Heat Pump – Air/Ground/Water to Water System: Applicant Guidance

We have created this guidance to walk you through what supporting information would make a high-quality application on various types of heat pump systems.

Most heat pump solutions operate at lower flow temperatures than existing fossil fuel systems. These lower flow temperatures will generally be between **35-55°C** rather than the **70-80°C** for a traditional oil/gas boiler. Low temperature systems only work in sites that are adapted for these lower heating flow temperatures. Therefore, we need you to evidence that the site will be suitable for the proposed heat pump system once all the works are complete. Aspects of the building that need to be checked to assess whether it will be suitable for low temperature heating are the building fabric and peak heat loss of the building, proposed heat emitters and heating pipework.

It is recommended that applicants also review the latest guidance from CIBSE titled *AM17: Heat pumps for large non-domestic buildings*, which details best practice in the design, installation, commissioning, operation, and maintenance of large heat pump systems.

Information you will need to provide with your application

Whole Building Approach

Follow the whole building approach outlined in the scheme guidance and show that the proposed building fabric is suitable for your heat pump measure.

- The building needs to have a reasonable level of insulation and air tightness so that it is possible to heat it sufficiently using low temperature hot water for heating.
- Please provide details of the existing building thermal envelope including areas and U values i.e., floor, walls, roof, windows, and doors

Sizing New Heating System

The peak heat loss of the building needs to be calculated. Please find the tool on our website in the supporting documents.

- The peak heat load of the property needs to be calculated by measuring all the fabric and ventilation/infiltration heat losses for the coldest day of the year based on geographic location. As per CIBSE guides.
- Estimate of air change rates can be used for ventilation rate estimate.
- The calculation should account for the areas of the walls, floors, roof, windows and doors and their U values.
- The peak kW rating of the heat pump needs to match the peak kW heat loss of the building.

- The kW rating of the heat pump depends on the flow temperature it needs to provide and the lowest winter external air temperature. Ensure you are considering the air and flow temperatures on the manufacturers specification when sizing your heat pump.

Domestic Hot Water (DHW)

Survey of Existing Heat Emitters

A survey of existing heat emitters needs to be completed for any systems proposing lower flow temperatures than the existing system.

The lower flow temperatures of heat pumps require larger heat emitters than traditional boiler systems to allow the heating system to provide the set point temperature in the building. A survey needs to be completed to see whether existing heat emitters are large enough for the proposed flow temperature. If some or all the heat emitters are not large enough then they will need to be replaced to allow the heating system to heat the building to the desired set point temperature.

Survey of Existing Pipework

A survey of existing pipework needs to be completed for any systems proposing higher flow rate than the existing system.

The pipework needs to be compatible with the new flow rates. Systems with lower temperature differences between the flow and return water temperature require higher flow rates to meet building heating demand. Heat pumps generally have a lower temperature difference between flow and return temperatures when compared to fossil fuel systems therefore need higher flow rates. If the old pipework is too small in diameter for the new flow rates required by the heat pump, then it needs to be replaced.

Distribution Network Operator (DNO)

It is important that your Distribution Network Operator (DNO) is contacted to ensure that you can connect your heat pump to their network within the PSDS timeline. This could resolve some problems in the future as part of the PSDS scheme:

- Example 1: You may find the DNO has too much demand for the local network already and therefore deny your request for permission to connect your heat pump to the network.
- Example 2: Your heat pump may not be compatible with the current grid connection.
- Example 3: There could be delays in obtaining approval for this causing the project timescale to be delayed.
- Example 4: There can be long lead times for electrical upgrades at the sites that require them.

You will need to provide the DNO with details of your installation and typical loading vs your maximum demand.

Table 1: Checklist for all types of air-to-air and air-to water heat pump applications

All Types of Heat Pump Applications Checklist	
1. Description of works: background information of existing heating system and if any infrastructure will remain that will be used by the heat pump.	☐
2. Schematics and drawings of existing and proposed system.	☐
3. Details of the building fabric measures indicating suitability for heat pump.	☐
4. Heat pump sizing calculations based on building peak heat loss.	☐
5. Explanation/evidence to check DHW demand will be met.	☐
6. Flow and return temperatures for new heat pump system.	☐
7. Explanation/evidence to check proposed pipework and pumps is suitable for required flow rate.	☐
8. Indicate heat emitters sized appropriately for the flow temperature.	☐
9. Details of current heat emitters.	☐
10. Details of proposed heat emitters.	☐
11. Specification for chosen heat pump to confirm the Seasonal Coefficient of Performance (SCOP) for given flow temperatures/operating conditions.	☐
12. Indicate initial contact with Distribution Network Operator (DNO) for heat pump installation to local electricity network (include timeframe in project plan).	☐

Table 2: Checklist for GSHP & WSHP heat pumps

GSHP & WSHP Checklist	
1. Details of source system design (boreholes, horizontal ground loop, closed or open loop water system). ➢ Ensure source system design specifications are matched to the heat pumps specifications. ➢ Ensure maximum power you can extract from your source system matches the peak heat demand of the site.	☐
2. GSHP – A Geological conditions survey or feasibility study.	☐
3. WSHP – A feasibility study and evidence of extraction permission for an open loop system.	☐
4. Indicate timeframe sufficient enough to install source system in project plan. (For example, dig the trenches/drill the boreholes for the system).	☐