation is not known then it becomes difficult to size the heat pump accurately. The only way this can be achieved with any degree of accuracy is to commission a Heat Loss calculation according to BS EN12831 which takes into account the build, insulation, heating system, etc and can be used to determine a peak heat load.

In**sulation:**
Insulation plays a big part in how effective a heat pump operates. Reducing the energy requirement for any building should be a central theme to the design process. Any investment in an upgraded insulation specification will have a far swifter pay-back than the return on any renewable technology. For this reason, consideration should be given to improving the insulation level as much as practically possible.

There is also a concern for un-insulated buildings that the actual heat emitting device, i.e. radiators, under-floor, etc. will not output enough heat at the heat pump's lower flow temperatures to obtain a warm enough temperature within the building. This is a particular concern when the temperature outside is cold.

As a guide, a building post 1985 with cavity wall insulation, double glazing and 300mm thick loft insulation, will have a peak heating load of 50W/m2. A property built before 1985 with single glazing we would assume has a peak heating load of 70W/m2 or greater. In cases of very poor insulation the low temperature output from the heat pump may mean that the building will never get warm and that the running costs for the heat pump are increased.

Facts at a glance:

Sizing—Determining the heat loss of an existing property is difficult and a heat loss calculation to BS EN12831 would be required to provide a peak load.

Insulation- Insulation levels for the property have to be good. Poor insulation leads to high running costs and the possibility of the building being cold.

For a poorly insulated building Kensa do not recommend that a heat pump is fitted to be building .

The existing heating system:
Many existing properties will be heated by radiators. As radiators have a smaller surface area than under-floor, they require a higher flow temperature to provide heat. Before a radiator will provide any heat the flow temperature needs to be at least 45oC. This does mean that the efficiency of the heat pump is reduced, simply that the Coefficient of Performance (COP) drops from 4 (for under-floor in screed) to 3. This means that for every one unit of electricity used the heat pump will produce 3 units of thermal energy. This is still a significant saving compared to oil and LPG.

Due to the lower flow temperatures produced by a heat pump compared to a traditional fossil fuel boiler, the surface area of the radiator will need to be increased to provide the required heat into the building. Therefore all radiators may need to be upgraded.

Land Available:
A ground source heat pump uses renewable stored solar energy from the ground to heat the property. It absorbs this energy by means of a ground array buried within the property's boundaries. It is important to ensure that the correct amount of pipe for the application is buried and that it is buried correctly. If insufficient pipe is installed then the ground could potentially run out of energy mid heating season, leaving the occupants without heat. It is important to remember that if the heat pump is producing Domestic Hot Water as well as space heating, an additional amount of ground array is required simply as there is an additional all year round load on the ground.

As a guide, roughly 2 to 2.5 times the area being heated is required to install horizontal ground arrays. If there is insufficient land available an alternative to horizontally laid ground arrays is a vertical drilled borehole. These can be down to a depth of over 100m. Drilling a borehole is a specialist activity and as such can be expensive. As a guide these costs can be £40-£45 per m.

More facts at a glance:

Radiators—The heat pump needs to be run at a higher flow temperature reducing efficiency. Radiators will also generally have to be oversized .

Land available—As an estimate approximately 2 to 2.5 times the area to be heated is required as available land to install horizontal ground arrays. If this is not available vertical ground arrays are an alternative but can be expensive.