Heat Loss and Heating Design Report

Project Information

Project Reference:
[redacted]

Heating Type:
Air Source Heat Pump

Installation Address

[redacted]

Surveyor Details

Surveyor Name:
Dean CHAPPLE

Contact Number:
07830126923

Site Location & Front of House

Front of House

No front of house
image available

Software Version: V3

Contents

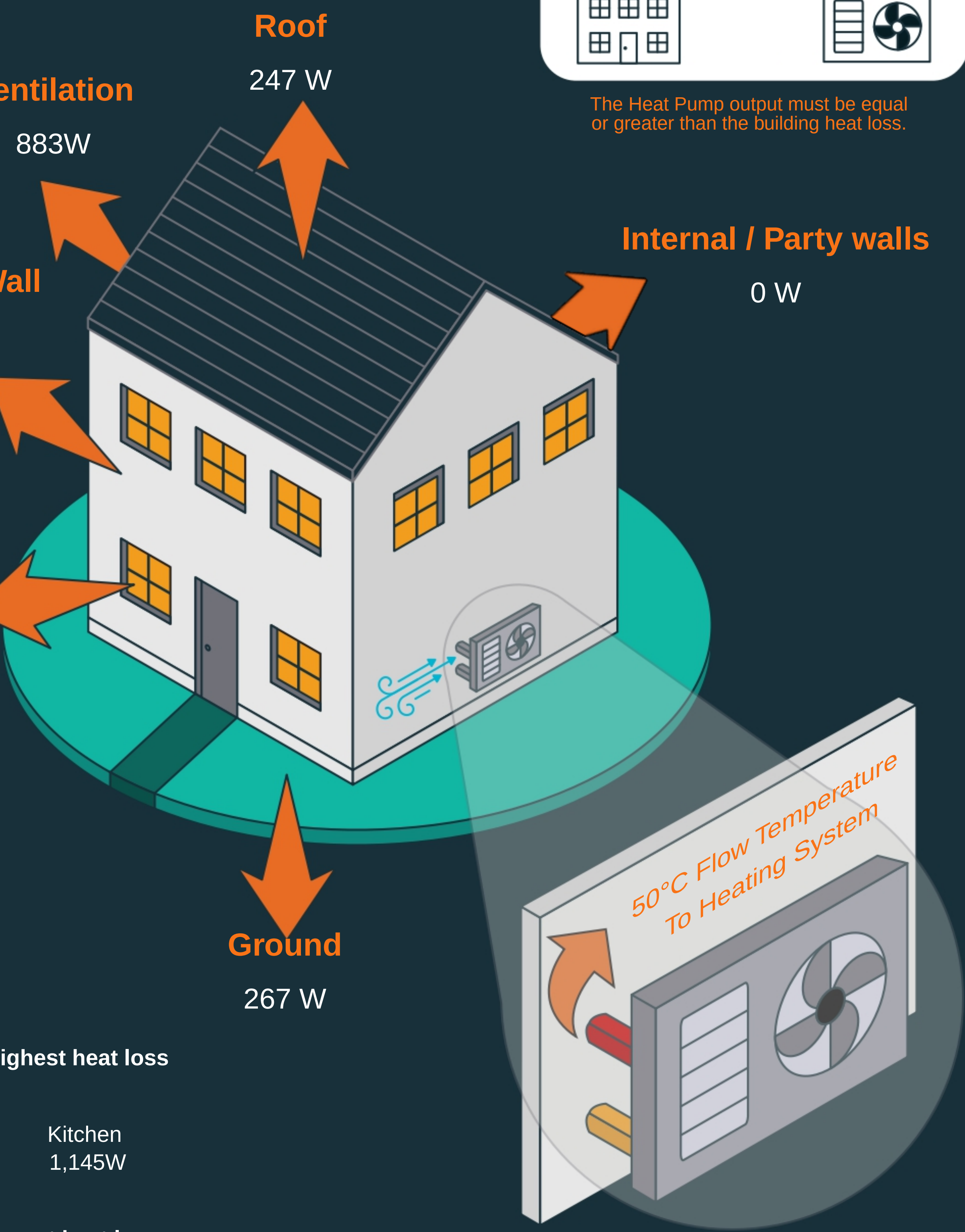
This report provides a comprehensive analysis of the property's thermal characteristics and heating requirements.

Property Address

[redacted]

Property Heat Loss		Heat Pump Output
3.34 kW	<	5 kW

The Heat Pump output must be equal or greater than the building heat loss.



Room with highest heat loss

Kitchen
1,145W

Room with lowest heat loss

Landing
114W

Manufacturer: Vaillant Group UK Ltd
Model: aroTHERM Plus 5kW VWL 55/6 A 230V S2
Certificate Number: KIWA 00016/018 HP

An overview for property owners

Why a Room-by-Room Heat Loss Report Matters

When it comes to designing an efficient heating system for your home, accuracy matters. A room-by-room heat loss report ensures that every space in your property receives the right amount of heat – no more, no less.

This isn't just about comfort – it's about performance, cost savings, and getting the most from your heating system for years to come.

What is a Heat Loss Report?

A heat loss report shows how much heat each room in your home loses during cold weather. Every building loses heat through walls, windows, doors, floors, ceilings, and ventilation.

By understanding exactly where and how much heat is lost, we can accurately calculate the energy needed to keep each room comfortable.

Why Room-by-Room is Best

Many heating systems are sized using rough estimates or assumptions. This can lead to:

- ⚠ Uneven temperatures between rooms
- ⚠ Higher energy bills
- ⚠ Reduced lifespan of your heating system
- ⚠ Poor performance with modern systems like heat pumps

A room-by-room heat loss report avoids these issues by tailoring the design to your property's exact layout and construction.

Powered by Heat Engineer Software

This report has been generated using Heat Engineer Software, one of the UK's leading tools for precise domestic heat loss calculations.

It follows industry-recognised standards (CIBSE, EN 12831) and meets MCS compliance requirements – crucial for renewable systems like heat pumps.

Benefits of using Heat Engineer Software

- ✓ Accurate, room-specific data for smarter design
- ✓ Supports eligibility for government funding and MCS accreditation
- ✓ Helps select the right emitters (radiators or underfloor heating)
- ✓ Trusted by professional installers across the UK

What This Means for You

With this report, you're equipped to choose a heating system that:

- Works efficiently
- Saves energy
- Keeps every room at a comfortable temperature

Whether it's a traditional boiler or a renewable heat pump system, you'll benefit from lower running costs, longer system life, and better comfort.

If you have any questions about your report, your installer will be happy to explain more.

This comprehensive heat loss analysis provides the foundation for an efficient, cost-effective heating system tailored to your specific property.

Heating Demand Projection Chart

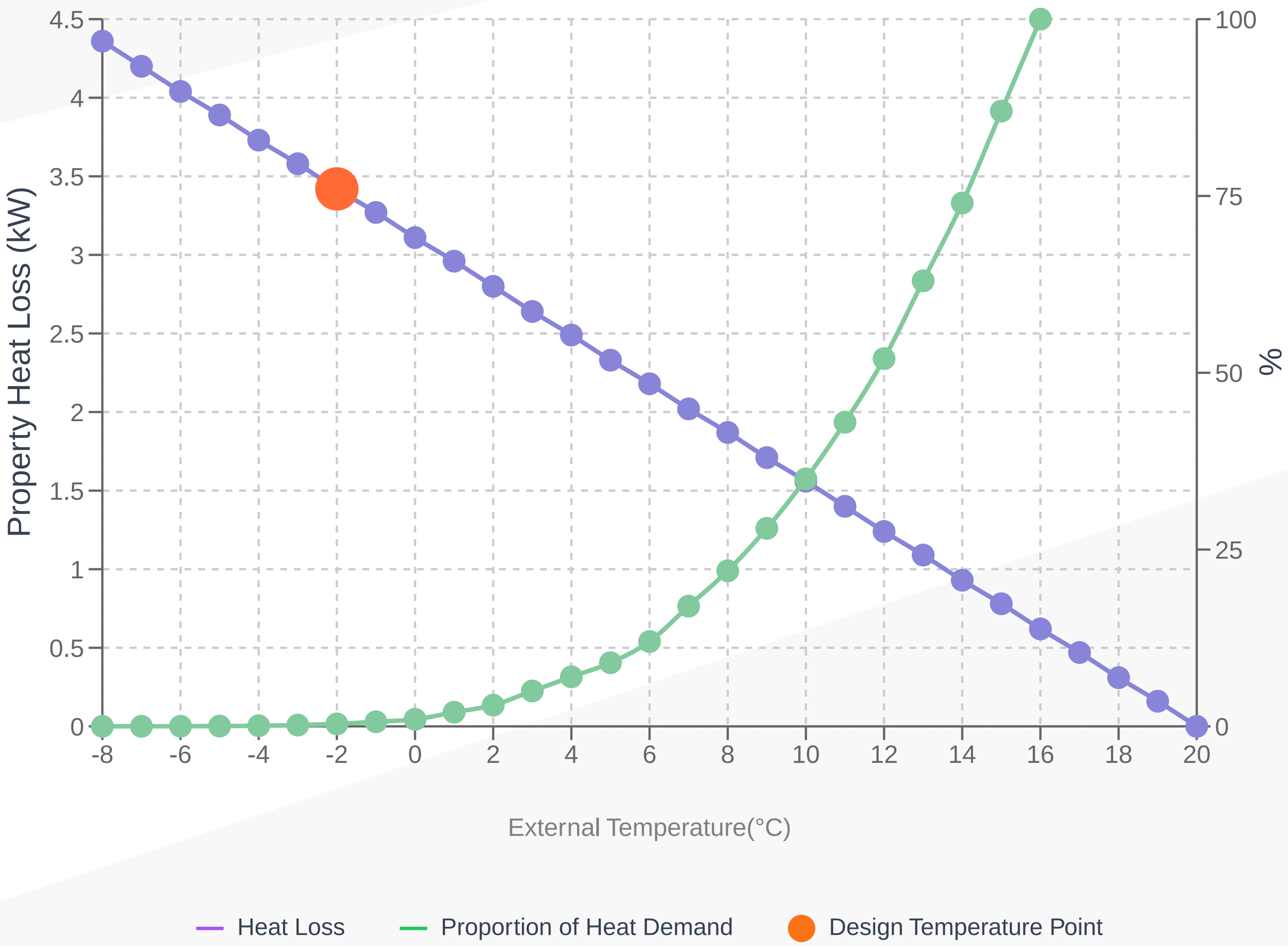
About this chart

This shows the proportion of heating demand for each external temperature for a whole year. The heating percentage information is intended for guidance only acting as an approximation to provide property owners a better understanding of heating demands throughout a whole year.

•The amount of time the temperature falls below 2 °C is only 3% of the year.

•74% of the time the external temperatures are below 14 °C.

Note:
These averages are taken from the weather station at Gatwick airport over a 20 year average period (2002 to 2021). The Chartered Institution of Building Services Engineers standard uses a base temperature of 15.5 °C. Therefore, a buildings internal heat and solar gains contribute to the remaining demand above this temperature, so it's assumed the heating system won't be in use. Only hot water will be required.



Heat Pump Cost Analysis

Detailed breakdown of energy consumption and associated costs

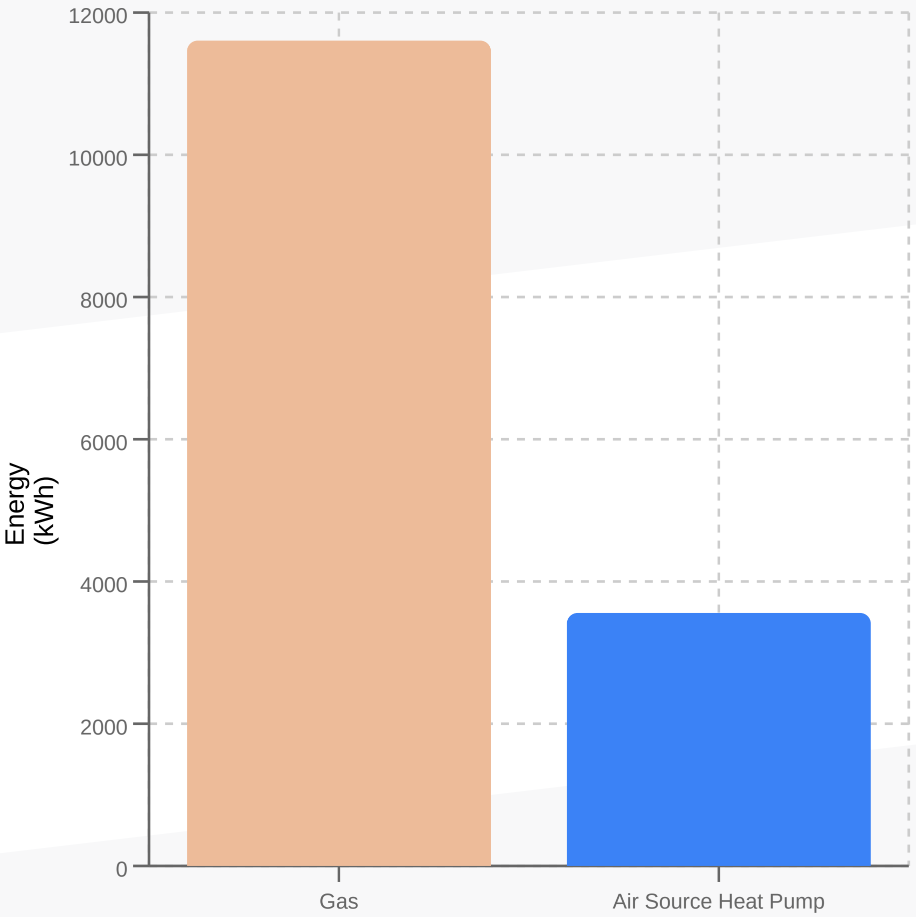
Heat Pump Running Costs Breakdown

Heating and Hot Water	Energy(kWh)	Annual Running Cost
Renewable Heat	8,048	£ 0
Energy You Pay For	3,557	£ 889.35
Total	**11,606**	**£ 889.35**

Note: Includes standing charge

Method Used

Energy Source	Energy(kWh)
Heating and Hot Water	3,476
* Hot Water includes pasteurisation cycle	82
Total	**3,557**



*Note: This analysis is based on current energy prices and may vary depending on future price changes and actual usage patterns. The renewable heat portion represents the energy extracted from the environment and does not contribute to your energy bills. * Pasteurisation cycle is required periodically to eliminate bacteria in the hot water system.*

Calculated Energy using Degree Day Data: The energy calculation method is worst case scenario, therefore assuming all rooms to be heated to their designed temperatures throughout the heating season. Of course most people don't use all the rooms and don't have the heating on within all rooms throughout a year at maximum. As a result, the calculated energy figure can be overestimated, therefore running costs may be higher with this calculation than actual.

Technical Information

Summary of Results

The total heat source required to heat the building must provide an output of **3.34 kW**

When the external temperature is **-1.5°C**

Heating System Details

Heating Type:	Air Source Heat Pump
Manufacturer:	Vaillant Group UK Ltd
Model(s):	aroTHERM Plus 5kW VWL 55/6 A 230V S2
Certificate Number:	KIWA 00016/018 HP
Output at designed external temperature:	5 kW
Maximum designed flow temperature:	50°C
ASHP:	Air Source Heat Pump

Worst Performing Room

Room Name:	Kitchen
Floor Area:	12.10 m²
Power demand:	1,145.07
Specific room heat loss:	94.64 W/m²
Emitter type:	Standard Radiators
Seasonal Coefficient of Performance (SCOP):	3.41

The methods used in these calculations are from the Chartered Institution of Building Services Engineers (CIBSE) The Domestic Heating Design Guide and EN 12831. The UK standards for MCS MIS 3005 and MIS 3004 have also been met ensuring heat pumps and Biomass calculations can be presented.

Room Features

Property Overview

Number of rooms:	7 (total floor area: 68.18 m²)	Degree Day Data:	1858	Shielding:	None
Location (Degree Day):	Bideford, Devon, Bideford	Is Property > 2006:	NO	Dwelling Type:	Mid-Terrace
Ground Temperature:	10.50 °C			Storeys:	2
Outside Temperature:	-1.50 °C				

Room Details

Room Names	Designed temperature	Fireplace	Throat Restriction	Year room was built	Minimum air change rate of the room	Exposed Location	Intermitted Heating	Vaulted Ceiling?	Vaulted Ceiling Type	Room Below	Room Above	Emitter Type
Kitchen	20°C	NO	NO	1930	2	NO	NO	NO		None	Bathroom 1	SR
Lounge	20°C	NO	NO	1930	1.5	NO	NO	NO		None	Bedroom 1	SR
Entrance Hall	20°C	NO	NO	1930	2	NO	NO	NO		None	Bedroom 1	SR
Bedroom 1	20°C	NO	NO	1930	1	NO	NO	NO		Lounge	None	SR
Landing	20°C	NO	NO	1930	0	NO	NO	NO		Lounge	None	SR
Bedroom 2	20°C	NO	NO	1930	1	NO	NO	NO		Lounge	None	SR
Bathroom 1	20°C	NO	NO	1930	2	NO	NO	NO		Kitchen	None	SR

MVHR: Mechanical Ventilation with Heat Recovery
Air Changes Per Hour: A measure of how many times the air within a defined space is replaced per hour

Room Dimensions

This table provides detailed measurements for each room in the building, which are essential for calculating heat loss. The dimensions include ***floor areas***, ***wall lengths***, ***window areas***, and other structural elements that affect thermal performance. These measurements are used to determine heat loss through ***walls***, ***windows***, ***doors***, and other building elements, enabling accurate energy efficiency calculations and heating system sizing.

Room Names	Floor Areas m²	Room Height m	External wall(Type A) m		Window (Type A) m²		Internal Wall m	Party wall m	External Door Area m²	Roof Glazing Area m²	Lowest Parallel room temp	High ceiling % increase
			Type A (m)	Type B (m)	Type A (m²)	Type B (m²)						
Kitchen	12.10	2.26	7	0	1.36	0	0	0	2.58	0	18 °C	0 %
Lounge	17.58	2.53	3.17	0	3.61	0	0	0	0	0	18 °C	0 %
Entrance Hall	3.72	2.55	0.92	0	0	0	0	0	2.27	0	18 °C	0 %
Bedroom 1	14.14	2.60	4.23	0	2.58	0	0	0	0	0	18 °C	0 %
Landing	5.92	2.58	0	0	0	0	0	0	0	0	18 °C	0 %
Bedroom 2	8.56	2.58	2.46	0	1.31	0	0	0	0	0	18 °C	0 %
Bathroom 1	6.16	2.41	2.40	0	1.10	0	0	0	0	0	18 °C	0 %

External, Internal and Party Walls

This table shows the construction materials used for different types of walls in each room. ***External walls*** are those exposed to the outside environment and are critical for heat loss calculations as they transfer heat to the exterior. ***Internal walls*** separate rooms within the building and may affect heat distribution. ***Party walls*** are shared walls between adjacent buildings or units. The material composition of these walls directly impacts thermal conductivity and insulation values, which are essential for accurate heat loss calculations and energy efficiency assessments.

Room Names	External Wall (A)	External Wall (B)	Internal Wall	Party Wall
Kitchen	Render, Brick 102mm, Brick 102mm, Plaster (1.25)			
Lounge	Render, Brick 102mm, Brick 102mm, Plaster (1.25)			
Entrance Hall	Render, Brick 102mm, Brick 102mm, Plaster (1.25)			
Bedroom 1	Render, Brick 102mm, Brick 102mm, Plaster (1.25)			
Landing				
Bedroom 2	Render, Brick 102mm, Brick 102mm, Plaster (1.25)			
Bathroom 1	Render, Brick 102mm, Brick 102mm, Plaster (1.25)			

Windows and Doors

This table identifies the types of ***windows*** and ***doors*** installed in each room. ***Windows*** are typically the weakest thermal elements in a building, often accounting for significant heat loss due to their lower insulation values compared to walls. ***Roof glazing*** refers to windows or skylights in the ceiling, which can experience different thermal conditions. ***External doors*** also contribute to heat loss, especially if they lack proper insulation. The glazing type, frame material, and overall construction quality of these elements significantly impact the building's thermal performance and energy efficiency calculations.

Room Names	Window Type (A)	Window Type (B)	Roof Glazing	Door
Kitchen	Standard Double Glazing Wood/PVC frame (2.8)			Old PVC door (2.8)
Lounge	Standard Double Glazing Wood/PVC frame (2.8)			
Entrance Hall	Standard Double Glazing Wood/PVC frame (2.8)			High Quality Door 50% glazing (2.2)
Bedroom 1	Standard Double Glazing Wood/PVC frame (2.8)			
Landing				
Bedroom 2	Standard Double Glazing Wood/PVC frame (2.8)			
Bathroom 1	Standard Double Glazing Wood/PVC frame (2.8)			

Floors, Ceilings and Roof

This table shows the construction materials used for ***floors***, ***ceilings***,and ***roofs*** in each room. ***Ground floors*** can lose heat to the soil below, while ***upper floors*** may lose heat to unheated spaces above. ***Ceilings*** and ***roofs*** are critical for heat loss calculations as they can account for significant energy loss, especially in buildings with poor attic insulation or exposed roof structures. The material composition and insulation levels of these horizontal surfaces directly affect the building's overall thermal performance and heating requirements.

Room Names	Floor	Roof or Ceiling
Kitchen	Ground Floor No Insulation (1.15)	Intermediate Floor Timber without insulation (1.73)
Lounge	Ground Floor 50mm Insulation (0.43)	Intermediate Floor Timber without insulation (1.73)
Entrance Hall	Ground Floor 50mm Insulation (0.43)	Intermediate Floor Timber without insulation (1.73)
Bedroom 1	Intermediate Floor Timber without insulation (1.73)	Pitched roof with tiles, 200mm Insulation between joists (0.18)
Landing	Intermediate Floor Timber without insulation (1.73)	Pitched roof with tiles, 200mm Insulation between joists (0.18)
Bedroom 2	Intermediate Floor Timber without insulation (1.73)	Pitched roof with tiles, 200mm Insulation between joists (0.18)
Bathroom 1	Intermediate Floor Timber without insulation (1.73)	Pitched roof with tiles, 200mm Insulation between joists (0.18)

Review of Heat Loss Part 1

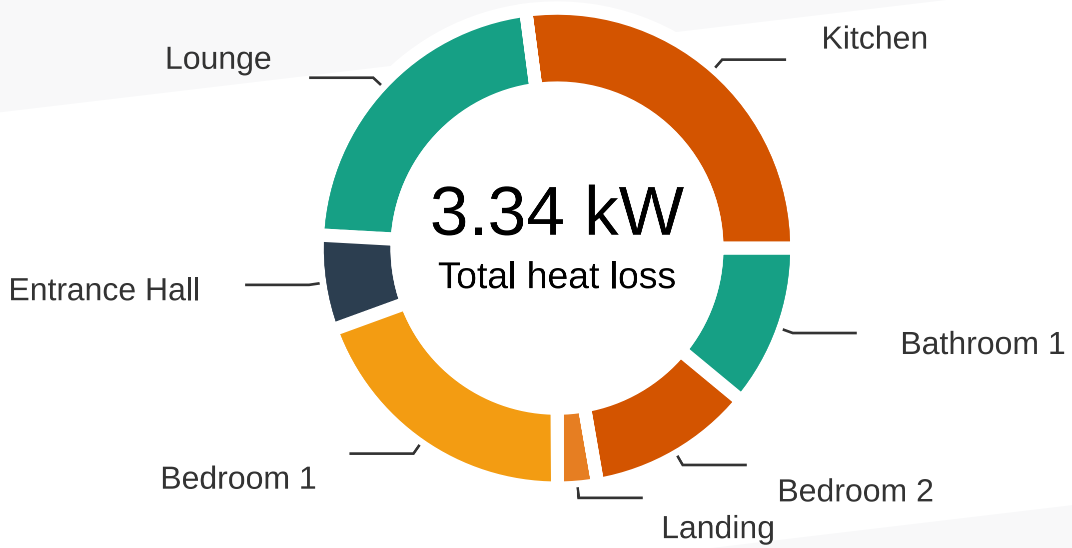
This table provides a detailed breakdown of ***heat loss calculations*** for each room, showing how much heat is lost through different building elements in ***watts***. The ***W/m²*** column shows the average heat loss per square meter, which is a key metric for comparing thermal performance across rooms. Each column represents heat loss through specific elements: ***floors***, ***external walls***, ***windows***, ***doors***, ***ceilings***, and ***roofs***. This detailed analysis helps identify which building elements contribute most to heat loss and where energy efficiency improvements would be most effective.

Room Names	W/m²	Floor (watts)	External wall Type A (watts)	External wall Type B (watts)	Window Type A (watts)	Window Type B (watts)	Internal Wall (watts)	Party Wall (watts)	External Door (watts)	Roof Glazing (watts)	Roof or Ceiling (watts)
Kitchen	94.64	149.42	357.44	0	86.43	0	0	0	163.77	0	0
Lounge	53.01	96.84	132.8	0	228.84	0	0	0	0	0	0
Entrance Hall	73.12	20.51	2.32	0	0	0	0	0	114.64	0	0
Bedroom 1	58.21	0	253.42	0	163.55	0	0	0	0	0	100.33
Landing	19.26	0	0	0	0	0	0	0	0	0	42.02
Bedroom 2	55.67	0	151.76	0	82.78	0	0	0	0	0	60.75
Bathroom 1	75.47	0	141.13	0	69.46	0	0	0	0	0	43.72

Review of Heat Loss Part 2

This table shows ***additional heat loss factors*** that affect each room's thermal performance. ***High ceiling increases*** account for extra heat loss in rooms with elevated ceilings. ***Ventilation heat loss*** represents energy required to heat fresh air entering the room. ***Exposed location factors*** consider rooms that are more exposed to wind and weather. ***Intermittent heating*** accounts for rooms that aren't continuously heated. ***Thermal bridges*** represent heat loss through structural elements that bypass insulation. The ***total watts*** and ***kWh*** columns show the complete heat loss calculations, which are used to determine heating system requirements and energy consumption estimates.

Room Names	High Ceiling Increase (watts)	Minimum air volume flow (m^3/hour)	Ventilation per Room (Watts)	Exposed Location (watts)	Intermitted Heating (watts)	Thermal Bridges (watts)	Total Watts	Total kWh
Kitchen	0	54.69	388	0	0	0	1,145.07	2,723.57
Lounge	0	66.70	473.25	0	0	0	931.73	2,014.97
Entrance Hall	0	18.98	134.68	0	0	0	272.14	704.05
Bedroom 1	0	36.77	305.77	0	0	0	823.07	1,445.78
Landing	0	0	72.03	0	0	0	114.05	47.53
Bedroom 2	0	22.09	181.35	0	0	0	476.63	837.78
Bathroom 1	0	29.70	210.72	0	0	0	465.03	884.59


3.34 kW
Total heat loss
Lounge
Kitchen
Entrance Hall
Bathroom 1
Bedroom 1
Bedroom 2
Landing

Summary of U values (W/m²K) Part 1

By default, thermal bridging will be added to all external and internal building elements and the values used will differ based on the age of construction. EN 12831:2017 do have generic values, however, to align with MCS we have used the following:

Modified U value = Thermal Bridging U value + Material U value

This table shows the ***U-values*** for each building element in every room, measured in ***W/m²K*** (watts per square meter per Kelvin). ***U-values*** indicate how well a building element insulates - lower values mean better insulation. The calculations include ***thermal bridging factors*** that account for heat loss through structural elements like wall ties, joist ends, and other construction details that bypass the main insulation. These ***U-values*** are fundamental to heat loss calculations as they determine how much heat passes through each building element, directly affecting the overall thermal performance and energy efficiency of the building.

Table Legend:
U: Material U-value (W/m²K) **TB:** Thermal Bridging factor (W/m²K)

Summary of U values (W/m²K) Part 1

Room Names	Floor	External Wall Type A	External Wall Type B	Window Type A	Window Type B	Internal Wall	Party Wall	External Door	Roof Glazing	Roof or Ceiling
Kitchen	U: 1.15 TB: 0.15 **1.30**	U: 1.25 TB: 0.15 **1.40**		U: 2.80 TB: 0.15 **2.95**				U: 2.80 TB: 0.15 **2.95**		U: 1.73 TB: 0.10 **1.83**
Lounge	U: 0.43 TB: 0.15 **0.58**	U: 1.25 TB: 0.15 **1.40**		U: 2.80 TB: 0.15 **2.95**						U: 1.73 TB: 0.10 **1.83**

Room Names	Floor	External Wall Type A	External Wall Type B	Window Type A	Window Type B	Internal Wall	Party Wall	External Door	Roof Glazing	Roof or Ceiling
Entrance Hall	U: 0.43 TB: 0.15 **0.58**	U: 1.25 TB: 0.15 **1.40**		U: 2.80 TB: 0.15 **2.95**				U: 2.20 TB: 0.15 **2.35**		U: 1.73 TB: 0.10 **1.83**
Bedroom 1	U: 1.73 TB: 0.10 **1.83**	U: 1.25 TB: 0.15 **1.40**		U: 2.80 TB: 0.15 **2.95**						U: 0.18 TB: 0.15 **0.33**
Landing	U: 1.73 TB: 0.10 **1.83**									U: 0.18 TB: 0.15 **0.33**
Bedroom 2	U: 1.73 TB: 0.10 **1.83**	U: 1.25 TB: 0.15 **1.40**		U: 2.80 TB: 0.15 **2.95**						U: 0.18 TB: 0.15 **0.33**
Bathroom 1	U: 1.73 TB: 0.10 **1.83**	U: 1.25 TB: 0.15 **1.40**		U: 2.80 TB: 0.15 **2.95**						U: 0.18 TB: 0.15 **0.33**

Summary of U values (W/m²K) Part 2

This table provides ***additional U-value factors*** and environmental conditions that affect heat loss calculations. ***Roof glazing*** and ***roof/ceiling U-values*** account for heat loss through overhead elements. ***Exposed location percentages*** indicate how much a room is affected by wind and weather exposure. ***Intermittent heating percentages*** reflect rooms that aren't continuously heated. ***Thermal bridges*** show heat loss through structural elements. ***Room temperatures above and below*** represent the thermal conditions of adjacent spaces, which significantly impact heat transfer calculations and overall thermal performance assessment.

Room Names	Exposed Location	Intermitted Heating	Thermal Bridges	Room Temp Below (If none then average Ground temp)	Room Temp Above (through Ceiling or Roof)
Kitchen	0%	0%	0	10.50	20
Lounge	0%	0%	0	10.50	20
Entrance Hall	0%	0%	0	10.50	20
Bedroom 1	0%	0%	0	20	-1.50
Landing	0%	0%	0	20	-1.50
Bedroom 2	0%	0%	0	20	-1.50
Bathroom 1	0%	0%	0	20	-1.50

DHW (Domestic Hot Water)

This section provides detailed information about the ***domestic hot water (DHW)*** system requirements for the property. It includes ***property information*** such as number of bedrooms and occupants, ***hot water system specifications*** including flow temperatures and efficiency factors, and ***energy demand calculations*** that determine the total hot water energy requirements. The calculations consider factors like ***occupancy patterns***, ***hot water usage per person***, and ***system efficiency losses*** to provide accurate estimates for sizing hot water systems and calculating energy costs.

Property Information

Number of bedrooms:	2
Number of occupants per bedroom:	1

Hot Water System

Flow temperature for hot water (DHW):	55°C (55 for heat pump others 70)
Hot water per occupant:	45 litres (if heat pump use 45, if other use 35)
·efficiency pipework loss to cylinder:	90%

Constants & Conversion Factors

Electricity Cost:	25 p/kWh $
SHC Water:	4,187 J/kgK
J to kWh:	3,600,000
Water mains input temp:	10°C
kg to litres water:	1

Energy Demand Results:

Hot water energy demand per day:	8.14 kWh

Emitters and Performance

This table provides detailed information about ***heating emitters*** (radiators, underfloor heating, etc.) and their performance characteristics in each room. It shows the ***current emitter capacity*** at 70°C, ***flow temperatures*** required for different heating systems, and ***heat loss requirements*** for each room. For ***underfloor heating systems***, it includes floor type, surface materials, and maximum pipe spacing details. The ***ASHP performance factors*** and ***star ratings*** help assess the efficiency and suitability of different heating systems for each room's specific requirements.

Room names	Types of Emitter	Current Emitter watts (70°C)	Flow Temperature °C	W/m^2	Room Heat Loss watts	Underfloor Heating Details			Wall type or roof	Star rating
						Floor Type	Floor Surface	Max Pipe Spacing	ASHP	
Kitchen	Standard Radiators	997.73	50°C	94.64	1,145.07	-	-	N/A	3.41	★★★☆☆
Lounge	Standard Radiators	1,745.88	50°C	53.01	931.73	-	-	N/A	3.41	★★★☆☆
Entrance Hall	Standard Radiators	0	50°C	73.12	272.14	-	-	N/A	3.41	★★★☆☆
Bedroom 1	Standard Radiators	1,447.84	50°C	58.21	823.07	-	-	N/A	3.41	★★★☆☆
Landing	Standard Radiators	0	50°C	19.26	114.05	-	-	N/A	3.41	★★★☆☆
Bedroom 2	Standard Radiators	762.03	50°C	55.67	476.63	-	-	N/A	3.41	★★★☆☆
Bathroom 1	Standard Radiators	440.05	50°C	75.47	465.03	-	-	N/A	3.41	★★★☆☆

Ventilation Heat Loss

This table provides detailed information about ventilation heat loss for each room, which is a significant factor in overall building heat loss. It shows the room ventilation rates in air changes per hour which indicate how frequently the air in each room is replaced, and ventilation zones for compliance with EN 12831:2017.

The calculations use a minimum ACH as an input for each room and then compares it to another calculation based on the room envelope volume flow rate at m^3/h. This is used in equation 17 within the EN12831:2017 standard. The overall calculation will use the maximum flow rate from these two numbers to produce the ventilation heat loss for that room and zone.

Total Ventilation Zone

882.90 W

Note: This value is added to the total building heat loss.

Building Ventilation Details

Total Zone (Building) envelope area: **120.27 m^2**

Total Zone (Building) volume: **170.29 m^3**

Room Ventilation Details

Room Names	Room Ventilation (Watts)	Ventilation Zone (Watts)	Minimum Air Changes per Hour	Equivalent ACH Calculated
Kitchen	388	194	2	2
Lounge	473.25	236.62	1.5	1.5
Entrance Hall	134.68	67.34	2	2
Bedroom 1	305.77	152.89	1	1.2
Landing	72.03	36.02		0.7
Bedroom 2	181.35	90.67	1	1.2
Bathroom 1	210.72	105.36	2	2

Note: Ventilation heat loss is calculated based on the air changes per hour and the volume of each room. Higher ventilation rates improve indoor air quality but increase heat loss. The balance between energy efficiency and air quality should be considered when designing ventilation systems.

Air Source Heat Pump Summary

SPACE HEATING

Demand	8,658.28 kWh/yr
Heat supplied by HP, excluding auxiliary heaters	8,658.28
SCOP(2)	3.41
Electricity consumed by HP, excluding auxiliary heaters	2,539.08 kWh/yr
Renewable heat supplied by HP	6,119.19 kWh/yr
Remaining heat to be supplied by auxiliary heaters and other heat sources	0 kWh/yr
Remaining heat, supplied by other heat sources	0 kWh/yr
Remaining heat, supplied by auxiliary heaters	0 kWh/yr
Electricity consumed by HP, including auxiliary heaters	2,539.08 kWh/yr

WHERE OTHER HEAT SOURCES ARE USED

Fuel used	N/A
Efficiency of other heat sources	0%
Consumed by other heat sources	0 kWh/yr

WATER HEATING

No. of bedrooms	2 Rooms
No of occupants / bedroom	1 Person/s
HP flow temperature in DHW mode	55°C
Hot water / occupant	45 Litres/day
Final HP secondary HW temperature	50°C
Demand	2,947.35 kWh/yr
Heat supplied by HP, excluding immersion heater	2,865.48 kWh/yr
SCOP(2)	3.06
Electricity consumed by HP, excluding immersion heater	936.43 kWh/yr
Renewable heat supplied by HP	1,929.05 kWh/yr
Remaining heat to be supplied by immersion heater and other heat sources	81.87 kWh/yr
Remaining heat, supplied by other heat sources	0 kWh/yr
Remaining heat, supplied by immersion heater	81.87 kWh/yr

Electricity consumed by HP, including immersion heater	1,018.30 kWh/yr

WHERE OTHER HEAT SOURCES ARE USED (WATER HEATING)

Fuel used	N/A
Efficiency of other heat sources	0%
Consumed by other heat sources	0 kWh/yr

PROPORTIONS, ENERGY CONSUMPTION, AND PERFORMANCE

Proportion of space heating and water heating demand provided by heat pump (excluding auxiliary)	100%
Renewable heat	8,048.24 kWh/yr
Electricity consumed by HP (excluding auxiliary/immersion heaters)	3,475.51 kWh/yr
Electricity consumed by auxiliary/immersion heaters (supplied as part of HP)	81.87 kWh/yr
Fuel consumed by other heat sources	0 kWh/yr
HP combined performance SCOP(4)	3.26

RUNNING COST

Cost per unit of electricity for HP	25 p/kWh
Cost per day for electric standing charge	0.00 Pence / day
Cost per unit of fuel for other heat sources	0 p/kWh
Cost of electricity for HP (including auxiliary/immersion heaters)	889.35 GBP / year
Cost of fuel for other heat sources	0.00 GBP / year

Disclaimer

The performance of Microgeneration heat pump systems is impossible to predict with certainty due to the variability of the climate and its subsequent effect on both heat supply and demand. This estimate is based upon the best available information but is given as guidance only and should not be considered as a guarantee.

Current Emitters

This table provides detailed specifications for ***existing heating emitters*** (radiators) currently installed in each room. It displays ***room heat loss requirements***, ***current radiator specifications*** including ***radiator dimensions*** (height and length), ***connection types*** and ***thermal output ratings*** at standard temperature conditions. This baseline information helps assess the performance of existing systems and provides a reference point for comparing with the proposed new emitters that will be installed.

Room Temperature °C	Room Names	Room Heat Loss	Radiator Type	Connection Type	Conversion Factor	Height (mm)	Length (mm)	Volume (L)	Custom defined MWT 47.5 °C Output Watts
20	Kitchen	1,145.07	K2 (current)	BOE	0.452	450	758	3.91	450.50
								Total Watts	450.50
20	Lounge	931.73	K2 (current)	BOE	0.452	600	1050	6.93	788.31
								Total Watts	788.31
20	Bedroom 1	823.07	K2 (current)	BOE	0.452	450	1100	5.67	653.74
								Total Watts	653.74
20	Bedroom 2	476.63	K1 (current)	BOE	0.454	450	1050	2.70	346.14
								Total Watts	346.14

Room Temperature °C	Room Names	Room Heat Loss	Radiator Type	Connection Type	Conversion Factor	Height (mm)	Length (mm)	Volume (L)	Custom defined MWT 47.5 °C Output Watts
20	Bathroom 1	465.03	K1 (current)	BOE	0.454	300	900	1.70	199.89
								Total Watts	199.89

Proposed Emitters

This table provides detailed specifications for ***proposed heating emitters*** (radiators) in each room, comparing them with existing systems. It shows ***room heat loss requirements***, ***radiator dimensions*** (height and length), and ***thermal output ratings*** at different temperature conditions. The ***conversion factors*** account for how radiator performance changes at lower flow temperatures (40°C vs 70°C), which is crucial for ***heat pump systems*** that operate at lower temperatures. This information ensures that the proposed emitters are properly sized to meet each room's heating requirements while optimizing for the specific heating system being installed.

Room Temperature °C	Room Names	Room Heat Loss	Radiator Type	Connection Type	Conversion Factor	Height (mm)	Length (mm)	Volume (L)	Custom defined MWT
									47.5 °C Output Watts
20	Kitchen	1,145.07	K2 (proposed)	BOE	0.449	700	1000	7.63	844.97
								Total Watts	844.97
20	Lounge	931.73	K2 (proposed)	BOE	0.449	700	1200	9.16	1,013.96
								Total Watts	1,013.96
20	Bedroom 1	823.07	K2 (proposed)	BOE	0.452	450	1400	7.21	832.02
								Total Watts	832.02
20	Bedroom 2	476.63	K2 (proposed)	BOE	0.452	450	1000	5.15	594.31
								Total Watts	594.31

Room Temperature °C	Room Names	Room Heat Loss	Radiator Type	Connection Type	Conversion Factor	Height (mm)	Length (mm)	Volume (L)	Custom defined MWT 47.5 °C Output Watts
20	Bathroom 1	465.03	K2 (proposed)	BOE	0.452	450	1000	5.15	594.31
								Total Watts	594.31

Heating Demand Projection

Heating Demand Calculations

At design temp:	-1.5°C °C
Average room temp:	20 °C
Delta T:	21.50 °C
Total heat loss:	3,344.83 watts
Total area:	68.18 m²
At design conditions:	49.06 W/m²
Heat transfer coefficient:	2.28 W/(m²·K)

Proportion of heating demand	External Temp	Delta T	W/m2	Heating Demand	
	°C	K		watts	kW
0.005%	-8°C	28	63.89	4,356.06	4.36
0.01%	-7°C	27	61.61	4,200.48	4.20
0.02%	-6°C	26	59.32	4,044.91	4.04
0.04%	-5°C	25	57.04	3,889.34	3.89
0.09%	-4°C	24	54.76	3,733.76	3.73
0.18%	-3°C	23	52.48	3,578.19	3.58
0.35%	-2°C	22	50.20	3,422.62	3.42
0.65%	-1°C	21	47.92	3,267.04	3.27
1%	0°C	20	45.63	3,111.47	3.11
2%	1°C	19	43.35	2,955.90	2.96
3%	2°C	18	41.07	2,800.32	2.80
5%	3°C	17	38.79	2,644.75	2.64
7%	4°C	16	36.51	2,489.18	2.49
9%	5°C	15	34.23	2,333.60	2.33
12%	6°C	14	31.94	2,178.03	2.18
17%	7°C	13	29.66	2,022.46	2.02
22%	8°C	12	27.38	1,866.88	1.87
28%	9°C	11	25.10	1,711.31	1.71

Proportion of heating demand	External Temp	Delta T	W/m2	Heating Demand	
	°C	K		watts	kW
35%	10°C	10	22.82	1,555.74	1.56
43%	11°C	9	20.54	1,400.16	1.40
52%	12°C	8	18.25	1,244.59	1.24
63%	13°C	7	15.97	1,089.01	1.09
74%	14°C	6	13.69	933.44	0.93
87%	15°C	5	11.41	777.87	0.78
100%	16°C	4	9.13	622.29	0.62

CIBSE standard base temperature is 15.5 °C. Therefore, a buildings internal heat and solar gains contribute to the remaining demand above this temperature, so it's assumed the heating system won't be in use. Only hot water will be required.

Fuel Comparisons

This table provides a comprehensive comparison of different ***heating fuel types*** and their performance characteristics. It shows ***efficiency ratings*** for both hot water and space heating, ***annual energy demands*** in kilowatt-hours, and ***cost analysis*** including unit prices and annual running costs. The comparison includes ***environmental impact*** through CO, emissions factors and total annual emissions. This analysis enables informed decision-making by comparing the***economic viability***, ***energy efficiency***, and ***environmental performance*** of different heating systems, helping to identify the most cost-effective and sustainable heating solution for the property.

Heating Type	Efficiency%		Annual Energy Demand kWh			kWh/Unit	Price per unit	Pence per kWh	£ / kWh	Pence / day standing charge	Total annual running cost	C02 emissions	
	Hot water	Heating	Hot water	Heating	Total							factor (kg/kWh)	Total kg
Oil	85%	85%	2,971.61	8,658.28	11,629.88	10.35	75p / 10.35	7.25	0.07	0	£991.46	0.314	4,296
Mains Gas	85%	85%	2,971.61	8,658.28	11,629.88	1	7.7p / 1	7.70	0.08	0	£1,053.53	0.227	3,106
LPG	90%	90%	2,971.61	8,658.28	11,629.88	7.11	75p / 7.11	10.55	0.11	0	£1,363.09	0.259	3,347
Direct Electric	100%	100%	2,971.61	8,658.28	11,629.88	1	24.86p / 1	24.86	0.25	0	£2,891.19	0.233	2,710
Air Source Heat Pump	(SCOP) 3.06	(SCOP) 3.41	2,865.48	8,658.28	11,523.75	1	25p / 1	25	0.25	0	£889.35	0.233	810
Ground Source Heat Pump	(SCOP) 3.1	(SCOP) 3.4	2,865.48	8,658.28	11,523.75	1	25p / 1	25	0.25	0	£867.72	0.233	809