

Date: 21 March 2022
 Project Ref Number: 630



Heat Loss Calculation and Heating Distribution Summary

Design criteria for heat loss calculations

1. The Heat pump selection has been based on the information included in the document.
2. The Heat loss has been calculated in accordance with latest version of MIS3005 and using a method that complies with BS EN 12831.
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.

| Room | Temperature and Ventilation Rates | | | | |
|-----------------------|-----------------------------------|----|-------------------------|------------------|---------------|
| | Internal Temperature | | Ventilation Change Rate | | |
| | | | Old buildings | Modern buildings | New buildings |
| Living room | 21 | °C | 1.5 | 1.0 | 0.5 |
| Dining room | 21 | °C | 1.5 | 1.0 | 0.5 |
| Bedsitting room | 21 | °C | 1.5 | 1.0 | 0.5 |
| Bedroom | 18 | °C | 1.0 | 1.0 | 0.5 |
| Hall / landing | 18 | °C | 2.0 | 1.0 | 0.5 |
| Kitchen | 18 | °C | 2.0 | 1.5 | 1.5 |
| Bathroom | 22 | °C | 3.0 | 1.5 | 1.5 |
| Toilet | 18 | °C | 3.0 | 1.5 | 1.5 |
| Neighbouring Property | 10 | °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) | Cardiff | Design Ambient Temp Design Ground Temp Altitude | -1.6 10.6 67 |
| Closest Location for degree day data | Severn Valley (Fitton) | Degree Day Data Air Change Factor (W/m3K) | 1835 0.34 |

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

| Room Name | Floor area [m2] | Design Temp. [°C] | Fabric Heat Loss [kW] | Ventilation Heat Loss [kW] | Total Heat Loss [kW] | Specific Heat Loss [W/m2] |
|--------------------------|-----------------|-------------------|-----------------------|----------------------------|----------------------|---------------------------|
| Entrance Hall | 45 | 18 | -0.20 | 0.39 | 0.20 | 4 |
| Cloakroom | 4 | 16 | -0.01 | 0.03 | 0.02 | 6 |
| Snug/Living Room | 14 | 21 | 0.43 | 0.15 | 0.58 | 40 |
| Laundry Room/Home Office | 7 | 21 | 0.27 | 0.07 | 0.34 | 48 |
| Cinema Room | 25 | 21 | 0.34 | 0.25 | 0.59 | 24 |
| Entertainment Room | 30 | 21 | 0.66 | 0.31 | 0.97 | 32 |
| Utility Room | 6 | 18 | 0.07 | 0.06 | 0.12 | 19 |
| Kitchen/Family Room | 74 | 18 | 0.82 | 1.96 | 2.79 | 38 |
| Landing | 41 | 18 | 0.38 | 0.35 | 0.73 | 18 |
| Master Bedroom | 21 | 18 | 0.35 | 0.18 | 0.53 | 25 |
| B1 En-suite | 13 | 22 | 0.33 | 0.39 | 0.72 | 57 |
| Dressing Room 1 | 4 | 18 | 0.07 | 0.03 | 0.10 | 26 |
| Wardrobe 1 | 7 | 18 | 0.08 | 0.06 | 0.14 | 21 |
| Wardrobe 2 | 7 | 18 | 0.02 | 0.06 | 0.07 | 10 |
| Bedroom 2 | 22 | 18 | 0.29 | 0.18 | 0.47 | 22 |
| En-suite 2 | 13 | 22 | 0.34 | 0.41 | 0.75 | 56 |
| Wardrobe 3 | 9 | 18 | 0.03 | 0.08 | 0.11 | 12 |
| Bedroom 3 | 16 | 18 | 0.23 | 0.13 | 0.36 | 23 |
| Wardrobe 4 | 9 | 18 | 0.09 | 0.07 | 0.17 | 19 |
| En-suite 3 | 9 | 22 | 0.28 | 0.26 | 0.55 | 63 |
| Bedroom 4 | 16 | 18 | 0.23 | 0.13 | 0.36 | 23 |
| Wardrobe 5 | 9 | 18 | 0.09 | 0.07 | 0.17 | 19 |
| En-suite 4 | 9 | 22 | 0.28 | 0.26 | 0.55 | 63 |
| Boot Room | 6 | 18 | 0.16 | 0.05 | 0.21 | 33 |
| - | 5 | 22 | 0.19 | 0.16 | 0.35 | 66 |
| - | 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 | 420 | | | Total Kw Loss | 11.93 | |

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 | 4 | rooms |
| No of occupants/bedroom | 1.00 | persons |
| Hot water / occupant | 45 | litres/day |
| Recommended Tank Size | 300 | Litres |
| Flow temp in HW mode | 55 | °C |
| Final HP secondary HW temperature | 50 | °C |
| Full DHW cylinder recharging time | 109 | mins |
| HP SPF (at HW flow temp_in accordance with SAP 2012) | 3.29 | |

Heat Emitter selection and Star ratings

Under latest version of MIS 3005, alternatives to current heat emitters and advice on additional insulation should be provided if a higher star 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 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 system design.

| | |
|--------------------------------------|---------------------|
| Worst Performing Room | - |
| Specific Heat Loss for room | 66 W/m ² |
| Room Heat Loss Band | 80 W/m ² |
| System Emitter(s) Type | Radiators |
| System Design Flow Temp | 50 °C |
| Likely Heat Pump SCOP (heating mode) | 3.6 |
| Minimum Required Oversize Factor | - |
| Star Rating for (new) system | 3 Stars 0-6 Stars |
| Status | |

Emitter detail by room

| Room Name | Heat losses | | New system | | Actual system | |
|--------------------------|---------------------|--|----------------------------------|---|---|----------------------------------|
| | Total Heat Loss [W] | Specific Heat Loss [W/m ²] | Radiators design oversize factor | Required Output [Radiators "W" or UFH "mm" spacing] | Actual Output [Radiators "W" or UFH "mm" spacing] | Radiators actual oversize factor |
| Entrance Hall | 198 | 4 | - | Underfloor: 300 | Underfloor: 150 | - |
| Cloakroom | 25 | 6 | - | Underfloor: 300 | Underfloor: 150 | - |
| Snug/Living Room | 577 | 40 | - | Underfloor: 200 | Underfloor: 150 | - |
| Laundry Room/Home Office | 338 | 48 | - | Underfloor: 200 | Underfloor: 150 | - |
| Cinema Room | 591 | 24 | - | Underfloor: 300 | Underfloor: 150 | - |
| Entertainment Room | 965 | 32 | - | Underfloor: 200 | Underfloor: 150 | - |
| Utility Room | 122 | 19 | - | Underfloor: 300 | Underfloor: 150 | - |
| Kitchen/Family Room | 2786 | 38 | - | Underfloor: 200 | Underfloor: 150 | - |
| Landing | 726 | 18 | - | Underfloor: 300 | Underfloor: 150 | - |
| Master Bedroom | 533 | 25 | - | Underfloor: 300 | Underfloor: 150 | - |
| B1 En-suite | 718 | 57 | - | Underfloor: 200 | Underfloor: 150 | - |
| Dressing Room 1 | 96 | 26 | - | Underfloor: 300 | Underfloor: 150 | - |
| Wardrobe 1 | 136 | 21 | - | Underfloor: 300 | Underfloor: 150 | - |
| Wardrobe 2 | 71 | 10 | - | Underfloor: 300 | Underfloor: 150 | - |
| Bedroom 2 | 472 | 22 | - | Underfloor: 300 | Underfloor: 150 | - |
| En-suite 2 | 751 | 56 | - | Underfloor: 200 | Underfloor: 150 | - |
| Wardrobe 3 | 108 | 12 | - | Underfloor: 300 | Underfloor: 150 | - |
| Bedroom 3 | 363 | 23 | - | Underfloor: 300 | Underfloor: 150 | - |
| Wardrobe 4 | 169 | 19 | - | Underfloor: 300 | Underfloor: 150 | - |
| En-suite 3 | 548 | 63 | - | Underfloor: 200 | Underfloor: 150 | - |
| Bedroom 4 | 363 | 23 | - | Underfloor: 300 | Underfloor: 150 | - |
| Wardrobe 5 | 169 | 19 | - | Underfloor: 300 | Underfloor: 150 | - |
| En-suite 4 | 548 | 63 | - | Underfloor: 200 | Underfloor: 150 | - |
| Boot Room | 210 | 33 | - | Underfloor: 200 | Underfloor: 150 | - |
| * | 347 | 66 | - | Underfloor: 200 | Underfloor: 150 | - |
| * | 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 | - |