kensaheatpumps

Fact Sheet

Fact Sheet - Heat Pumps at Start-up for Flat Battery Buildings

Heat pumps are generally sized to match the heat losses from a building and it is assumed that the building will never be allowed to go fully cold. A supplementary heating source (such as a log burning stove or electric heating) may therefore be required to heat a building up from cold, particularly in cold weather. This is often termed a *flat battery building*.

When a building is cold, perhaps 5°C, and the weather is also cold, the water in the underfloor heating system is likely to be about 5°C as opposed to the normal 20-30°C. This means that the water coming into the heat pump will also be just 5 deg C.

If you give the heat pump a load at just 5°C, its refrigeration capacity is massive, perhaps twice its rated output power. So, a 5 kW heat pump with a load (i.e. underfloor) temperature of just 5°C could try and extract as much as 10 kW from the ground arrays. Essentially, the building needs extra energy from the ground arrays in order to heat the building up, as this takes much more ground energy than simply keeping pace with heat losses.

A ground source heat pump, under these conditions, will have a very low power output on the load side of perhaps just 60% of its rated capacity, so it will take a very long time to heat the building, although it will get there eventually. If the building is heated up one zone at a time (in other words, turn the thermostat down in all the rooms, and just bring one room up to temperature at a time) then it will heat up much quicker.

To avoid this situation developing:

1. Never let a flat battery scenario develop, and if you do, you may need a supplementary heat source to help heat the building up to temperature from cold.
2. Only heat the property up one zone at a time, so that the return temperature will rise quickly initially, and remain high.

Air source heat pumps have specific problems with flat battery buildings, and will need a buffer tank or thermal store if they are connected to a wet style of underfloor heating system.

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Facts at a glance:

Flat Battery Buildings
Flat battery buildings are buildings which have been allowed to go fully cold and have a heating distribution water temperature similar to the ambient external temperature.

Sizing of Heat Pumps
Heat pumps are generally sized to match the heat losses from a building which isn't fully cold.

Reduced Power Output
The lower the heating distribution water temperature the more energy the heat pump will try and extract from the ground. Under these conditions the power output on the load side is reduced.

Longer Heat Up Time
A flat battery building results in a longer heat up time .

Reducing the Heat Up Time
Supplementary Heating such as a log burner can be used to reduce the heat up time as well as heating the property up one zone at a time.

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