| Survey Date: | 02 March 2023 |
|---------------------|---------------|
| Project Ref Number: | Project 4.1 |
| Name | Mr S Sample |
| Address | Samle Road |
| | Smaple Town |
| Postcode | DE11 \$GF |

Thank you for choosing us to carry out your heat loss calculations. Below you will find all the required information to enable us to install the correct size of heat pump and equally as important, the correctly rated heat emitters.

Heat Loss Calculation and Heat Emitter Summary

Design criteria for heat loss calculations

Postcode Number of bedrooms

1. The Heat pump selection has been based on the information included in the document.

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2. The Heat loss has been calculated in accordance with latest version of MIS3005 and using a method that complies with BS EN 12831: 2017.

3. The external design air temperature is based on localised weather data and is specified in accordance with CIBSE guide A. 4. Internal design temperatures are detailed below and are in accordance with CIBSE guide.

| Temperature and Ventilation Rates | | | | | | | |
|-----------------------------------|----------------------|---|---------------|------------------|---------------|--|--|
| Baam | Internal Temperature | Temperature Internal Temp Ventilation C | | | nange Rate | | |
| Room | Pre-2006 | Post 2006 | Old buildings | Modern buildings | New buildings | | |
| Living room | 21°C | 21°C | 1.5 | 1.0 | 0.5 | | |
| Dining room | 21°C | 21°C | 1.5 | 1.0 | 0.5 | | |
| Bedroom with en-suite bath | 21°C | 21°C | 2.0 | 1.5 | 1.0 | | |
| Bedroom | 18°C | 21°C | 1.0 | 1.0 | 0.5 | | |
| Hall / landing | 18°C | 21°C | 2.0 | 1.0 | 0.5 | | |
| Kitchen | 18°C | 21°C | 2.0 | 1.5 | 1.5 | | |
| Bathroom | 22°C | 22°C | 3.0 | 1.5 | 1.5 | | |
| Toilet | 18°C | 21°C | 3.0 | 1.5 | 1.5 | | |
| Neighbouring Property | 10°C | °C | N/A | N/A | N/A | | |

5. Details of site location and associated data are used, see below table.

| Building Location (closest for design temperature) | London | Design Ambient Temp | -1.8 |
|--|-----------------|---------------------------|------|
| | | Design Ground Temp | 10.4 |
| | | Altitude | 25 |
| Closert Location for degree day data | Southorn (Hurn) | Degree Day Data | 2224 |
| closest cotation for degree day data | Southern (num) | Air Change Factor (W/m3K) | 0.5 |

6. The below table gives details of the room by room heat loss calculation. Before proceeding, please ensure the below information looks reasonable.

| Room Nama | Electron [m2] | Design | Fabric | Ventilation | Total | Specific |
|------------------|-------------------|------------|----------------|----------------|----------------|------------------|
| Room Name | FIOUR area [III2] | Temp. [°C] | Heat Loss [kW] | Heat Loss [kW] | Heat Loss [kW] | Heat Loss [W/m2] |
| Kitchen | 12 | 21 | 0.40 | 0.11 | 0.51 | 44 |
| Storage | 1 | 21 | 0.03 | 0.01 | 0.04 | 29 |
| Livingroom | 19 | 21 | 0.30 | 0.18 | 0.49 | 25 |
| GF Hallway | 6 | 21 | 0.24 | 0.05 | 0.29 | 52 |
| Toilet | 2 | 21 | 0.07 | 0.01 | 0.09 | 58 |
| Bedroom 1 | 12 | 21 | 0.27 | 0.10 | 0.37 | 32 |
| Bathroom 1 | 5 | 21 | 0.07 | 0.04 | 0.12 | 24 |
| Bedroom 2 | 10 | 21 | 0.22 | 0.09 | 0.31 | 30 |
| Bathroom 2 | 4 | 21 | 0.09 | 0.03 | 0.13 | 31 |
| - | 0 | 0 | 0.00 | 0.00 | 0.00 | 0 |
| - | 0 | 0 | 0.00 | 0.00 | 0.00 | 0 |
| - | 0 | 0 | 0.00 | 0.00 | 0.00 | 0 |
| - | 0 | 0 | 0.00 | 0.00 | 0.00 | 0 |
| - | 0 | 0 | 0.00 | 0.00 | 0.00 | 0 |
| - | 0 | 0 | 0.00 | 0.00 | 0.00 | 0 |
| - | 0 | 0 | 0.00 | 0.00 | 0.00 | 0 |
| - | 0 | 0 | 0.00 | 0.00 | 0.00 | 0 |
| - | 0 | 0 | 0.00 | 0.00 | 0.00 | 0 |
| - | 0 | 0 | 0.00 | 0.00 | 0.00 | 0 |
| - | 0 | 0 | 0.00 | 0.00 | 0.00 | 0 |
| - | 0 | 0 | 0.00 | 0.00 | 0.00 | 0 |
| - | 0 | 0 | 0.00 | 0.00 | 0.00 | 0 |
| - | 0 | 0 | 0.00 | 0.00 | 0.00 | 0 |
| - | 0 | 0 | 0.00 | 0.00 | 0.00 | 0 |
| - | 0 | 0 | 0.00 | 0.00 | 0.00 | 0 |
| - | 0 | 0 | 0.00 | 0.00 | 0.00 | 0 |
| - | 0 | 0 | 0.00 | 0.00 | 0.00 | 0 |
| - | 0 | 0 | 0.00 | 0.00 | 0.00 | 0 |
| - | 0 | 0 | 0.00 | 0.00 | 0.00 | 0 |
| - | 0 | 0 | 0.00 | 0.00 | 0.00 | 0 |
| Total Floor Area | 70.0 | 1 | | Total kW Loss | 2.34 | 1 |

Domestic Hot Water Considerations

Hot water calculations are in accordance with BS6700 allocating a capacity of 45lt per person per day.

The number of people allocated has been based on the number of bedrooms plus one. The below table gives details on hot water usage, sizing and assumptions.

| No of Bedrooms | 2 | rooms | Flow temp in HW mode | 50°C | °C |
|-------------------------|--------|------------|--|------|------|
| No of occupants/bedroom | 1.00 | persons | Final HP secondary HW temperature | 45°C | °C |
| Hot water / occupant | 45 lt | litres/day | Full DHW cylinder recharging time | 157 | mins |
| Recommended Tank Size | 135 lt | Litres | HP SCOP (at HW flow temp_in accordance with SAP 2012) | 3.02 | |

Our recommended heat pump and heat emitter solution is as follows:

| Air Source Heat pump | 1 Daikin |
|-------------------------|----------|
| Ground Source Heat Pump | N/A N/A |

1 Daikin EJHA04AAV3 Hybrid Monobloc 4.0kW

Comparison of calculated energy use & CO2 savings with EPC figures (if available)

| Calculated Figures | | | | | |
|-------------------------------------|------|-----|--|--|--|
| Estimated Energy Hot Water/Year | 2865 | kWh | | | |
| | | | | | |
| Estimated Energy Space Heating/Year | 5528 | kWh | | | |
| | | | | | |
| Estimated CO2 Savings/Year | 1775 | Kgs | | | |

| EPC Figures (if available) | | |
|-------------------------------------|------|-----|
| EPC Hot Water Energy/Year | 1464 | kWh |
| | | |
| EPC Space Heating Energy/Year | 3010 | kWh |
| | | |
| Estimated EPC CO2 Savings/Year (| 946 | Kgs |

Heat Emitter selection

Under latest version of MIS 3005, alternatives to current heat emitters and advice on additional insulation should be provided if a higher SCOP rating can be achieved or is required. When making decisions on heat emitters it is important to consider investment cost versus return on investment, estimated usage and long term efficiency. Heat emitter selections and system design flow temperatures are based on the worst performing room identified in W/m2.

System Design

To achieve the maximum possible star rating, Seasonal Co-efficient of Performance (SCOP) and associated efficiency it is necessary for the system design flow temperature to be as low as possible in accordance with room insulation levels and emitter types. It is advisable for insulation levels to be as high as is feasible. Below are details of the worst performing room which will determine the overall system design.

| Worst Performing Room | GF Hallway | |
|--------------------------------------|------------|------|
| Specific Heat Loss for room | 52 | W/m2 |
| Room Heat Loss Band | 80 | W/m2 |
| System Emitter(s) Type | Radiators | |
| System Design Flow Temp | 50 | °C |
| Likely Heat Pump SCOP (heating mode) | 3.0 | |
| Minimum Required Oversize Factor | 2.40 | |

Emitter detail by room

| Heat losses | | Existing system | Existing Radiators % | New radiator system designed to 50c | | |
|-------------|---------------------------------|---------------------------------|--|-------------------------------------|--|--|
| | 00000 | | output at 70c Flow | of New Required | Flow T | emp. |
| Room Name | Total Heat Loss in Watts [W] | Specific Heat Loss [W/m2] | Actual Output of existing rads @70c flow temp | Output at 50c Flow Temp. | Minimum Output required @70c equivalent flow temp for new rads | % of Required Output met by New Radiators |
| Kitchen | 506 | 44 | Radiators: 1117 | 92.0% | Radiators: 1213 | 100.8% |
| Storage | 41 | 29 | Radiators: 0 | #DIV/0! | Radiators: 0 | - |
| Livingroom | 487 | 25 | Radiators: 1340 | 114.6% | Radiators: 1169 | 104.7% |
| GF Hallway | 292 | 52 | Radiators: 894 | 127.5% | Radiators: 700 | 127.5% |
| Toilet | 87 | 58 | Radiators: 894 | 237.7% | Radiators: 376 | 156.3% |
| Bedroom 1 | 370 | 32 | Radiators: 1340 | 151.1% | Radiators: 886 | 100.8% |
| Bathroom 1 | 118 | 24 | Radiators: 1117 | 220.9% | Radiators: 505 | 116.3% |
| Bedroom 2 | 310 | 30 | Radiators: 894 | 120.2% | Radiators: 743 | 105.4% |
| Bathroom 2 | 126 | 31 | Radiators: 1564 | 289.0% | Radiators: 541 | 108.7% |
| - | 0 | 0 | None: 0 | - | None: 0 | - |
| - | 0 | 0 | None: 0 | - | None: 0 | - |
| - | 0 | 0 | None: 0 | - | None: 0 | - |
| - | 0 | 0 | None: 0 | - | None: 0 | - |
| - | 0 | 0 | None: 0 | - | None: 0 | - |
| - | 0 | 0 | None: 0 | - | None: 0 | - |
| - | 0 | 0 | None: 0 | - | None: 0 | - |
| - | 0 | 0 | None: 0 | - | None: 0 | - |
| - | 0 | 0 | None: 0 | - | None: 0 | - |
| - | 0 | 0 | None: 0 | - | None: 0 | - |
| - | 0 | 0 | None: 0 | - | None: 0 | - |
| - | 0 | 0 | None: 0 | - | None: 0 | - |
| - | 0 | 0 | None: 0 | - | None: 0 | - |
| - | 0 | 0 | None: 0 | - | None: 0 | - |
| - | 0 | 0 | None: 0 | - | None: 0 | - |
| - | 0 | 0 | None: 0 | - | None: 0 | - |
| - | 0 | 0 | None: 0 | - | None: 0 | - |
| - | 0 | 0 | None: 0 | - | None: 0 | - |
| - | 0 | 0 | None: 0 | - | None: 0 | - |
| - | 0 | 0 | None: 0 | - | None: 0 | - |
| - | 0 | 0 | None: 0 | - | None: 0 | - |

Proposed Heat Emitter (Radiators)

| # | Room Type | Required | Radiators selection | New Output [W] |
|----|------------|----------|----------------------------|----------------|
| 1 | Kitchen | 1214 | 1 New Stelrad DP H700 W800 | 1224 |
| 2 | Storage | 0 | | 0 |
| 3 | Livingroom | 1169 | 1 New Stelrad DP H700 W800 | 1224 |
| 4 | GF Hallway | 701 | 1 New Stelrad SC H700 W800 | 894 |
| 5 | Toilet | 376 | 1 New Stelrad SC H600 W600 | 588 |
| 6 | Bedroom 1 | 887 | 1 New Stelrad SC H700 W800 | 894 |
| 7 | Bathroom 1 | 506 | 1 New Stelrad SC H600 W600 | 588 |
| 8 | Bedroom 2 | 744 | 1 New Stelrad SC H600 W800 | 784 |
| 9 | Bathroom 2 | 541 | 1 New Stelrad SC H600 W600 | 588 |
| 10 | - | - | | 0 |
| 11 | - | - | | 0 |
| 12 | - | - | | 0 |
| 13 | - | - | | 0 |
| 14 | - | - | | 0 |
| 15 | - | - | | 0 |
| 16 | - | - | | 0 |
| 17 | - | - | | 0 |
| 18 | - | - | | 0 |
| 19 | - | - | | 0 |
| 20 | - | - | | 0 |
| 21 | - | - | | 0 |
| 22 | - | - | | 0 |
| 23 | - | - | | 0 |
| 24 | - | - | | 0 |
| 25 | - | - | | 0 |
| 26 | - | - | | 0 |
| 27 | - | - | | 0 |
| 28 | - | - | | 0 |
| 29 | - | - | | 0 |
| 30 | - | - | | 0 |

We have assumed your loft and cavity wall insulation (where appropriate) meets the eligibility requirements for the Renewable Heat Incentive. This requires you to insulate the cavity wall (if you have cavity walls) and/or ensure you have a minimum of 250mm loft insulation (if you have the capabilities to insulate). If you are exempt from these requirements it is your responsibility to let us know. There are few scenarios that qualify for exemption but more detail can be found via the following link; https://www.ofgem.gov.uk/key-term-explained/insulation-exemptions

We have selected radiators to achieve the minimum requirement for the Renewable Heat Incentive, these radiators may not fit in the locations that were described from the survey results. We advise that you review the size and type of each radiator before installation, to ensure that they will fit.