Heat Loss and Heating Design Report

QUALIS
ENERGY

Project Information

Project Reference:
189 Park Lane

Heating Type:
Air Source Heat Pump

Installation Address

189 Park Lane
Belper
Derbyshire
DE56 2AE

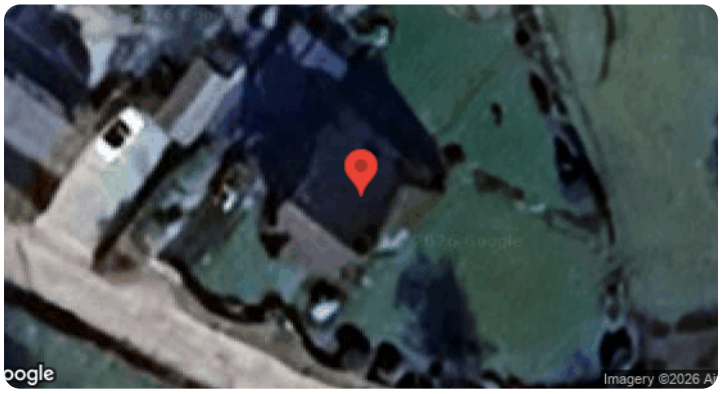
Surveyor Details

Surveyor Name:
Simon Midgley

Contact Number:

Site Location & Front of House

Site Location Map



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

189 Park Lane
Belper
Derbyshire
DE56 2AE

Property Heat Loss	Heat Pump Output
9.35 kW	9.62 kW

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

Roof
1,090 W

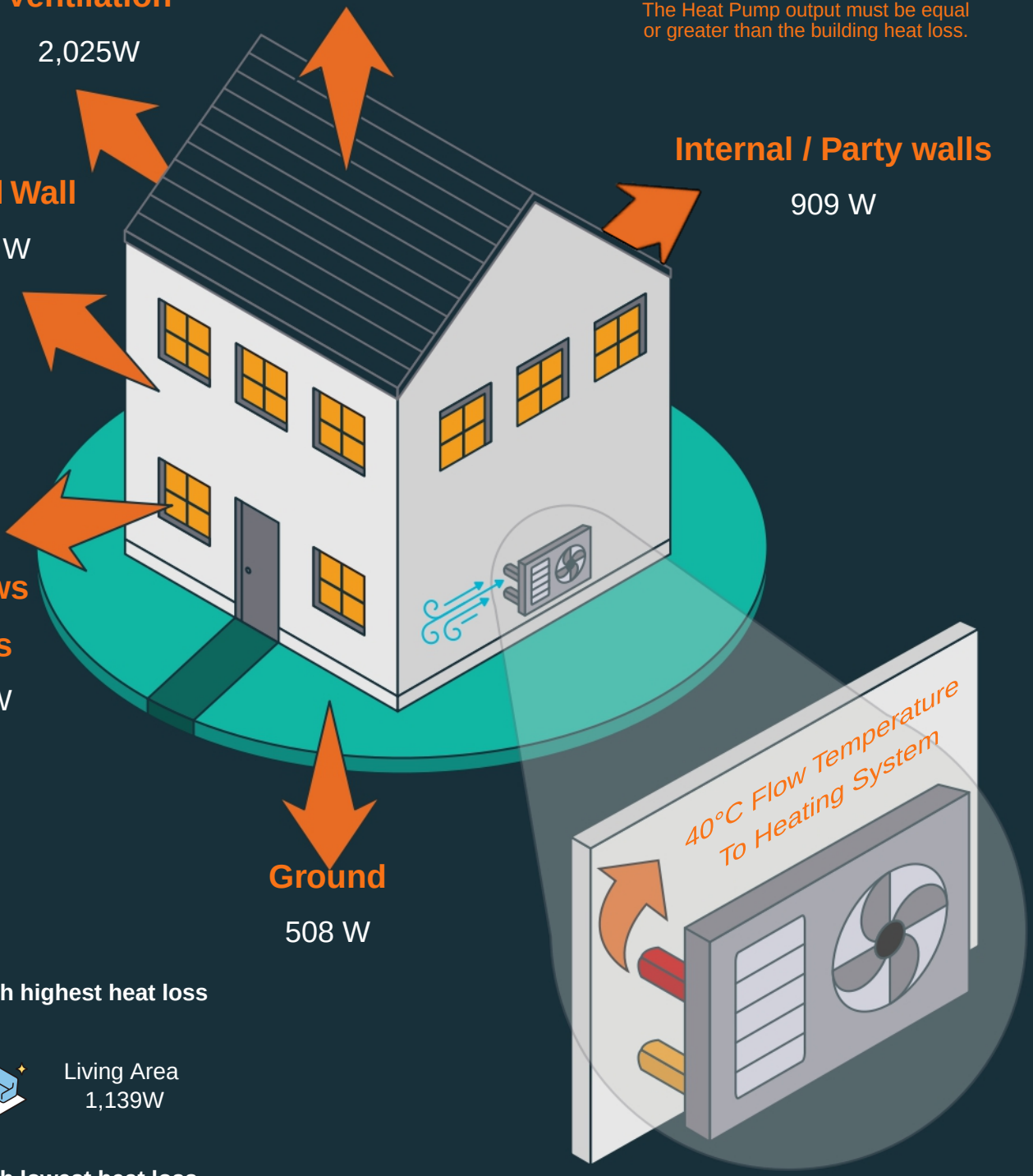
Ventilation
2,025W

External Wall
2,235 W

Internal / Party walls
909 W

Windows & Doors
2,571 W

Ground
508 W



Room with highest heat loss

Living Area
1,139W

Room with lowest heat loss

Toilet
9W

Manufacturer: Ideal Heating
Model: Ideal Logic Air 10kW
Certificate Number: KIWA 00027/022 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

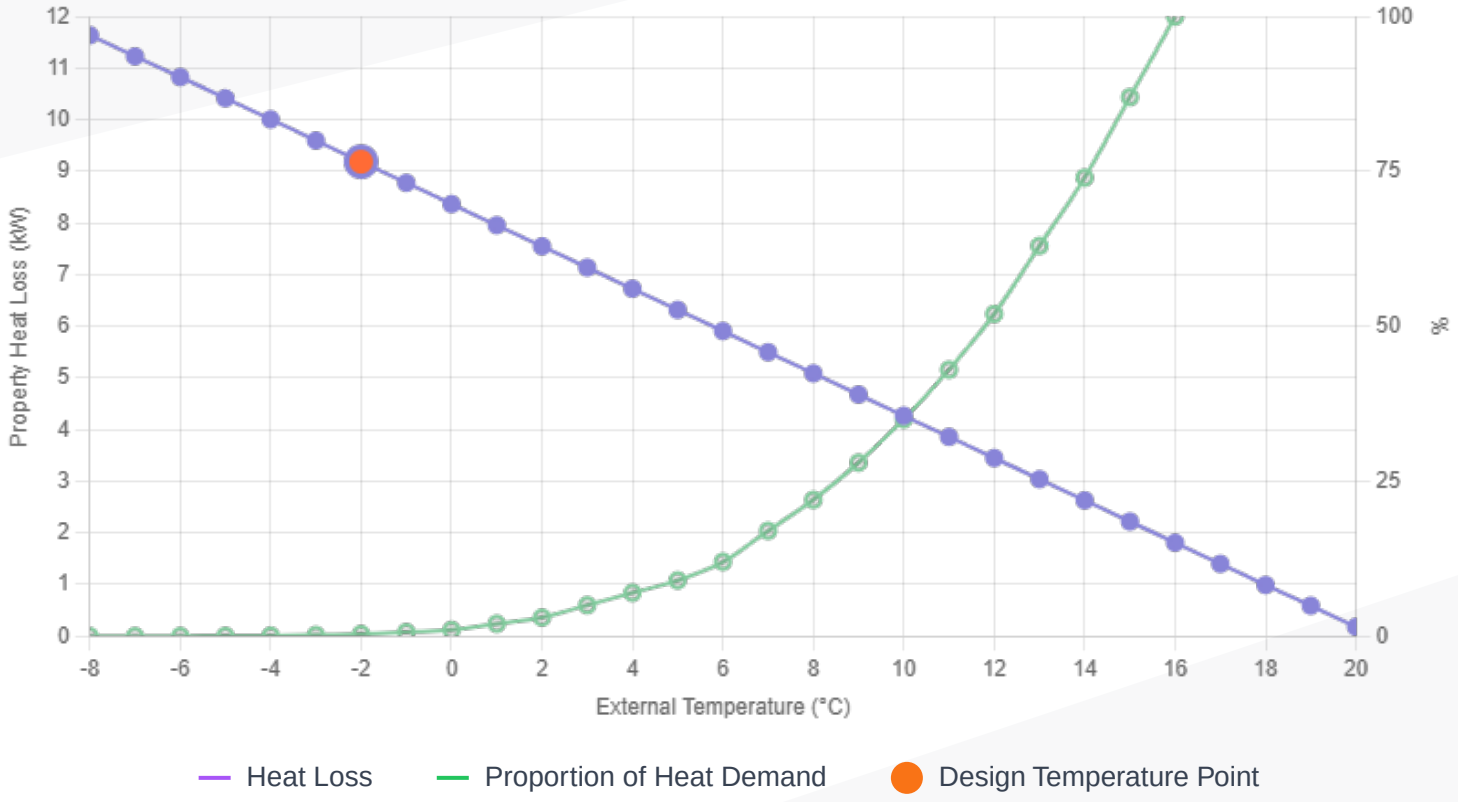
About this chart

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.



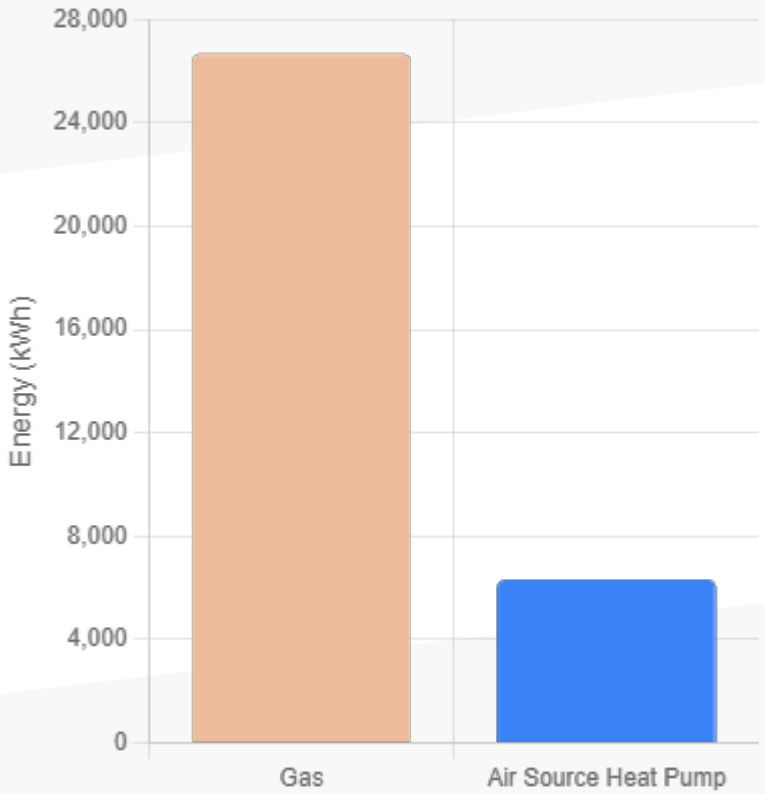
Heat Pump Cost Analysis

Detailed breakdown of energy consumption and associated costs

Heat Pump Running Costs Breakdown

Heating and Hot Water	Energy(kWh)	Annual Running Cost
Renewable Heat	20,348	£ 0
Energy You Pay For	6,324	£ 1,915.42
Total	**26,671**	**£ 1,915.42**

Note: Includes standing charge



Method Used

Energy Source	Energy(kWh)
Heating and Hot Water	6,187
* Hot Water includes pasteurisation cycle	136
Total	**6,324**

*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 **9.35 kW**

When the external temperature is **-2.4°C**

Heating System Details

Heating Type:	Air Source Heat Pump
Manufacturer:	Ideal Heating
Model(s):	Ideal Logic Air 10kW
Certificate Number:	KIWA 00027/022 HP
Output at designed external temperature:	9.62 kW
Maximum designed flow temperature:	40°C
ASHP:	Air Source Heat Pump

Worst Performing Room

Room Name:	workshop
Floor Area:	9.70 m²
Power demand:	761.54
Specific room heat loss:	78.49 W/m²
Emitter type:	Standard Radiators
Seasonal Coefficient of Performance (SCOP):	4.46

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:	28 (total floor area: 447.72 m²)	Degree Day Data:	2228	Shielding:	Normal
Location (Degree Day):	Belper, Derbyshire	Is Property > 2006:	NO	Dwelling Type:	Detached
Ground Temperature:	9.60 °C			Storeys:	1
Outside Temperature:	-2.40 °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
Living Area	21°C	NO	NO	2026	0.5	NO	NO	YES	Type 1	None	None	UH
Dining Room	21°C	NO	NO	2026	0.5	NO	NO	NO	None	None	Master Bedroom	UH
Kitchen	21°C	NO	NO	2026	0.5	NO	NO	NO	None	None	Master En Suite	UH
Plant room	21°C	NO	NO	2026	0	NO	NO	NO	None	None	Landing	SR
Toilet	21°C	NO	NO	2026	0	NO	NO	NO	None	None	Landing	UH
Lounge	21°C	NO	NO	2026	0.5	NO	NO	NO	None	None	Bedroom 2	UH
Study	21°C	NO	NO	2026	0.5	NO	NO	NO	None	None	Bedroom 3	UH
Entrance Hall	21°C	NO	NO	2026	0.5	NO	NO	NO	None	None	Landing	SR
Master Bedroom	21°C	NO	NO	2026	0.5	NO	NO	NO	None	Dining Room	Bedroom 4	SR

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
Dressing Room	21°C	NO	NO	2026	0.5	NO	NO	NO	None	Dining Room	Landing 1	SR
Master En Suite	22°C	NO	NO	2026	0.5	NO	NO	NO	None	Kitchen	Bedroom 5	SR
Bedroom 2	21°C	NO	NO	2026	0.5	NO	NO	NO	None	Lounge	Bedroom 4	SR
Ensuite bed 2	22°C	NO	NO	2026	0.5	NO	NO	NO	None	Lounge	Bedroom 4	SR
Bedroom 3	21°C	NO	NO	2026	0.5	NO	NO	NO	None	Study	Bedroom 5	SR
bedroom 3 ensuite	22°C	NO	NO	2026	0.5	NO	NO	NO	None	Kitchen	Bedroom 5	SR
Utility Room	21°C	NO	NO	2026	0.5	NO	NO	NO	None	None	None	UH
Toilet 1	21°C	NO	NO	2026	0.5	NO	NO	NO	None	None	None	UH
Garage	10°C	NO	NO	2026	0.5	NO	NO	NO	None	None	Gym a	SR
Lobby	21°C	NO	NO	2026	0.5	NO	NO	NO	None	None	Room at 21C	SR
workshop	21°C	NO	NO	2026	0.5	NO	NO	NO	None	None	gym b	SR
Plant Room	18°C	NO	NO	2026	0.5	NO	NO	NO	None	None	None	SR
Gym a	18°C	NO	NO	2026	0.5	NO	NO	YES	Type 1	Garage	None	SR
gym b	18°C	NO	NO	2026	0.5	NO	NO	YES	Type 1	workshop	None	SR
Landing	21°C	NO	NO	2026	0.5	NO	NO	NO	None	Hall	Bathroom	SR
Landing 2	21°C	NO	NO	2026	0.5	NO	NO	YES	Type 7	Landing	None	SR
Bathroom	22°C	NO	NO	2026	0.5	NO	NO	YES	Type 7	Landing	None	SR

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
Bedroom 4	21°C	NO	NO	2026	0.5	NO	NO	YES	Type 3	Master Bedroom	None	SR
Bedroom 5	21°C	NO	NO	2026	0.5	NO	NO	YES	Type 3	None	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)						
Living Area	23.83	0	0	0	0.96	0	0	0	9.45	0	21 °C	0 %
Dining Room	18.55	2.58	5.90	0	1.92	0	14.81	0	0	0	21 °C	0 %
Kitchen	27.06	2.58	6.40	0	1.92	0	14.68	0	0	0	21 °C	0 %
Plant room	2.55	2.58	0	0	0	0	6.40	0	0	0	10 °C	0 %
Toilet	1.52	2.58	0	0	0	0	5.04	0	0	0	21 °C	0 %
Lounge	25.39	2.58	10.17	0	2.88	0	10.17	0	0	0	21 °C	0 %
Study	10.98	2.58	5.70	0	2.88	0	8.15	0	0	0	21 °C	0 %
Entrance Hall	21.74	2.58	5.15	0	7.61	0	14.50	0	0	0	18 °C	0 %
Master Bedroom	20.21	2.70	9	0	2.88	0	9	0	0	0	21 °C	0 %
Dressing Room	8.40	2.70	3.40	0	2.16	0	8.40	0	0	0	21 °C	0 %
Master En Suite	16.21	2.70	8.08	0	0	0	8.08	0	0	0	21 °C	0 %

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)						
Bedroom 2	13.70	2.70	7.51	0	2.88	0	7.51	0	0	0	21 °C	0 %
Ensuite bed 2	3.52	2.70	1.43	0	0.96	0	6.35	0	0	0	21 °C	0 %
Bedroom 3	12.42	2.70	8.06	0	2.88	0	10.73	0	0	0	21 °C	0 %
bedroom 3 ensuite	3.60	2.70	1.43	0	0.96	0	6.52	0	0	0	21 °C	0 %
Utility Room	13.05	2.58	5.65	0	2.16	0	8.50	0	1.91	0	18 °C	2.16 %
Toilet 1	2.70	2.70	1.80	0	0.96	0	3.50	0	0	0	18 °C	0 %
Garage	38.68	2.58	12.44	0	0.96	0	12.44	0	10.44	0	21 °C	0 %
Lobby	7.96	2.58	1.90	0	0	0	10.29	0	1.91	0	10 °C	0 %
workshop	9.70	2.58	13.48	0	3.24	0	5.92	0	3.83	0	10 °C	0 %
Plant Room	4.12	2.58	4.07	0	0	0	4.07	0	0	0	18 °C	0 %
Gym a	53.10	0	0	0	0	0	0	0	0	4.32	18 °C	0 %
gym b	22	0	0	0	1.65	0	0	0	0	3.30	18 °C	0 %
Landing	25.31	2.58	5.96	0	2.97	0	30.81	0	0	0	18 °C	0 %
Landing 2	9.60	0	0	0	0	0	0	0	0	1.62	18 °C	0 %
Bathroom	8.32	0	0	0	0	0	0	0	0	1.62	18 °C	0 %
Bedroom 4	24.94	0	0	0	0	0	0	0	0	3.24	18 °C	0 %
Bedroom 5	18.56	0	0	0	0	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
Living Area	External Wall .18		Plaster, Standard Aerated Block 125mm, Plaster (0.93)	
Dining Room	External Wall .18		Plaster, Standard Aerated Block 125mm, Plaster (0.93)	
Kitchen	External Wall .18		Plaster, Standard Aerated Block 125mm, Plaster (0.93)	
Plant room	External Wall .18		Plaster, Standard Aerated Block 125mm, Plaster (0.93)	
Toilet	External Wall .18		Plaster, Standard Aerated Block 125mm, Plaster (0.93)	
Lounge	External Wall .18		Plaster, Standard Aerated Block 125mm, Plaster (0.93)	
Study	External Wall .18		Plaster, Standard Aerated Block 125mm, Plaster (0.93)	
Entrance Hall	External Wall .18		Plaster, Standard Aerated Block 125mm, Plaster (0.93)	
Master Bedroom	External Wall .18		Plaster, Standard Aerated Block 125mm, Plaster (0.93)	

Room Names	External Wall (A)	External Wall (B)	Internal Wall	Party Wall
Dressing Room	External Wall .18		Plaster, Standard Aerated Block 125mm, Plaster (0.93)	
Master En Suite	External Wall .18		Plaster, Standard Aerated Block 125mm, Plaster (0.93)	
Bedroom 2	External Wall .18		Plaster, Standard Aerated Block 125mm, Plaster (0.93)	
Ensuite bed 2	External Wall .18		Plaster, Standard Aerated Block 125mm, Plaster (0.93)	
Bedroom 3	External Wall .18		Plaster, Standard Aerated Block 125mm, Plaster (0.93)	
bedroom 3 ensuite	External Wall .18		Plaster, Standard Aerated Block 125mm, Plaster (0.93)	
Utility Room	External Wall .18		Plaster, Standard Aerated Block 125mm, Plaster (0.93)	
Toilet 1	External Wall .18		Plaster, Standard Aerated Block 125mm, Plaster (0.93)	
Garage	External Wall .18		Plaster, Standard Aerated Block 125mm, Plaster (0.93)	
Lobby	External Wall .18		Plaster, Standard Aerated Block 125mm, Plaster (0.93)	
workshop	External Wall .18		Plaster, Standard Aerated Block 125mm, Plaster (0.93)	
Plant Room	External Wall .18		Plaster, Standard Aerated Block 125mm, Plaster (0.93)	
Gym a	External Wall .18		Plaster, Standard Aerated Block 125mm, Plaster (0.93)	
gym b	External Wall .18		Plaster, Standard Aerated Block 125mm, Plaster (0.93)	

Room Names	External Wall (A)	External Wall (B)	Internal Wall	Party Wall
Landing	External Wall .18		Plaster, Standard Aerated Block 125mm, Plaster (0.93)	
Landing 2	External Wall .18		Plaster, Standard Aerated Block 125mm, Plaster (0.93)	
Bathroom	External Wall .18		Plaster, Standard Aerated Block 125mm, Plaster (0.93)	
Bedroom 4	External Wall .18		Plaster, Standard Aerated Block 125mm, Plaster (0.93)	
Bedroom 5	External Wall .18		Plaster, Standard Aerated Block 125mm, Plaster (0.93)	

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
Living Area	Windows 1.2			Door 1.2
Dining Room	Windows 1.2			Door 1.2
Kitchen	Windows 1.2			Door 1.2
Plant room	Windows 1.2			Door 1.2
Toilet	Windows 1.2			Door 1.2
Lounge	Windows 1.2			Door 1.2
Study	Windows 1.2			Door 1.2
Entrance Hall	Windows 1.2			Door 1.2
Master Bedroom	Windows 1.2			Door 1.2
Dressing Room	Windows 1.2			Door 1.2
Master En Suite	Windows 1.2			Door 1.2
Bedroom 2	Windows 1.2			Door 1.2

Room Names	Window Type (A)	Window Type (B)	Roof Glazing	Door
Ensuite bed 2	Windows 1.2			Door 1.2
Bedroom 3	Windows 1.2			Door 1.2
bedroom 3 ensuite	Windows 1.2			Door 1.2
Utility Room	Windows 1.2			Door 1.2
Toilet 1	Windows 1.2			Door 1.2
Garage	Windows 1.2			Solid Wood Door (3)
Lobby	Windows 1.2			Door 1.2
workshop	Windows 1.2			Door 1.2
Plant Room	Windows 1.2			Door 1.2
Gym a	Windows 1.2		Windows 1.2	Door 1.2
gym b	Windows 1.2		Windows 1.2	Door 1.2
Landing	Windows 1.2			Door 1.2
Landing 2	Windows 1.2		Windows 1.2	Door 1.2
Bathroom	Windows 1.2		Windows 1.2	Door 1.2
Bedroom 4	Windows 1.2		Windows 1.2	Door 1.2
Bedroom 5	Windows 1.2			Door 1.2

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
Living Area	Ground Floor .11	Intermediate Floor Timber with insulation (0.32)
Dining Room	Ground Floor .11	Intermediate Floor Timber with insulation (0.32)
Kitchen	Ground Floor .11	Intermediate Floor Timber with insulation (0.32)
Plant room	Ground Floor .11	Intermediate Floor Timber with insulation (0.32)
Toilet	Ground Floor .11	Intermediate Floor Timber with insulation (0.32)
Lounge	Ground Floor .11	Intermediate Floor Timber with insulation (0.32)
Study	Ground Floor .11	Intermediate Floor Timber with insulation (0.32)
Entrance Hall	Ground Floor .11	Intermediate Floor Timber with insulation (0.32)
Master Bedroom	Intermediate Floor Timber with insulation (0.32)	Intermediate Floor Timber with insulation (0.32)
Dressing Room	Intermediate Floor Timber with insulation (0.32)	Intermediate Floor Timber with insulation (0.32)
Master En Suite	Intermediate Floor Timber with insulation (0.32)	Intermediate Floor Timber with insulation (0.32)
Bedroom 2	Intermediate Floor Timber with insulation (0.32)	Intermediate Floor Timber with insulation (0.32)
Ensuite bed 2	Intermediate Floor Timber with insulation (0.32)	Intermediate Floor Timber with insulation (0.32)
Bedroom 3	Intermediate Floor Timber with insulation (0.32)	Intermediate Floor Timber with insulation (0.32)
bedroom 3 ensuite	Intermediate Floor Timber with insulation (0.32)	Intermediate Floor Timber with insulation (0.32)
Utility Room	Ground Floor .11	Intermediate Floor Timber with insulation (0.32)
Toilet 1	Ground Floor .11	Intermediate Floor Timber with insulation (0.32)
Garage	Ground Floor U-Value = (0.2)	Intermediate Floor Timber with insulation (0.32)
Lobby	Ground Floor .11	Intermediate Floor Timber with insulation (0.32)
workshop	Ground Floor .11	Intermediate Floor Timber with insulation (0.32)
Plant Room	Ground Floor .11	Intermediate Floor Timber with insulation (0.32)

Room Names	Floor	Roof or Ceiling
Gym a	Ground Floor .11	Intermediate Floor Timber with insulation (0.32)
gym b	Intermediate Floor Timber with insulation (0.32)	Pitched roof flat .1
Landing	Intermediate Floor Timber with insulation (0.32)	Intermediate Floor Timber with insulation (0.32)
Landing 2	Intermediate Floor Timber with insulation (0.32)	Pitched roof flat .1
Bathroom	Intermediate Floor Timber with insulation (0.32)	Pitched roof flat .1
Bedroom 4	Intermediate Floor Timber with insulation (0.32)	Pitched roof flat .1
Bedroom 5	Intermediate Floor Timber with insulation (0.32)	Pitched roof flat .1

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)
Living Area	47.81	51.62	192.26	0	28.75	0	0	0	283.05	0	257.88
Dining Room	19.59	40.18	80.98	0	57.51	0	0	0	0	0	0
Kitchen	17.16	58.61	88.81	0	57.51	0	0	0	0	0	-10.01
Plant room	75.81	5.52	0	0	0	0	177.94	0	0	0	0
Toilet	6.03	3.3	0	0	0	0	0	0	0	0	0
Lounge	21.12	54.99	142.11	0	86.26	0	0	0	0	0	0
Study	26.53	23.78	71.87	0	86.26	0	0	0	0	0	0
Entrance Hall	29.26	47.09	34.58	0	227.96	0	109.96	0	0	0	0
Master Bedroom	21.14	0	130.29	0	86.26	0	0	0	0	0	0
Dressing Room	23.21	0	42.66	0	64.7	0	0	0	0	0	0
Master En Suite	21.47	6	138.4	0	0	0	21.38	0	0	0	6

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)
Bedroom 2	24.45	0	105.79	0	86.26	0	0	0	0	0	0
Ensuite bed 2	30.14	1.3	18.4	0	29.98	0	16.81	0	0	0	1.3
Bedroom 3	26.62	0	114.83	0	86.26	0	0	0	0	0	0
bedroom 3 ensuite	29.86	1.33	18.4	0	29.98	0	17.26	0	0	0	1.33
Utility Room	43.67	28.27	63.92	0	64.7	0	64.47	0	57.24	0	122.15
Toilet 1	55.93	5.85	23.73	0	28.75	0	27.78	0	0	0	25.27
Garage	5.91	4.33	66.73	0	15.24	0	-345.99	0	398.61	0	-114.49
Lobby	57.55	17.24	18.2	0	0	0	286.13	0	57.24	0	0
workshop	78.49	21.01	168.63	0	97.04	0	164.71	0	114.6	0	10.77
Plant Room	38.57	6.58	55.7	0	0	0	0	0	0	0	33.64
Gym a	19.64	67.97	151.48	0	0	0	0	0	0	112.8	424.62
gym b	17.7	-24.42	92.24	0	43.08	0	0	0	0	86.17	73.84
Landing	25.32	0	75.4	0	88.96	0	233.69	0	0	0	-9.37
Landing 2	23.57	0	19.47	0	0	0	51.16	0	0	48.52	39.19
Bathroom	27.68	3.08	20.3	0	0	0	61.54	0	0	50.6	34.86
Bedroom 4	21.71	0	153.32	0	0	0	12.64	0	0	97.04	104.95
Bedroom 5	26.6	84.63	146.62	0	0	0	9.41	0	0	0	88.26

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 (m³/hour)	Ventilation per Room (Watts)	Exposed Location (watts)	Intermitted Heating (watts)	Thermal Bridges (watts)	Total Watts	Total kWh
Living Area	0	42.18	325.73	0	0	0	1,139.29	1,947.61
Dining Room	0	23.93	184.78	0	0	0	363.45	782.67
Kitchen	0	34.91	269.55	0	0	0	464.47	1,038.83
Plant room	0	0	9.85	0	0	0	193.31	15
Toilet	0	0	5.88	0	0	0	9.17	8.95
Lounge	0	32.75	252.90	0	0	0	536.27	1,136.86
Study	0	14.16	109.36	0	0	0	291.27	612.96
Entrance Hall	0	28.04	216.56	0	0	0	636.16	1,165.82
Master Bedroom	0	27.29	210.70	0	0	0	427.25	872.40
Dressing Room	0	11.34	87.57	0	0	0	194.92	406.19
Master En Suite	0	21.88	176.16	0	0	0	347.94	596.03

Room Names	High Ceiling Increase (watts)	Minimum air volume flow (m³/hour)	Ventilation per Room (Watts)	Exposed Location (watts)	Intermitted Heating (watts)	Thermal Bridges (watts)	Total Watts	Total kWh
Bedroom 2	0	18.49	142.78	0	0	0	334.83	678.43
Ensuite bed 2	0	4.75	38.25	0	0	0	106.05	173.35
Bedroom 3	0	16.77	129.47	0	0	0	330.57	662.33
bedroom 3 ensuite	0	4.86	39.10	0	0	0	107.41	175.21
Utility Room	12.05	16.83	157.05	0	0	0	569.84	977.85
Toilet 1	0	3.65	39.61	0	0	0	151	225.54
Garage	0	49.90	204.18	0	0	0	228.61	3,329.67
Lobby	0	10.27	79.29	0	0	0	458.10	397.82
workshop	0	12.52	184.77	0	0	0	761.54	1,034.92
Plant Room	0	5.32	63.10	0	0	0	159.02	289.72
Gym a	0	42.48	285.98	0	0	0	1,042.85	1,301.68
gym b	0	17.60	118.48	0	0	0	389.40	795.57
Landing	0	32.65	252.13	0	0	0	640.82	886.02
Landing 2	0	8.80	67.95	0	0	0	226.30	290.03
Bathroom	0	7.44	59.91	0	0	0	230.29	266.03
Bedroom 4	0	22.47	173.49	0	0	0	541.44	846.90
Bedroom 5	0	16.72	164.71	0	0	0	493.63	844.58

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)

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
Living Area	U: 0.11 TB: 0.08 **0.19**	U: 0.18 TB: 0.08 **0.26**	U: 0 TB: 0.08 **0**	U: 1.20 TB: 0.08 **1.28**	U: 0 TB: 0.08 **0**	U: 0.93 TB: 0.05 **0.98**	U: 0 TB: 0.05 **0**	U: 1.20 TB: 0.08 **1.28**	U: 0 TB: 0.08 **0**	U: 0.32 TB: 0.08 **0.40**
Dining Room	U: 0.11 TB: 0.08 **0.19**	U: 0.18 TB: 0.08 **0.26**	U: 0 TB: 0.08 **0**	U: 1.20 TB: 0.08 **1.28**	U: 0 TB: 0.08 **0**	U: 0.93 TB: 0.05 **0.98**	U: 0 TB: 0.05 **0**	U: 1.20 TB: 0.08 **1.28**	U: 0 TB: 0.08 **0**	U: 0.32 TB: 0.05 **0.37**
Kitchen	U: 0.11 TB: 0.08 **0.19**	U: 0.18 TB: 0.08 **0.26**	U: 0 TB: 0.08 **0**	U: 1.20 TB: 0.08 **1.28**	U: 0 TB: 0.08 **0**	U: 0.93 TB: 0.05 **0.98**	U: 0 TB: 0.05 **0**	U: 1.20 TB: 0.08 **1.28**	U: 0 TB: 0.08 **0**	U: 0.32 TB: 0.05 **0.37**

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
Plant room	U: 0.11 TB: 0.08 **0.19**	U: 0.18 TB: 0.08 **0.26**	U: 0 TB: 0.08 **0**	U: 1.20 TB: 0.08 **1.28**	U: 0 TB: 0.08 **0**	U: 0.93 TB: 0.05 **0.98**	U: 0 TB: 0.05 **0**	U: 1.20 TB: 0.08 **1.28**	U: 0 TB: 0.08 **0**	U: 0.32 TB: 0.05 **0.37**
Toilet	U: 0.11 TB: 0.08 **0.19**	U: 0.18 TB: 0.08 **0.26**	U: 0 TB: 0.08 **0**	U: 1.20 TB: 0.08 **1.28**	U: 0 TB: 0.08 **0**	U: 0.93 TB: 0.05 **0.98**	U: 0 TB: 0.05 **0**	U: 1.20 TB: 0.08 **1.28**	U: 0 TB: 0.08 **0**	U: 0.32 TB: 0.05 **0.37**
Lounge	U: 0.11 TB: 0.08 **0.19**	U: 0.18 TB: 0.08 **0.26**	U: 0 TB: 0.08 **0**	U: 1.20 TB: 0.08 **1.28**	U: 0 TB: 0.08 **0**	U: 0.93 TB: 0.05 **0.98**	U: 0 TB: 0.05 **0**	U: 1.20 TB: 0.08 **1.28**	U: 0 TB: 0.08 **0**	U: 0.32 TB: 0.05 **0.37**
Study	U: 0.11 TB: 0.08 **0.19**	U: 0.18 TB: 0.08 **0.26**	U: 0 TB: 0.08 **0**	U: 1.20 TB: 0.08 **1.28**	U: 0 TB: 0.08 **0**	U: 0.93 TB: 0.05 **0.98**	U: 0 TB: 0.05 **0**	U: 1.20 TB: 0.08 **1.28**	U: 0 TB: 0.08 **0**	U: 0.32 TB: 0.05 **0.37**
Entrance Hall	U: 0.11 TB: 0.08 **0.19**	U: 0.18 TB: 0.08 **0.26**	U: 0 TB: 0.08 **0**	U: 1.20 TB: 0.08 **1.28**	U: 0 TB: 0.08 **0**	U: 0.93 TB: 0.05 **0.98**	U: 0 TB: 0.05 **0**	U: 1.20 TB: 0.08 **1.28**	U: 0 TB: 0.08 **0**	U: 0.32 TB: 0.05 **0.37**
Master Bedroom	U: 0.32 TB: 0.05 **0.37**	U: 0.18 TB: 0.08 **0.26**	U: 0 TB: 0.08 **0**	U: 1.20 TB: 0.08 **1.28**	U: 0 TB: 0.08 **0**	U: 0.93 TB: 0.05 **0.98**	U: 0 TB: 0.05 **0**	U: 1.20 TB: 0.08 **1.28**	U: 0 TB: 0.08 **0**	U: 0.32 TB: 0.05 **0.37**
Dressing Room	U: 0.32 TB: 0.05 **0.37**	U: 0.18 TB: 0.08 **0.26**	U: 0 TB: 0.08 **0**	U: 1.20 TB: 0.08 **1.28**	U: 0 TB: 0.08 **0**	U: 0.93 TB: 0.05 **0.98**	U: 0 TB: 0.05 **0**	U: 1.20 TB: 0.08 **1.28**	U: 0 TB: 0.08 **0**	U: 0.32 TB: 0.05 **0.37**
Master En Suite	U: 0.32 TB: 0.05 **0.37**	U: 0.18 TB: 0.08 **0.26**	U: 0 TB: 0.08 **0**	U: 1.20 TB: 0.08 **1.28**	U: 0 TB: 0.08 **0**	U: 0.93 TB: 0.05 **0.98**	U: 0 TB: 0.05 **0**	U: 1.20 TB: 0.08 **1.28**	U: 0 TB: 0.08 **0**	U: 0.32 TB: 0.05 **0.37**
Bedroom 2	U: 0.32 TB: 0.05 **0.37**	U: 0.18 TB: 0.08 **0.26**	U: 0 TB: 0.08 **0**	U: 1.20 TB: 0.08 **1.28**	U: 0 TB: 0.08 **0**	U: 0.93 TB: 0.05 **0.98**	U: 0 TB: 0.05 **0**	U: 1.20 TB: 0.08 **1.28**	U: 0 TB: 0.08 **0**	U: 0.32 TB: 0.05 **0.37**
Ensuite bed 2	U: 0.32 TB: 0.05 **0.37**	U: 0.18 TB: 0.08 **0.26**	U: 0 TB: 0.08 **0**	U: 1.20 TB: 0.08 **1.28**	U: 0 TB: 0.08 **0**	U: 0.93 TB: 0.05 **0.98**	U: 0 TB: 0.05 **0**	U: 1.20 TB: 0.08 **1.28**	U: 0 TB: 0.08 **0**	U: 0.32 TB: 0.05 **0.37**
Bedroom 3	U: 0.32 TB: 0.05 **0.37**	U: 0.18 TB: 0.08 **0.26**	U: 0 TB: 0.08 **0**	U: 1.20 TB: 0.08 **1.28**	U: 0 TB: 0.08 **0**	U: 0.93 TB: 0.05 **0.98**	U: 0 TB: 0.05 **0**	U: 1.20 TB: 0.08 **1.28**	U: 0 TB: 0.08 **0**	U: 0.32 TB: 0.05 **0.37**
bedroom 3 ensuite	U: 0.32 TB: 0.05 **0.37**	U: 0.18 TB: 0.08 **0.26**	U: 0 TB: 0.08 **0**	U: 1.20 TB: 0.08 **1.28**	U: 0 TB: 0.08 **0**	U: 0.93 TB: 0.05 **0.98**	U: 0 TB: 0.05 **0**	U: 1.20 TB: 0.08 **1.28**	U: 0 TB: 0.08 **0**	U: 0.32 TB: 0.05 **0.37**

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
Utility Room	U: 0.11 TB: 0.08 **0.19**	U: 0.18 TB: 0.08 **0.26**	U: 0 TB: 0.08 **0**	U: 1.20 TB: 0.08 **1.28**	U: 0 TB: 0.08 **0**	U: 0.93 TB: 0.05 **0.98**	U: 0 TB: 0.05 **0**	U: 1.20 TB: 0.08 **1.28**	U: 0 TB: 0.08 **0**	U: 0.32 TB: 0.08 **0.40**
Toilet 1	U: 0.11 TB: 0.08 **0.19**	U: 0.18 TB: 0.08 **0.26**	U: 0 TB: 0.08 **0**	U: 1.20 TB: 0.08 **1.28**	U: 0 TB: 0.08 **0**	U: 0.93 TB: 0.05 **0.98**	U: 0 TB: 0.05 **0**	U: 1.20 TB: 0.08 **1.28**	U: 0 TB: 0.08 **0**	U: 0.32 TB: 0.08 **0.40**
Garage	U: 0.20 TB: 0.08 **0.28**	U: 0.18 TB: 0.08 **0.26**	U: 0 TB: 0.08 **0**	U: 1.20 TB: 0.08 **1.28**	U: 0 TB: 0.08 **0**	U: 0.93 TB: 0.05 **0.98**	U: 0 TB: 0.05 **0**	U: 3 TB: 0.08 **3.08**	U: 0 TB: 0.08 **0**	U: 0.32 TB: 0.05 **0.37**
Lobby	U: 0.11 TB: 0.08 **0.19**	U: 0.18 TB: 0.08 **0.26**	U: 0 TB: 0.08 **0**	U: 1.20 TB: 0.08 **1.28**	U: 0 TB: 0.08 **0**	U: 0.93 TB: 0.05 **0.98**	U: 0 TB: 0.05 **0**	U: 1.20 TB: 0.08 **1.28**	U: 0 TB: 0.08 **0**	U: 0.32 TB: 0.05 **0.37**
workshop	U: 0.11 TB: 0.08 **0.19**	U: 0.18 TB: 0.08 **0.26**	U: 0 TB: 0.08 **0**	U: 1.20 TB: 0.08 **1.28**	U: 0 TB: 0.08 **0**	U: 0.93 TB: 0.05 **0.98**	U: 0 TB: 0.05 **0**	U: 1.20 TB: 0.08 **1.28**	U: 0 TB: 0.08 **0**	U: 0.32 TB: 0.05 **0.37**
Plant Room	U: 0.11 TB: 0.08 **0.19**	U: 0.18 TB: 0.08 **0.26**	U: 0 TB: 0.08 **0**	U: 1.20 TB: 0.08 **1.28**	U: 0 TB: 0.08 **0**	U: 0.93 TB: 0.05 **0.98**	U: 0 TB: 0.05 **0**	U: 1.20 TB: 0.08 **1.28**	U: 0 TB: 0.08 **0**	U: 0.32 TB: 0.08 **0.40**
Gym a	U: 0.11 TB: 0.05 **0.16**	U: 0.18 TB: 0.08 **0.26**	U: 0 TB: 0.08 **0**	U: 1.20 TB: 0.08 **1.28**	U: 0 TB: 0.08 **0**	U: 0.93 TB: 0.05 **0.98**	U: 0 TB: 0.05 **0**	U: 1.20 TB: 0.08 **1.28**	U: 1.20 TB: 0.08 **1.28**	U: 0.32 TB: 0.08 **0.40**
gym b	U: 0.32 TB: 0.05 **0.37**	U: 0.18 TB: 0.08 **0.26**	U: 0 TB: 0.08 **0**	U: 1.20 TB: 0.08 **1.28**	U: 0 TB: 0.08 **0**	U: 0.93 TB: 0.05 **0.98**	U: 0 TB: 0.05 **0**	U: 1.20 TB: 0.08 **1.28**	U: 1.20 TB: 0.08 **1.28**	U: 0.10 TB: 0.08 **0.18**
Landing	U: 0.32 TB: 0.05 **0.37**	U: 0.18 TB: 0.08 **0.26**	U: 0 TB: 0.08 **0**	U: 1.20 TB: 0.08 **1.28**	U: 0 TB: 0.08 **0**	U: 0.93 TB: 0.05 **0.98**	U: 0 TB: 0.05 **0**	U: 1.20 TB: 0.08 **1.28**	U: 0 TB: 0.08 **0**	U: 0.32 TB: 0.05 **0.37**
Landing 2	U: 0.32 TB: 0.05 **0.37**	U: 0.18 TB: 0.08 **0.26**	U: 0 TB: 0.08 **0**	U: 1.20 TB: 0.08 **1.28**	U: 0 TB: 0.08 **0**	U: 0.93 TB: 0.05 **0.98**	U: 0 TB: 0.05 **0**	U: 1.20 TB: 0.08 **1.28**	U: 1.20 TB: 0.08 **1.28**	U: 0.10 TB: 0.08 **0.18**
Bathroom	U: 0.32 TB: 0.05 **0.37**	U: 0.18 TB: 0.08 **0.26**	U: 0 TB: 0.08 **0**	U: 1.20 TB: 0.08 **1.28**	U: 0 TB: 0.08 **0**	U: 0.93 TB: 0.05 **0.98**	U: 0 TB: 0.05 **0**	U: 1.20 TB: 0.08 **1.28**	U: 1.20 TB: 0.08 **1.28**	U: 0.10 TB: 0.08 **0.18**
Bedroom 4	U: 0.32 TB: 0.05 **0.37**	U: 0.18 TB: 0.08 **0.26**	U: 0 TB: 0.08 **0**	U: 1.20 TB: 0.08 **1.28**	U: 0 TB: 0.08 **0**	U: 0.93 TB: 0.05 **0.98**	U: 0 TB: 0.05 **0**	U: 1.20 TB: 0.08 **1.28**	U: 1.20 TB: 0.08 **1.28**	U: 0.10 TB: 0.08 **0.18**
Bedroom 5	U: 0.32 TB: 0.08 **0.40**	U: 0.18 TB: 0.08 **0.26**	U: 0 TB: 0.08 **0**	U: 1.20 TB: 0.08 **1.28**	U: 0 TB: 0.08 **0**	U: 0.93 TB: 0.05 **0.98**	U: 0 TB: 0.05 **0**	U: 1.20 TB: 0.08 **1.28**	U: 0 TB: 0.08 **0**	U: 0.10 TB: 0.08 **0.18**

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 factors*** adjust calculations for rooms that are not continuously heated. The ***room temperature references*** show the temperatures of adjacent rooms above and below, which are used to calculate heat transfer between spaces.

Room Names	Exposed Location	Intermitted Heating	Thermal Bridges	Room Temp Below (If none then average Ground temp)	Room Temp Above (through Ceiling or Roof)
Living Area	0%	0%	0	9.60	-2.40
Dining Room	0%	0%	0	9.60	21
Kitchen	0%	0%	0	9.60	22
Plant room	0%	0%	0	9.60	21
Toilet	0%	0%	0	9.60	21
Lounge	0%	0%	0	9.60	21
Study	0%	0%	0	9.60	21
Entrance Hall	0%	0%	0	9.60	21
Master Bedroom	0%	0%	0	21	21
Dressing Room	0%	0%	0	21	21
Master En Suite	0%	0%	0	21	21
Bedroom 2	0%	0%	0	21	21

Room Names	Exposed Location	Intermitted Heating	Thermal Bridges	Room Temp Below (If none then average Ground temp)	Room Temp Above (through Ceiling or Roof)
Ensuite bed 2	0%	0%	0	21	21
Bedroom 3	0%	0%	0	21	21
bedroom 3 ensuite	0%	0%	0	21	21
Utility Room	0%	0%	0	9.60	-2.40
Toilet 1	0%	0%	0	9.60	-2.40
Garage	0%	0%	0	9.60	18
Lobby	0%	0%	0	9.60	21
workshop	0%	0%	0	9.60	18
Plant Room	0%	0%	0	9.60	-2.40
Gym a	0%	0%	0	10	-2.40
gym b	0%	0%	0	21	-2.40
Landing	0%	0%	0	21	22
Landing 2	0%	0%	0	21	-2.40
Bathroom	0%	0%	0	21	-2.40
Bedroom 4	0%	0%	0	21	-2.40
Bedroom 5	0%	0%	0	9.60	-2.40

This section provides detailed information about the ***hot water sizing*** 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 occupants:	4

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:	27 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:	13.57 kWh

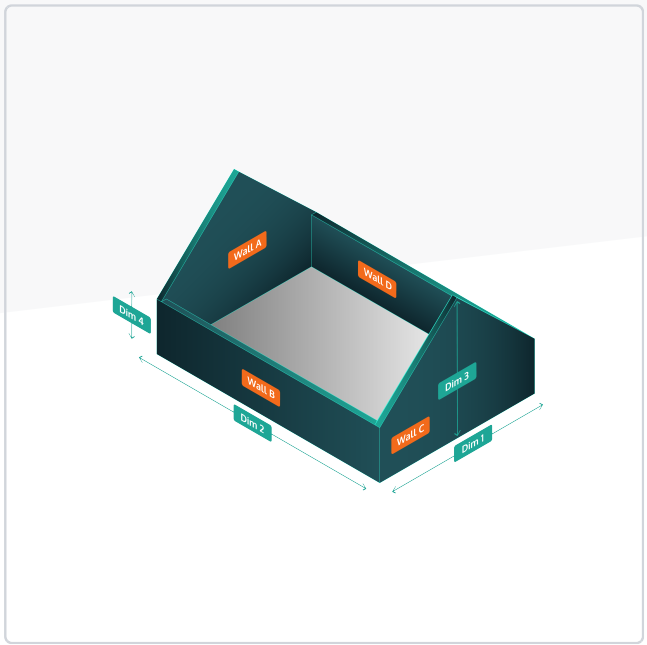
Vaulted Rooms

This table displays information about rooms with ***complex*** or ***vaulted*** ceilings, which require special consideration in heat loss calculations. Vaulted rooms have ***non-standard ceiling configurations*** that affect thermal performance differently than standard flat ceilings. The dimensions and wall/roof types are used to calculate the additional heat loss through these complex ceiling structures, ensuring accurate energy efficiency assessments for buildings with architectural features that impact heating requirements.

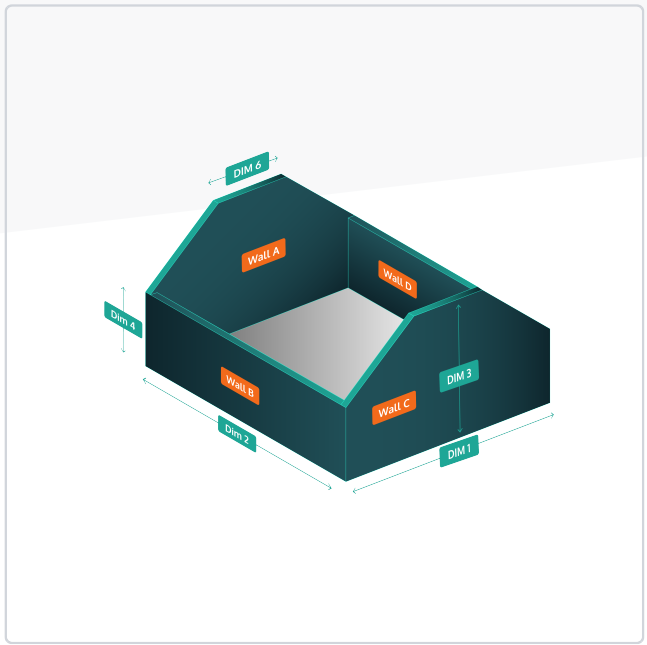
Room names	Vaulted room type	Dimensions						Wall type or roof			
		Dim1	Dim2	Dim3	Dim4	Dim5	Dim6	Wall A	Wall B	Wall C	Wall D
Living Area	Type 1	6.62	3.6	4.5	2.58	-	-	External wall	External wall	Internal wall	External wall
Gym a	Type 1	4.5	11.8	2	1.2	-	-	External wall	External wall	External wall	Internal wall
gym b	Type 1	4.4	5	2	1.2	-	-	Internal wall	External wall	External wall	External wall
Landing 2	Type 7	3	3.2	2	1	-	2	Internal wall	External wall	Internal wall	Internal wall
Bathroom	Type 7	2.6	3.2	2	1	-	1.5	Internal wall	External wall	Internal wall	Internal wall
Bedroom 4	Type 3	5.8	4.3	2	1	3.5	3.5	External wall	Internal wall	External wall	External wall
Bedroom 5	Type 3	5.8	3.2	2	1	3.5	3.5	External wall	Internal wall	External wall	External wall

Vaulted Rooms Diagrams

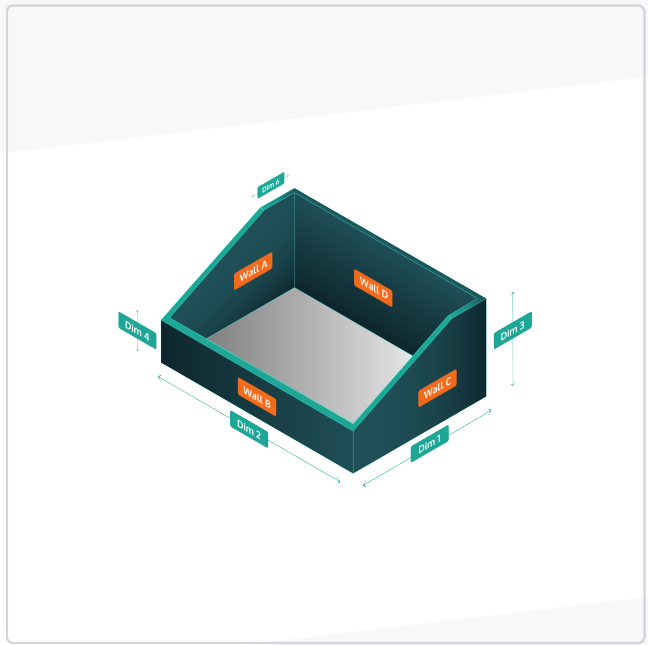
Vaulted Room Types Used in This Survey



Type 1



Type 3



Type 7

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 m³/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

2,024.66 W

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

Building Ventilation Details

Total Zone (Building) envelope area: **726.16 m²**
Total Zone (Building) volume: **1,066.47 m³**
Pulse/Blower-Door Test Result: **5m³/h/m² @ 50 Pa**

Room Ventilation Details

Room Names	Room Ventilation (Watts)	Ventilation Zone (Watts)	Minimum Air Changes per Hour	Equivalent ACH Calculated
Living Area	325.73	162.87	0.5	0.5
Dining Room	184.78	92.39	0.5	0.5
Kitchen	269.55	134.78	0.5	0.5
Plant room	9.85	4.92		0.2
Toilet	5.88	2.94		0.2
Lounge	252.90	126.45	0.5	0.5
Study	109.36	54.68	0.5	0.5
Entrance Hall	216.56	108.28	0.5	0.5
Master Bedroom	210.70	105.35	0.5	0.5
Dressing Room	87.57	43.78	0.5	0.5
Master En Suite	176.16	88.08	0.5	0.5
Bedroom 2	142.78	71.39	0.5	0.5
Ensuite bed 2	38.25	19.13	0.5	0.5
Bedroom 3	129.47	64.74	0.5	0.5

Room Names	Room Ventilation (Watts)	Ventilation Zone (Watts)	Minimum Air Changes per Hour	Equivalent ACH Calculated
bedroom 3 ensuite	39.10	19.55	0.5	0.5
Utility Room	157.05	78.53	0.5	0.6
Toilet 1	39.61	19.81	0.5	0.7
Garage	204.18	102.09	0.5	0.5
Lobby	79.29	39.65	0.5	0.5
workshop	184.77	92.39	0.5	1
Plant Room	63.10	31.55	0.5	0.9
Gym a	285.98	142.99	0.5	0.5
gym b	118.48	59.24	0.5	0.5
Landing	252.13	126.07	0.5	0.5
Landing 2	67.95	33.98	0.5	0.5
Bathroom	59.91	29.95	0.5	0.5
Bedroom 4	173.49	86.75	0.5	0.5
Bedroom 5	164.71	82.36	0.5	0.6

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.

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/m²	Room Heat Loss watts	Underfloor Heating Details			Wall type or roof	Star rating
						Floor Type	Floor Surface	Max Pipe Spacing	ASHP	
Living Area	Underfloor Heating	0	40°C	47.81	1,139.29	Screed	with tiles	300	4.46	★★★★★
Dining Room	Underfloor Heating	0	40°C	19.59	363.45	Screed	with tiles	300	4.46	★★★★★
Kitchen	Underfloor Heating	0	40°C	17.16	464.47	Screed	with tiles	300	4.46	★★★★★
Plant room	Standard Radiators	0	40°C	75.81	193.31	Screed	-	N/A	4.46	★★★★★
Toilet	Underfloor Heating	0	40°C	6.03	9.17	Screed	with tiles	300	4.46	★★★★★
Lounge	Underfloor Heating	0	40°C	21.12	536.27	Screed	with tiles	300	4.46	★★★★★
Study	Underfloor Heating	0	40°C	26.53	291.27	Screed	with tiles	300	4.46	★★★★★
Entrance Hall	Standard Radiators	0	40°C	29.26	636.16	Screed	with tiles	N/A	4.46	★★★★★
Master Bedroom	Standard Radiators	0	40°C	21.14	427.25	-	-	N/A	4.46	★★★★★

Room names	Types of Emitter	Current Emitter watts (70°C)	Flow Temperature °C	W/m²	Room Heat Loss watts	Underfloor Heating Details			Wall type or roof	Star rating
						Floor Type	Floor Surface	Max Pipe Spacing	ASHP	
Dressing Room	Standard Radiators	0	40°C	23.21	194.92	-	-	N/A	4.46	★★★★★
Master En Suite	Standard Radiators	0	40°C	21.47	347.94	-	-	N/A	4.46	★★★★★
Bedroom 2	Standard Radiators	0	40°C	24.45	334.83	-	-	N/A	4.46	★★★★★
Ensuite bed 2	Standard Radiators	0	40°C	30.14	106.05	-	-	N/A	4.46	★★★★★
Bedroom 3	Standard Radiators	0	40°C	26.62	330.57	-	-	N/A	4.46	★★★★★
bedroom 3 ensuite	Standard Radiators	0	40°C	29.86	107.41	-	-	N/A	4.46	★★★★★
Utility Room	Underfloor Heating	0	40°C	43.67	569.84	Screed	with tiles	300	4.46	★★★★★
Toilet 1	Underfloor Heating	0	40°C	55.93	151	Screed	with tiles	200	4.46	★★★★★
Garage	Standard Radiators	0	40°C	5.91	228.61	-	-	N/A	4.46	★★★★★
Lobby	Standard Radiators	0	40°C	57.55	458.10	-	-	N/A	4.46	★★★★★
workshop	Standard Radiators	0	40°C	78.49	761.54	-	-	N/A	4.46	★★★★★
Plant Room	Standard Radiators	0	40°C	38.57	159.02	-	-	N/A	4.46	★★★★★
Gym a	Standard Radiators	0	40°C	19.64	1,042.85	-	-	N/A	4.46	★★★★★
gym b	Standard Radiators	0	40°C	17.70	389.40	-	-	N/A	4.46	★★★★★

Room names	Types of Emitter	Current Emitter watts (70°C)	Flow Temperature °C	W/m²	Room Heat Loss watts	Underfloor Heating Details			Wall type or roof	Star rating
						Floor Type	Floor Surface	Max Pipe Spacing	ASHP	
Landing	Standard Radiators	0	40°C	25.32	640.82	-	-	N/A	4.46	★★★★★
Landing 2	Standard Radiators	0	40°C	23.57	226.30	-	-	N/A	4.46	★★★★★
Bathroom	Standard Radiators	0	40°C	27.68	230.29	-	-	N/A	4.46	★★★★★
Bedroom 4	Standard Radiators	0	40°C	21.71	541.44	-	-	N/A	4.46	★★★★★
Bedroom 5	Standard Radiators	0	40°C	26.60	493.63	-	-	N/A	4.46	★★★★★

Air Source Heat Pump Summary

SPACE HEATING

Demand	21,758.97 kWh/yr
Heat supplied by HP, excluding auxiliary heaters	21,758.97
SCOP(2)	4.46
Electricity consumed by HP, excluding auxiliary heaters	4,878.69 kWh/yr
Renewable heat supplied by HP	16,880.28 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	4,878.69 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 occupants	4
HP flow temperature in DHW mode	55°C
Hot water / occupant	45 Litres/day
Final HP secondary HW temperature	50°C
Demand	4,912.25 kWh/yr
Heat supplied by HP, excluding immersion heater	4,775.80 kWh/yr
SCOP(2)	3.65
Electricity consumed by HP, excluding immersion heater	1,308.44 kWh/yr
Renewable heat supplied by HP	3,467.36 kWh/yr
Remaining heat to be supplied by immersion heater and other heat sources	136.45 kWh/yr
Remaining heat, supplied by other heat sources	0 kWh/yr
Remaining heat, supplied by immersion heater	136.45 kWh/yr
Electricity consumed by HP, including immersion heater	1,444.89 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	20,347.64 kWh/yr
Electricity consumed by HP (excluding auxiliary/immersion heaters)	6,187.13 kWh/yr
Electricity consumed by auxiliary/immersion heaters (supplied as part of HP)	136.45 kWh/yr
Fuel consumed by other heat sources	0 kWh/yr
HP combined performance SCOP(4)	4.22

RUNNING COST

Cost per unit of electricity for HP	27 p/kWh
Cost per day for electric standing charge	57.00 Pence / day
Cost per unit of fuel for other heat sources	0 p/kWh

Cost of electricity for HP (including auxiliary/immersion heaters)	1,915.42 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.

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… 37.5 °C Output Watts	Mass Flow Rate (kg/s)	Volume Flow Rate (L/m)	Proportion (%)
21	Master Bedroom	427.25	K2 (proposed)	BOE	0.229	600	1200	7.92	456.70	0.02	1.24	100
								Total Watts	456.70			
21	Dressing Room	194.92	P+ (proposed)	BOE	0.226	600	700	4.62	204.64	0.01	0.56	100
								Total Watts	204.64			
22	Master En Suite	347.94	Stelrad Caliente Rail White Straight Double (proposed)	BOE	0.231	1791	600	19.23	370.92	0.02	1.01	100
								Total Watts	370.92			
21	Bedroom 2	334.83	K2 (proposed)	BOE	0.229	600	1000	6.60	380.58	0.02	0.97	100
								Total Watts	380.58			

Room Temperature °C	Room Names	Room Heat Loss	Radiator Type	Connection Type	Conversion Factor	Height (mm)	Length (mm)	Volume (L)	Custom… 37.5 °C Output Watts	Mass Flow Rate (kg/s)	Volume Flow Rate (L/m)	Proportion (%)
22	Ensuite bed 2	106.05	Stelrad Caliente Rail White Straight Single (proposed)	BOE	0.242	1199	450	5.90	143.19	0.01	0.31	100
								Total Watts	143.19			
21	Bedroom 3	330.57	K2 (proposed)	BOE	0.229	600	1000	6.60	380.58	0.02	0.96	100
								Total Watts	380.58			
22	bedroom 3 ensuite	107.41	Stelrad Caliente Rail White Straight Single (proposed)	BOE	0.242	1199	450	5.90	143.19	0.01	0.31	100
								Total Watts	143.19			
10	Garage	228.61	K1 (proposed)	BOE	0.462	600	1000	3.25	435.08	0.01	0.66	100
								Total Watts	435.08			
21	Lobby	458.10	K2 (proposed)	BOE	0.226	700	1200	9.16	511.38	0.02	1.33	100
								Total Watts	511.38			
21	workshop	761.54	K2 (proposed)	BOE	0.229	600	1200	7.92	456.70	0.02	1.20	54.5
			K2 (proposed)	BOE	0.229	600	1000	6.60	380.58	0.02	1	45.5
								Total Watts	837.28			

Room Temperature °C	Room Names	Room Heat Loss	Radiator Type	Connection Type	Conversion Factor	Height (mm)	Length (mm)	Volume (L)	Custom… 37.5 °C Output Watts	Mass Flow Rate (kg/s)	Volume Flow Rate (L/m)	Proportion (%)
18	Gym a	1,042.85	K2 (proposed)	BOE	0.286	600	1100	7.26	544.58	0.03	1.54	51
			K2 (proposed)		0.286	600	1100	7.26	522.80	0.02	1.48	49
								Total Watts	1,067.38			
18	gym b	389.40	K2 (proposed)	BOE	0.286	600	800	5.28	380.22	0.02	1.13	100
								Total Watts	380.22			
21	Landing	640.82	Castrads Grace 4 Column (proposed)	BOE	0.239	700	1785	29	682.21	0.03	1.85	100
								Total Watts	682.21			
21	Landing 2	226.30	P+ (proposed)	BOE	0.226	600	800	5.28	233.87	0.01	0.65	100
								Total Watts	233.87			
22	Bathroom	230.29	Stelrad Caliente Rail White Straight Single (proposed)	BOE	0.247	1744	600	10.50	267.38	0.01	0.67	100
								Total Watts	267.38			
21	Bedroom 4	541.44	K2 (proposed)	BOE	0.229	600	1500	9.90	570.87	0.03	1.57	100
								Total Watts	570.87			

Room Temperature °C	Room Names	Room Heat Loss	Radiator Type	Connection Type	Conversion Factor	Height (mm)	Length (mm)	Volume (L)	Custom… 37.5 °C Output Watts	Mass Flow Rate (kg/s)	Volume Flow Rate (L/m)	Proportion (%)
21	Bedroom 5	493.63	K2 (proposed)	BOE	0.229	600	1400	9.24	532.81	0.02	1.43	100
								Total Watts	532.81			

Heating Demand Projection

Heating Demand Calculations

At design temp:	-2.4°C °C
Average room temp:	20.43 °C
Delta T:	22.83 °C
Total heat loss:	9,350.53 watts
Total area:	447.72 m²
At design conditions:	20.88 W/m²
Heat transfer coefficient:	0.91 W/(m²·K)

Proportion of heating demand	External Temp	Delta T	W/m2	Heating Demand	
	°C	K		watts	kW
0.005%	-8°C	28.43	26.01	11,644.28	11.64
0.01%	-7°C	27.43	25.09	11,234.68	11.23
0.02%	-6°C	26.43	24.18	10,825.08	10.83
0.04%	-5°C	25.43	23.26	10,415.48	10.42
0.09%	-4°C	24.43	22.35	10,005.88	10.01
0.18%	-3°C	23.43	21.43	9,596.29	9.60
0.35%	-2°C	22.43	20.52	9,186.69	9.19
0.65%	-1°C	21.43	19.60	8,777.09	8.78
1%	0°C	20.43	18.69	8,367.49	8.37
2%	1°C	19.43	17.77	7,957.90	7.96
3%	2°C	18.43	16.86	7,548.30	7.55
5%	3°C	17.43	15.94	7,138.70	7.14
7%	4°C	16.43	15.03	6,729.10	6.73
9%	5°C	15.43	14.11	6,319.51	6.32
12%	6°C	14.43	13.20	5,909.91	5.91
17%	7°C	13.43	12.29	5,500.31	5.50
22%	8°C	12.43	11.37	5,090.71	5.09
28%	9°C	11.43	10.46	4,681.12	4.68
35%	10°C	10.43	9.54	4,271.52	4.27
43%	11°C	9.43	8.63	3,861.92	3.86
52%	12°C	8.43	7.71	3,452.32	3.45

Proportion of heating demand	External Temp	Delta T	W/m2	Heating Demand	
	°C	K		watts	kW
63%	13°C	7.43	6.80	3,042.73	3.04
74%	14°C	6.43	5.88	2,633.13	2.63
87%	15°C	5.43	4.97	2,223.53	2.22
100%	16°C	4.43	4.05	1,813.93	1.81

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%	4,952.68	21,758.97	26,711.65	10.35	75p / 10.35	7.25	0.07	0	£2,277.21	0.314	9,868
Mains Gas	85%	85%	4,952.68	21,758.97	26,711.65	1	10p / 1	10	0.10	0	£3,142.55	0.227	7,134
LPG	90%	90%	4,952.68	21,758.97	26,711.65	7.11	75p / 7.11	10.55	0.11	0	£3,130.76	0.259	7,687
Direct Electric	100%	100%	4,952.68	21,758.97	26,711.65	1	24.86p / 1	24.86	0.25	0	£6,640.52	0.233	6,224
Biomass Wood Pellets	90%	90%	4,952.68	21,758.97	26,711.65	4.80	25p / 4.8	5.21	0.05	0	£1,545.81	0.080	2,374
Biomass Logs	90%	90%	4,952.68	21,758.97	26,711.65	4.10	15p / 4.1	3.66	0.04	0	£1,085.84	0.018	534
Biomass Chips	90%	90%	4,952.68	21,758.97	26,711.65	3.50	10p / 3.5	2.86	0.03	0	£847.99	0.018	534
Air Source Heat Pump	(SCOP) 3.65	(SCOP) 4.46	4,775.80	21,758.97	26,534.77	1	27p / 1	27	0.27	57	£1,915.42	0.233	1,442
Ground Source Heat Pump	(SCOP) 3.1	(SCOP) 4.1	4,775.80	21,758.97	26,534.77	1	27p / 1	27	0.27	0	£1,848.86	0.233	1,596