



Energy Consultants,
Architectural Design &
Surveyors



SAP Report Submission for Building Regulations Compliance

Client: Redmile Homes

Project: Plot 4 (Hathersage A) Goldthorpe Road
Goldthorpe, Barnsley, S63 9

Contact: ESAP Energy Consultants Arch Des & Surv
07909711677
esapenquiry@gmail.com

Report Issue Date: 27/03/2022

PREDICTED ENERGY ASSESSMENT

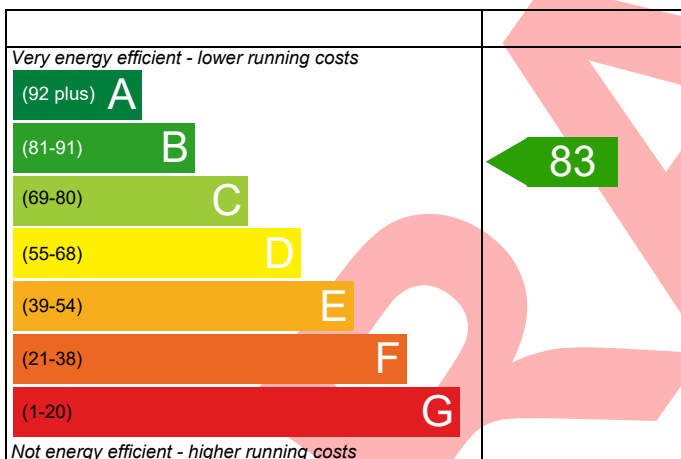
Goldthorpe Road,
Goldthorpe,
Barnsley,
S63 9

Dwelling type: House, Mid-Terrace
Date of assessment: 27/03/2022
Produced by: ESAP Energy Consultants Arch Des
& Surv
Total floor area: 66.65 m²

This document is a Predicted Energy Assessment for properties marketed when they are incomplete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, this rating will be updated and an official Energy Performance Certificate will be created for the property. This will include more detailed information about the energy performance of the completed property.

The energy performance has been assessed using the Government approved SAP2012 methodology and is rated in terms of the energy use per square meter of floor area; the energy efficiency is based on fuel costs and the environmental impact is based on carbon dioxide (CO₂) emissions.

Energy Efficiency Rating

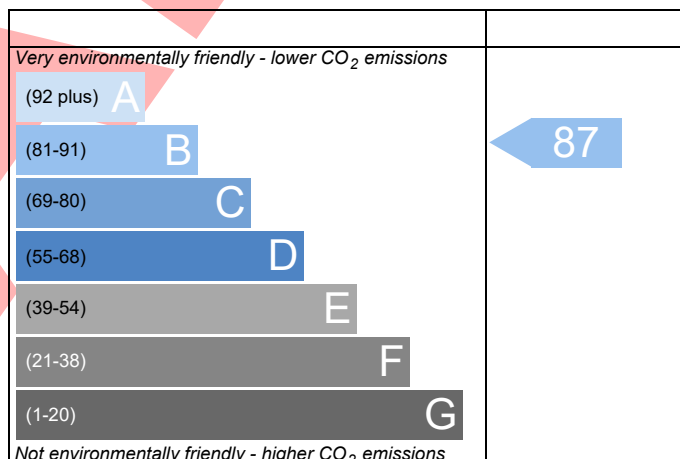


England

EU Directive
2002/91/EC

The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.

Environmental Impact (CO₂) Rating



England

EU Directive
2002/91/EC

The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO₂) emissions. The higher the rating the less impact it has on the environment.

This report has not been submitted through the Elmhurst Energy members' portal, therefore results are subject to change when the dwelling is completed.

BUILDING REGULATION COMPLIANCE

Calculation Type: New Build (As Designed)

Property Reference	000594			Issued on Date	27/03/2022
Assessment Reference	Plot 4 As Design	Prop Type Ref	Plot 4 - Hathersage A		
Property	Goldthorpe Road, Goldthorpe, Barnsley, S63 9				
SAP Rating	83 B	DER	18.59	TER	19.29
Environmental	87 B	% DER<TER	3.63		
CO ₂ Emissions (t/year)	1.06	DFEE	45.00	TFEE	52.30
General Requirements Compliance	Pass	% DFEE<TFEE	13.96		
Assessor Details	Mr. Peter Edwards, ESAP Energy Consultants Arch Des & Surv, Tel: 01455883250, esapenquiry@gmail.com			Assessor ID	H883-0001
Client	Redmile Homes, Redmile Homes				

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Criterion 1 – Achieving the TER and TFEE rate

1a TER and DER

Fuel for main heating	Mains gas		
Fuel factor	1.00 (mains gas)		
Target Carbon Dioxide Emission Rate (TER)	19.29	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	18.59	kgCO ₂ /m ²	Pass
	-0.70 (-3.6%)	kgCO ₂ /m ²	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	52.30	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	45.00	kWh/m ² /yr	
	-7.3 (-14.0%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.27 (max. 0.30)	0.27 (max. 0.70)	Pass
Party wall	0.00 (max. 0.20)	-	Pass
Floor	0.14 (max. 0.25)	0.15 (max. 0.70)	Pass
Roof	0.10 (max. 0.20)	0.10 (max. 0.35)	Pass
Openings	1.40 (max. 2.00)	1.40 (max. 3.30)	Pass

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	6.00 (design value)	m ³ /(h.m ²) @ 50 Pa	
Maximum	10.0	m ³ /(h.m ²) @ 50 Pa	Pass

Limiting System Efficiencies

4 Heating efficiency

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BUILDING REGULATION COMPLIANCE

Calculation Type: New Build (As Designed)

Main heating system

Boiler system with radiators or underfloor - Mains gas
Data from database
Vaillant ecoFIT sustain 825 VUW 256/6-3 (H-GB)
Combi boiler
Efficiency: 89.3% SEDBUK2009
Minimum: 88.0%

Pass

Secondary heating system

None

5 Cylinder insulation

Hot water storage

No cylinder

6 Controls

Space heating controls

Programmer, room thermostat and TRVs

Pass

Hot water controls

No cylinder

Boiler interlock

Yes

Pass

7 Low energy lights

Percentage of fixed lights with low-energy fittings

100 %

Minimum

75 %

Pass

8 Mechanical ventilation

Not applicable

Criterion 3 – Limiting the effects of heat gains in summer

9 Summertime temperature

Overheating risk (East Pennines)

Not significant

Pass

Based on:

Overshading

Average

Windows facing East

6.88 m², No overhang

Windows facing West

3.47 m², No overhang

Air change rate

4.00 ach

Blinds/curtains

None

Criterion 4 – Building performance consistent with DER and DFEE rate

Party Walls

Type

U-value

Filled Cavity with Edge Sealing

0.00

W/m²K

Pass

Air permeability and pressure testing

3 Air permeability

Air permeability at 50 pascals

6.00 (design value) m³/(h.m²) @ 50 Pa

Maximum

10.0 m³/(h.m²) @ 50 Pa

Pass

10 Key features

Party wall U-value

0.00

W/m²K

Roof U-value

0.10

W/m²K

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THERMAL BRIDGING

Calculation Type: New Build (As Designed)

Property Reference	000594	Issued on Date	27/03/2022
Assessment Reference	Plot 4 As Design	Prop Type Ref	Plot 4 - Hathersage A
Property	Goldthorpe Road, Goldthorpe, Barnsley, S63 9		
SAP Rating	83 B	DER	18.59
Environmental	87 B	TER	19.29
CO ₂ Emissions (t/year)	1.06	% DER<TER	3.63
General Requirements Compliance	Pass	DFEE	45.00
		TFEE	52.30
		% DFEE<TFEE	13.96
Assessor Details	Mr. Peter Edwards, ESAP Energy Consultants Arch Des & Surv, Tel: 01455883250, esapenquiry@gmail.com		Assessor ID
			H883-0001
Client	Redmile Homes, Redmile Homes		

	Junction detail	Source Type	Psi (W/mK)	Length (m)	Result	Reference
External wall	E1 Steel lintel with perforated steel base plate	Independently assessed	0.030	8.40	0.25	
External wall	E3 Sill	Independently assessed	0.015	7.38	0.11	
External wall	E4 Jamb	Independently assessed	0.010	18.90	0.19	
External wall	E5 Ground floor (normal)	Independently assessed	0.056	15.79	0.88	
External wall	E21 Exposed floor (inverted)	Table K1 - Default	0.320	1.05	0.34	
External wall	E6 Intermediate floor within a dwelling	Independently assessed	0.000	7.90	0.00	
External wall	E10 Eaves (insulation at ceiling level)	Table K1 - Approved	0.060	8.95	0.54	
External wall	E16 Corner (normal)	Independently assessed	0.059	4.80	0.28	
External wall	E18 Party wall between dwellings	Independently assessed	0.038	15.28	0.58	
Party wall	P1 Party wall - Ground floor	Table K1 - Default	0.160	7.89	1.26	
Party wall	P2 Party wall - Intermediate floor within a dwelling	Table K1 - Default	0.000	7.89	0.00	
Party wall	P7 Party Wall - Exposed floor (normal)	Table K1 - Default	0.160	1.05	0.17	
Party wall	P8 Party Wall - Exposed floor (inverted)	Table K1 - Default	0.240	7.89	1.89	
Party wall	P4 Party wall - Roof (insulation at ceiling level)	Independently assessed	0.041	15.78	0.65	

Total: **7.14** W/mK:
Y-Value: **0.054** W/m²K:

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

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SAP Rating	83 B	DER	18.59	TER	19.29
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CO ₂ Emissions (t/year)	1.06	DFEE	45.00	TFEE	52.30
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FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

DWELLING AS DESIGNED

Mid-Terrace House, total floor area 67 m²

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating:Mains gas
Fuel factor:1.00 (mains gas)
Target Carbon Dioxide Emission Rate (TER) 19.29 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 18.59 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 52.3 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE) 45.0 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.27 (max. 0.30)	0.27 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.14 (max. 0.25)	0.15 (max. 0.70)	OK
Roof	0.10 (max. 0.20)	0.10 (max. 0.35)	OK
Openings	1.40 (max. 2.00)	1.40 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals: 6.00 (design value)
Maximum 10.0 OK

4 Heating efficiency

Main heating system: Boiler system with radiators or underfloor - Mains gas
Data from database
Vaillant ecoFIT sustain 825 VUW 256/6-3 (H-GB)
Combi boiler
Efficiency: 89.3% SEDBUK2009
Minimum: 88.0% OK

Secondary heating system: None

5 Cylinder insulation

Hot water storage No cylinder

6 Controls

Space heating controls: Programmer, room thermostat and TRVs OK

Hot water controls: No cylinder

Boiler interlock Yes OK

7 Low energy lights

Percentage of fixed lights with low-energy fittings:100%
Minimum 75% OK

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (East Pennines): Not significant OK
Based on:
Overshading: Average
Windows facing East: 6.88 m², No overhang
Windows facing West: 3.47 m², No overhang
Air change rate: 4.00 ach
Blinds/curtains: None

10 Key features

Party wall U-value 0.00 W/m²K
Roof U-value 0.10 W/m²K

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	31.1700 (1b)	x 2.4000 (2b)	= 74.8080 (1b) - (3b)
First floor	35.4800 (1c)	x 2.6200 (2c)	= 92.9576 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	66.6500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 167.7656 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					3 * 10 = 30.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					30.0000 / (5) = 0.1788 (8)
Pressure test					Yes
Measured/design AP50					6.0000
Infiltration rate					0.4788 (18)
Number of sides sheltered					2 (19)
Shelter factor				(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor				(21) = (18) x (20) =	0.4070 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate												
Effective ac	0.5189	0.5087	0.4986	0.4477	0.4375	0.3866	0.3866	0.3765	0.4070	0.4375	0.4579	0.4782 (22b)
	0.6346	0.6294	0.6243	0.6002	0.5957	0.5747	0.5747	0.5709	0.5828	0.5957	0.6048	0.6143 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Entrance Door			2.1500	1.4000	3.0100		(26a)
Windows (Uw = 1.40)			5.1300	1.3258	6.8011		(27)
Patio Doors (Uw = 1.40)			5.2200	1.3258	6.9205		(27)
Main Floor			31.1700	0.1400	4.3638	75.0000	2337.7500 (28a)
Exposed Floor			4.3200	0.1500	0.6480	20.0000	86.4000 (28b)
Main Wall	61.3500	12.5000	48.8500	0.2700	13.1895	60.0000	2931.0000 (29a)
Main Roof	35.4800		35.4800	0.1000	3.5480	9.0000	319.3200 (30)
Total net area of external elements Aum(A, m ²)			132.3200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	38.4809		(33)
Party Wall			63.0300	0.0000	0.0000	110.0000	6933.3000 (32)
Stud Walls			126.4800			9.0000	1138.3200 (32c)
First Floor			31.1700			18.0000	561.0600 (32d)
Ground Floor Ceiling			31.1700			18.0000	561.0600 (32e)

Heat capacity Cm = Sum(A x k)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K
Thermal bridges (Sum(L x Psi) calculated using Appendix K)
Total fabric heat loss
(28)...(30) + (32) + (32a)...(32e) = 14868.2100 (34)
223.0789 (35)
7.1438 (36)
(33) + (36) = 45.6247 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	35.1354	34.8459	34.5622	33.2296	32.9803	31.8196	31.8196	31.6047	32.2667	32.9803	33.4846	34.0120 (38)
Heat transfer coeff	80.7600	80.4706	80.1868	78.8542	78.6049	77.4442	77.4442	77.2293	77.8913	78.6049	79.1093	79.6366 (39)
Average = Sum(39)m / 12 =												78.8530 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.2117	1.2074	1.2031	1.1831	1.1794	1.1620	1.1620	1.1587	1.1687	1.1794	1.1869	1.1948 (40)
HLP (average)												1.1831 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy
Average daily hot water use (litres/day)
2.1621 (42)
85.5506 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	94.1057	90.6837	87.2616	83.8396	80.4176	76.9956	76.9956	80.4176	83.8396	87.2616	90.6837	94.1057 (44)
Energy conte	139.5560	122.0566	125.9515	109.8075	105.3630	90.9202	84.2509	96.6792	97.8338	114.0159	124.4573	135.1526 (45)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Energy content (annual)												Total = Sum(45)m =	1346.0446 (45)
Distribution loss (46)m = 0.15 x (45)m													
	20.9334	18.3085	18.8927	16.4711	15.8044	13.6380	12.6376	14.5019	14.6751	17.1024	18.6686	20.2729 (46)	
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)	
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)	
Combi loss	1.5103	1.2729	1.2639	1.0587	0.9744	0.8051	0.7460	0.8941	0.9433	1.1442	1.2979	1.4626 (61)	
Total heat required for water heating calculated for each month	141.0663	123.3295	127.2154	110.8663	106.3374	91.7253	84.9969	97.5733	98.7771	115.1601	125.7552	136.6152 (62)	
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63)	
Output from w/h	141.0663	123.3295	127.2154	110.8663	106.3374	91.7253	84.9969	Solar input (sum of months) = Sum(63)m =		0.0000 (63)			
	141.0663	123.3295	127.2154	110.8663	106.3374	91.7253	84.9969	97.5733	98.7771	115.1601	125.7552	136.6152 (64)	
								Total per year (kWh/year) = Sum(64)m =					1359.4179 (64)
Heat gains from water heating, kWh/month	46.7800	40.9020	42.1948	36.7757	35.2768	30.4322	28.1999	32.3694	32.7656	38.1963	41.7065	45.3039 (65)	

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	108.1066	108.1066	108.1066	108.1066	108.1066	108.1066	108.1066	108.1066	108.1066	108.1066	108.1066	108.1066	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	17.7177	15.7367	12.7979	9.6889	7.2425	6.1145	6.6069	8.5879	11.5266	14.6357	17.0820	18.2101	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	189.3557	191.3206	186.3691	175.8278	162.5214	150.0153	141.6604	139.6955	144.6470	155.1882	168.4947	181.0008	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.8107	33.8107	33.8107	33.8107	33.8107	33.8107	33.8107	33.8107	33.8107	33.8107	33.8107	33.8107	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-86.4853	-86.4853	-86.4853	-86.4853	-86.4853	-86.4853	-86.4853	-86.4853	-86.4853	-86.4853	-86.4853	-86.4853	(71)
Water heating gains (Table 5)	62.8763	60.8661	56.7135	51.0773	47.4150	42.2670	37.9031	43.5072	45.5077	51.3392	57.9257	60.8923	(72)
Total internal gains	328.3816	326.3554	314.3125	295.0260	275.6110	256.8287	244.6024	250.2225	260.1134	279.5951	301.9344	318.5352	(73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W				
East				1.6600	19.6403	0.7600	0.7000	0.7700	12.0199 (76)				
West				3.4700	19.6403	0.7600	0.7000	0.7700	25.1259 (80)				
East				5.2200	19.6403	0.7600	0.7000	0.7700	37.7975 (76)				
Solar gains	74.9433	146.6049	241.4374	352.1220	431.5388	441.7567	420.5704	361.2638	280.8017	173.9591	93.4454	61.6297	(83)
Total gains	403.3249	472.9603	555.7499	647.1481	707.1497	698.5854	665.1728	611.4863	540.9150	453.5542	395.3798	380.1649	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	51.1399	51.3238	51.5054	52.3759	52.5420	53.3294	53.3294	53.4779	53.0234	52.5420	52.2070	51.8613
alpha	4.4093	4.4216	4.4337	4.4917	4.5028	4.5553	4.5553	4.5652	4.5349	4.5028	4.4805	4.4574
util living area	0.9966	0.9926	0.9799	0.9362	0.8316	0.6588	0.5001	0.5595	0.8167	0.9674	0.9934	0.9974 (86)
MIT	19.5595	19.7420	20.0579	20.4671	20.7811	20.9456	20.9876	20.9798	20.8532	20.4200	19.9193	19.5364 (87)
Th 2	19.9106	19.9141	19.9175	19.9335	19.9365	19.9506	19.9506	19.9532	19.9452	19.9365	19.9305	19.9241 (88)
util rest of house	0.9955	0.9903	0.9734	0.9156	0.7804	0.5695	0.3868	0.4423	0.7425	0.9529	0.9910	0.9966 (89)
MIT 2	18.6034	18.7875	19.1022	19.5089	19.7902	19.9252	19.9472	19.9471	19.8628	19.4746	18.9776	18.5909 (90)
Living area fraction	18.7883	18.9721	19.2871	19.6942	19.9819	20.1225	20.1484	20.1468	20.0543	19.6574	19.1598	18.7737 (91)
MIT	18.7883	18.9721	19.2871	19.6942	19.9819	20.1225	20.1484	20.1468	20.0543	19.6574	19.1598	18.7737 (92)
Temperature adjustment												0.0000
adjusted MIT	18.7883	18.9721	19.2871	19.6942	19.9819	20.1225	20.1484	20.1468	20.0543	19.6574	19.1598	18.7737 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9940	0.9876	0.9686	0.9100	0.7829	0.5850	0.4088	0.4649	0.7513	0.9480	0.9886	0.9953	(94)
Useful gains	400.9044	467.1084	538.2811	588.9200	553.6144	408.7013	271.9066	284.2775	406.3635	429.9686	390.8709	378.3946	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1170.0737	1132.3902	1025.3535	851.1687	650.9947	427.6870	274.8036	289.3645	463.7913	711.9577	954.0383	1160.6035	(97)
Month fracti	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	(97a)
Space heating kWh	572.2619	447.0693	362.3818	188.8191	72.4510	0.0000	0.0000	0.0000	0.0000	209.7999	405.4806	581.9634	(98)
Space heating												2840.2270	(98)
Space heating per m2												42.6141	(99)
(98) / (4) =													

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

8c. Space cooling requirement

Not applicable

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)											
Fraction of space heat from main system(s)	1.0000 (202)											
Efficiency of main space heating system 1 (in %)	90.2000 (206)											
Efficiency of secondary/supplementary heating system, %	0.0000 (208)											
Space heating requirement	3148.8104 (211)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	572.2619	447.0693	362.3818	188.8191	72.4510	0.0000	0.0000	0.0000	0.0000	209.7999	405.4806	581.9634 (98)
Space heating efficiency (main heating system 1)	90.2000	90.2000	90.2000	90.2000	90.2000	0.0000	0.0000	0.0000	0.0000	90.2000	90.2000	90.2000 (210)
Space heating fuel (main heating system)	634.4367	495.6423	401.7537	209.3338	80.3226	0.0000	0.0000	0.0000	0.0000	232.5941	449.5350	645.1922 (211)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating requirement	141.0663	123.3295	127.2154	110.8663	106.3374	91.7253	84.9969	97.5733	98.7771	115.1601	125.7552	136.6152 (64)
Efficiency of water heater (217)m	86.7242	86.4134	85.6877	83.9089	80.4969	75.0000	75.0000	75.0000	75.0000	84.1558	86.0707	75.0000 (216)
Fuel for water heating, kWh/month	162.6609	142.7203	148.4641	132.1269	132.1011	122.3004	113.3293	130.0977	131.7028	136.8415	146.1069	157.2939 (219)
Water heating fuel used												1655.7457 (219)
Annual totals kWh/year												
Space heating fuel - main system												3148.8104 (211)
Space heating fuel - secondary												0.0000 (215)
Electricity for pumps and fans:												
central heating pump												30.0000 (230c)
main heating flue fan												45.0000 (230e)
Total electricity for the above, kWh/year												75.0000 (231)
Electricity for lighting (calculated in Appendix L)												312.9000 (232)
Total delivered energy for all uses												5192.4562 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	3148.8104	0.2160	680.1431 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1655.7457	0.2160	357.6411 (264)
Space and water heating			1037.7841 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	312.9000	0.5190	162.3951 (268)
Total CO2, kg/year			1239.1042 (272)
Dwelling Carbon Dioxide Emission Rate (DER)			18.5900 (273)

16 CO2 EMISSIONS ASSOCIATED WITH APPLIANCES AND COOKING AND SITE-WIDE ELECTRICITY GENERATION TECHNOLOGIES

DER		18.5900 ZC1
Total Floor Area	TFA	66.6500
Assumed number of occupants	N	2.1621
CO2 emission factor in Table 12 for electricity displaced from grid	EF	0.5190
CO2 emissions from appliances, equation (L14)		16.8354 ZC2
CO2 emissions from cooking, equation (L16)		2.5640 ZC3
Total CO2 emissions		37.9894 ZC4
Residual CO2 emissions offset from biofuel CHP		0.0000 ZC5
Additional allowable electricity generation, kWh/m²/year		0.0000 ZC6
Resulting CO2 emissions offset from additional allowable electricity generation		0.0000 ZC7
Net CO2 emissions		37.9894 ZC8

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF TARGET EMISSIONS 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF TARGET EMISSIONS 09 Jan 2014

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	31.1700 (1b)	x 2.4000 (2b)	= 74.8080 (1b) - (3b)
First floor	35.4800 (1c)	x 2.6200 (2c)	= 92.9576 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	66.6500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 167.7656 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					2 * 10 = 20.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					20.0000 / (5) = 0.1192 (8)
Pressure test					Yes
Measured/design AP50					5.0000
Infiltration rate					0.3692 (18)
Number of sides sheltered					2 (19)
Shelter factor				(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor				(21) = (18) x (20) =	0.3138 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4001	0.3923	0.3844	0.3452	0.3374	0.2981	0.2981	0.2903	0.3138	0.3374	0.3531	0.3688 (22b)
Effective ac	0.5801	0.5769	0.5739	0.5596	0.5569	0.5444	0.5444	0.5421	0.5492	0.5569	0.5623	0.5680 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
TER Semi-glazed door			2.1500	1.2000	2.5800		(26a)
TER Opening Type (Uw = 1.40)			10.3500	1.3258	13.7216		(27)
Main Floor			31.1700	0.1300	4.0521		(28a)
Exposed Floor			4.3200	0.1300	0.5616		(28b)
Main Wall	61.3500	12.5000	48.8500	0.1800	8.7930		(29a)
Main Roof	35.4800		35.4800	0.1300	4.6124		(30)
Total net area of external elements Aum(A, m ²)			132.3200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	34.3207		(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							11.0686 (36)
Total fabric heat loss						(33) + (36) =	45.3893 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	32.1133	31.9412	31.7725	30.9802	30.8320	30.1419	30.1419	30.0141	30.4077	30.8320	31.1319	31.4454 (38)
Heat transfer coeff	77.5026	77.3305	77.1618	76.3695	76.2212	75.5311	75.5311	75.4033	75.7970	76.2212	76.5211	76.8347 (39)
Average = Sum(39)m / 12 =												76.3688 (39)
HLP	1.1628	1.1602	1.1577	1.1458	1.1436	1.1333	1.1333	1.1313	1.1372	1.1436	1.1481	1.1528 (40)
HLP (average)												1.1458 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.1621 (42)
Average daily hot water use (litres/day)												85.5506 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	94.1057	90.6837	87.2616	83.8396	80.4176	76.9956	76.9956	80.4176	83.8396	87.2616	90.6837	94.1057 (44)
Energy content (annual)	139.5560	122.0566	125.9515	109.8075	105.3630	90.9202	84.2509	96.6792	97.8338	114.0159	124.4573	135.1526 (45)
Distribution loss (46)m = 0.15 x (45)m	20.9334	18.3085	18.8927	16.4711	15.8044	13.6380	12.6376	14.5019	14.6751	17.1024	18.6686	20.2729 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF TARGET EMISSIONS 09 Jan 2014

If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	47.9552	41.7393	44.4676	41.3456	40.9799	37.9704	39.2361	40.9799	41.3456	44.4676	44.7207	47.9552	(61)
Total heat required for water heating calculated for each month	187.5113	163.7959	170.4190	151.1531	146.3429	128.8906	123.4870	137.6591	139.1794	158.4835	169.1780	183.1078	(62)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63)
Output from w/h	187.5113	163.7959	170.4190	151.1531	146.3429	128.8906	123.4870	137.6591	139.1794	158.4835	169.1780	183.1078	(64)
Heat gains from water heating, kWh/month	58.3912	51.0187	52.9958	46.8474	45.2782	39.7236	37.8225	42.3908	42.8661	49.0272	52.5622	56.9270	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	108.1066	108.1066	108.1066	108.1066	108.1066	108.1066	108.1066	108.1066	108.1066	108.1066	108.1066	108.1066	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	17.7177	15.7367	12.7979	9.6889	7.2425	6.1145	6.6069	8.5879	11.5266	14.6357	17.0820	18.2101	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	189.3557	191.3206	186.3691	175.8278	162.5214	150.0153	141.6604	139.6955	144.6470	155.1882	168.4947	181.0008	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.8107	33.8107	33.8107	33.8107	33.8107	33.8107	33.8107	33.8107	33.8107	33.8107	33.8107	33.8107	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-86.4853	-86.4853	-86.4853	-86.4853	-86.4853	-86.4853	-86.4853	-86.4853	-86.4853	-86.4853	-86.4853	-86.4853	(71)
Water heating gains (Table 5)	78.4828	75.9206	71.2309	65.0658	60.8577	55.1716	50.8366	56.9769	59.5363	65.8968	73.0031	76.5148	(72)
Total internal gains	343.9881	341.4099	328.8298	309.0145	289.0537	269.7333	257.5359	263.6922	274.1419	294.1527	317.0118	334.1577	(73)

6. Solar gains

[Jan]	Area m2				Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W	
East	6.8800				19.6403		0.6300		0.7000		0.7700		41.2960	
West	3.4700				19.6403		0.6300		0.7000		0.7700		20.8281 (76)	
Solar gains	62.1240	121.5277	200.1389	291.8906	357.7229	366.1931	348.6307	299.4686	232.7698	144.2029	77.4613	51.0878	(83)	
Total gains	406.1121	462.9376	528.9687	600.9051	646.7766	635.9264	606.1666	563.1609	506.9118	438.3556	394.4731	385.2455	(84)	

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	59.7202	59.8531	59.9840	60.6063	60.7242	61.2790	61.2790	61.3829	61.0641	60.7242	60.4862	60.2394	
alpha	4.9813	4.9902	4.9989	5.0404	5.0483	5.0853	5.0853	5.0922	5.0709	5.0483	5.0324	5.0160	
util living area	0.9979	0.9955	0.9874	0.9568	0.8704	0.7044	0.5363	0.5948	0.8480	0.9769	0.9957	0.9984	(86)
MIT	19.7502	19.8971	20.1606	20.5077	20.7942	20.9499	20.9897	20.9832	20.8685	20.4858	20.0544	19.7237	(87)
Th 2	19.9499	19.9519	19.9540	19.9636	19.9654	19.9738	19.9738	19.9753	19.9705	19.9654	19.9617	19.9579	(88)
util rest of house	0.9971	0.9939	0.9828	0.9406	0.8235	0.6131	0.4174	0.4728	0.7765	0.9653	0.9940	0.9978	(89)
MIT 2	18.2863	18.5020	18.8859	19.3859	19.7642	19.9406	19.9700	19.9684	19.8643	19.3647	18.7393	18.2534	(90)
Living area fraction	18.5694	18.7718	19.1324	19.6028	19.9634	20.1358	20.1672	20.1647	20.0585	19.5815	18.9936	18.5377	(91)
MIT	18.5694	18.7718	19.1324	19.6028	19.9634	20.1358	20.1672	20.1647	20.0585	19.5815	18.9936	18.5377	(92)
Temperature adjustment	18.5694	18.7718	19.1324	19.6028	19.9634	20.1358	20.1672	20.1647	20.0585	19.5815	18.9936	18.5377	(93)
adjusted MIT	18.5694	18.7718	19.1324	19.6028	19.9634	20.1358	20.1672	20.1647	20.0585	19.5815	18.9936	18.5377	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	404.3594	458.9399	517.2769	560.9169	532.5550	399.7115	266.9963	279.5002	397.2136	420.5431	391.1241	383.9547	(94)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1105.9146	1072.7156	974.7422	817.3691	629.8455	418.1273	269.4374	283.8681	451.6368	684.5832	910.1155	1101.6349	(97)
Month fracti	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	(97a)
Space heating kWh	521.9571	412.4573	340.3542	184.6455	72.3842	0.0000	0.0000	0.0000	0.0000	196.4459	373.6738	533.9541	(98)
Space heating												2635.8720	(98)
Space heating per m2												39.5480	(99)

8c. Space cooling requirement

Not applicable

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF TARGET EMISSIONS 09 Jan 2014

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													93.4000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													2822.1327 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	521.9571	412.4573	340.3542	184.6455	72.3842	0.0000	0.0000	0.0000	0.0000	196.4459	373.6738	533.9541	(98)
Space heating efficiency (main heating system 1)	93.4000	93.4000	93.4000	93.4000	93.4000	0.0000	0.0000	0.0000	0.0000	93.4000	93.4000	93.4000	(210)
Space heating fuel (main heating system)	558.8405	441.6031	364.4049	197.6933	77.4991	0.0000	0.0000	0.0000	0.0000	210.3275	400.0791	571.6853	(211)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating requirement	187.5113	163.7959	170.4190	151.1531	146.3429	128.8906	123.4870	137.6591	139.1794	158.4835	169.1780	183.1078	(64)
Efficiency of water heater (217)m	87.4915	87.2796	86.7591	85.5561	83.3830	80.3000	80.3000	80.3000	80.3000	85.5929	86.9901	80.3000	(216)
Fuel for water heating, kWh/month	214.3194	187.6680	196.4279	176.6713	175.5069	160.5114	153.7821	171.4310	173.3243	185.1597	194.4796	209.0586	(219)
Water heating fuel used												2198.3402	(219)
Annual totals kWh/year													
Space heating fuel - main system												2822.1327	(211)
Space heating fuel - secondary												0.0000	(215)
Electricity for pumps and fans:													
central heating pump												30.0000	(230c)
main heating flue fan												45.0000	(230e)
Total electricity for the above, kWh/year												75.0000	(231)
Electricity for lighting (calculated in Appendix L)												312.9000	(232)
Total delivered energy for all uses												5408.3729	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2822.1327	0.2160	609.5807 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2198.3402	0.2160	474.8415 (264)
Space and water heating			1084.4221 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	312.9000	0.5190	162.3951 (268)
Total CO2, kg/m2/year			1285.7422 (272)
Emissions per m2 for space and water heating			16.2704 (272a)
Fuel factor (mains gas)			1.0000
Emissions per m2 for lighting			2.4365 (272b)
Emissions per m2 for pumps and fans			0.5840 (272c)
Target Carbon Dioxide Emission Rate (TER) = (16.2704 * 1.00) + 2.4365 + 0.5840, rounded to 2 d.p.			19.2900 (273)

U-VALUE CALCULATOR REPORT

Property Reference	000594	Issued on Date	27/03/2022
Assessment Reference	Plot 4 As Design	Prop Type Ref	Plot 4 - Hathersage A
Project	Goldthorpe Road, Goldthorpe, Barnsley, S63 9		
Calculation Type	New Build (As Designed)		

SAP Rating	83 B	DER	18.59	TER	19.29
Environmental	87 B	% DER<TER	3.63		
CO ₂ Emissions (t/year)	1.06	DFEE	45.00	TFEE	52.30
General Requirements Compliance	Pass	% DFEE<TFEE	13.96		

Assessor Details	Mr. Peter Edwards, ESAP Energy Consultants Arch Des & Surv, Tel: 01455883250, esapenquiry@gmail.com	Assessor ID	H883-0001
Client	Redmile Homes, Redmile Homes		

Building Elements

Roof 000004 - 300mm Mineral Wool

Roof Type: Pitched Roof, insulated flat ceiling

Layer	Description	Thickness (mm)	Conductivity (W/m ² K)	Resistance (m ² K/W)	Fraction (%)
Ext surface				0.0400	
Layer 1	Mineral wool				
	Main construction	300	0.0400	7.5000	100.00
	Corrections - Air Gap: Level 0, Fasteners: None or plastic				
Layer 2	Mineral wool				
	Main construction	100	0.0400	2.5000	88.89
	Main construction	100	0.1300	0.7692	11.11
	Corrections - Air Gap: Level 0, Fasteners: None or plastic				
Layer 3	Plasterboard, standard				
	Main construction	12.5	0.2100	0.0595	100.00
Layer 4	Plaster, standard				
	Main construction	3	0.4000	0.0075	100.00
Int surface				0.1000	

Total resistance: Upper limit = 9.981 m² K/W Lower limit = 9.707 m² K/W Average = 9.844 m² K/W
Total correction = 0.0000 m² K/W U-value (unrounded) = 0.1 W/m² K

Unheated space: None

Total thickness: 416 mm

U-value: 0.10 W/m² K

Kappa: n/a

U-VALUE CALCULATOR REPORT

Property Reference	000594	Issued on Date	27/03/2022
Assessment Reference	Plot 4 As Design	Prop Type Ref	Plot 4 - Hathersage A
Project	Goldthorpe Road, Goldthorpe, Barnsley, S63 9		
Calculation Type	New Build (As Designed)		

SAP Rating	83 B	DER	18.59	TER	19.29
Environmental	87 B	% DER<TER	3.63		
CO ₂ Emissions (t/year)	1.06	DFEE	45.00	TFEE	52.30
General Requirements Compliance	Pass	% DFEE<TFEE	13.96		

Assessor Details	Mr. Peter Edwards, ESAP Energy Consultants Arch Des & Surv, Tel: 01455883250, esapenquiry@gmail.com	Assessor ID	H883-0001
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Client	Redmile Homes, Redmile Homes
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Building Elements

Wall 000001 - Newlay with Supafil 34

Wall Type: Standard Wall

Layer	Description	Thickness (mm)	Conductivity (W/m ² K)	Resistance (m ² K/W)	Fraction (%)
Ext surface				0.0400	
Layer 1	Brick, outer leaf				
	Main construction	102.5	0.7700	0.1331	82.81
	Main construction	102.5	0.9407	0.1090	17.19
Layer 2	Supafil 34				
	Main construction	100	0.0340	2.9412	100.00
	Corrections - Air Gap: Level 0, Fasteners: None or plastic				
Layer 3	Newlay, Newlite				
	Main construction	100	0.4300	0.2326	100.00
Layer 4	airspace/plaster dabs				
	Main construction	15	0.0882	0.1700	80.00
	Main construction	15	0.0882	0.1700	20.00
	Corrections - Cavity Unventilated, Emissivity: Normal				
Layer 5	Plaster, standard				
	Main construction	12.5	0.4000	0.0313	100.00
Layer 6	Plaster, standard				
	Main construction	3	0.4000	0.0075	100.00
Int surface				0.1300	

Total resistance:	Upper limit = 3.681 m ² K/W	Lower limit = 3.681 m ² K/W	Average = 3.681 m ² K/W
	Total correction = 0.0000 m ² K/W	U-value (unrounded) = 0.27 W/m ² K	

Unheated space: None

Total thickness: 333 mm

U-value: 0.27 W/m² K

Kappa: n/a

U-VALUE CALCULATOR REPORT

Property Reference	000594	Issued on Date	27/03/2022
Assessment Reference	Plot 4 As Design	Prop Type Ref	Plot 4 - Hathersage A
Project	Goldthorpe Road, Goldthorpe, Barnsley, S63 9		
Calculation Type	New Build (As Designed)		

SAP Rating	83 B	DER	18.59	TER	19.29
Environmental	87 B	% DER<TER	3.63		
CO ₂ Emissions (t/year)	1.06	DFEE	45.00	TFEE	52.30
General Requirements Compliance	Pass	% DFEE<TFEE	13.96		

Assessor Details	Mr. Peter Edwards, ESAP Energy Consultants Arch Des & Surv, Tel: 01455883250, esapenquiry@gmail.com	Assessor ID	H883-0001
Client	Redmile Homes, Redmile Homes		

Building Elements

Floor 000005 - Floor - suspended beam-and-block floor

Floor Type: Suspended Floor

Area = 31.17 m², Perimeter = 15.79 m, Wall thickness = 300.00 mm, Soil: Clay

Depth of underfloor space below ground: 0.200 m Floor wind shielding: Average (suburban)

Floor height above ground: h = 0.000 m

U-value of walls above ground: U_w = 1.500 m

Ventilation openings per perimeter length: e = 0.0015 %

Mean wind speed: v = 5.000 m/s

Resistance on solum: R_g = 0.000 m²K/W

Layer	Description	Thickness (mm)	Conductivity (W/m ² K)	Resistance (m ² K/W)	Fraction (%)
Ext surface				0.1700	
Layer 1	AAC (600 kg/m ³)/ concrete				
	Main construction	100	0.1800	0.5556	86.30
	Main construction	100	1.3500	0.0741	13.70
Layer 2	Kooltherm K3 Floorboard (45mm +)				
	Main construction	100	0.0200	5.0000	100.00
	Corrections - Air Gap: Level 1, Fasteners: None or plastic				
Layer 3	Screed				
	Main construction	65	1.1500	0.0565	100.00
Int surface				0.1700	

Total resistance: Upper limit = 5.881 m² K/W Lower limit = 5.690 m² K/W Average = 5.786 m² K/W

Total correction = 0.0075 m² K/W

U-value (unrounded) = 0.14 W/m² K

Unheated space: None

Total thickness: 265 mm

U-value: 0.14 W/m² K

Kappa: n/a

U-VALUE CALCULATOR REPORT

Property Reference	000594	Issued on Date	27/03/2022
Assessment Reference	Plot 4 As Design	Prop Type Ref	Plot 4 - Hathersage A
Project	Goldthorpe Road, Goldthorpe, Barnsley, S63 9		
Calculation Type	New Build (As Designed)		

SAP Rating	83 B	DER	18.59	TER	19.29
Environmental	87 B	% DER<TER	3.63		
CO ₂ Emissions (t/year)	1.06	DFEE	45.00	TFEE	52.30
General Requirements Compliance	Pass	% DFEE<TFEE	13.96		

Assessor Details	Mr. Peter Edwards, ESAP Energy Consultants Arch Des & Surv, Tel: 01455883250, esapenquiry@gmail.com	Assessor ID	H883-0001
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Client	Redmile Homes, Redmile Homes
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Building Elements

Floor 000006 - Passageway ceiling

Floor Type: Exposed Floor

Layer	Description	Thickness (mm)	Conductivity (W/m ² K)	Resistance (m ² K/W)	Fraction (%)	Density (kg/m ³)	Heat Cap. (J/kgK)
Ext surface				0.0400			
Layer 1	Plaster, standard						
	Main construction	3	0.4000	0.0075	100.00		
Layer 2	Plasterboard, standard						
	Main construction	12.5	0.2100	0.0595	100.00		
Layer 3	Extruded polystyrene						
	Main construction	100	0.0270	3.7037	88.89		
	Main construction	100	0.1300	0.7692	11.11		
	Corrections - Air Gap: Level 1, Fasteners: None or plastic						
Layer 4	Mineral wool						
	Main construction	150	0.0400	3.7500	88.89		
	Main construction	150	0.1300	1.1538	11.11		
	Corrections - Air Gap: Level 1, Fasteners: None or plastic						
Layer 5	Chipboard						
	Main construction	22	0.1300	0.1692	100.00		
Layer 6	Foam backed carpet						
	Main construction	20	0.0600	0.3333	100.00		
Int surface				0.1700			

Total resistance:	Upper limit = 7.316 m ² K/W	Lower limit = 6.381 m ² K/W	Average = 6.848 m ² K/W
	Total correction = 0.0034 m ² K/W	U-value (unrounded) = 0.15 W/m ² K	

Unheated space: None

Total thickness: 308 mm

U-value: 0.15 W/m² K

Kappa: 0.00 kJ/m² K

ASSESSMENT NOTES

Calculation Type: New Build (As Designed)

Property Reference	000594	Issued on Date	27/03/2022
Assessment Reference	Plot 4 As Design	Prop Type Ref	Plot 4 - Hathersage A
Property	Goldthorpe Road, Goldthorpe, Barnsley, S63 9		

SAP Rating	83 B	DER	18.59	TER	19.29
Environmental	87 B	% DER<TER	3.63		
CO ₂ Emissions (t/year)	1.06	DFEE	45.00	TFEE	52.30
General Requirements Compliance	Pass	% DFEE<TFEE	13.96		

Assessor Details	Mr. Peter Edwards, ESAP Energy Consultants Arch Des & Surv, Tel: 01455883250, esapenquiry@gmail.com	Assessor ID	H883-0001
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Client	Redmile Homes, Redmile Homes
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ASSESSMENT NOTES - Last time updated on: 27.03.2022

SUMMARY:-

- Walls to be Brick outer 100mm Knauf Crown Supafil 34 Insulation with 100mm Newlay Newlite Block or similar
- Min. 100mm Kingspan insulation above beam and block floors with 65mm Screed floating floor finish.
- Roof to be insulated with min 400mm Mineral Wool Insulation.
- Doors, Windows and Patio Doors to achieve min 1.4W/m2K or better
- 100% Low E-Lighting
- Air Test of 6.0 or lower
- Assumed Boiler to be a Valliant ECOFIT Sustain 825 with Programmer TRVs & Room Stats or similar, and Boiler Interlock.
- CBA Accredited Thermal Bridging details to be used.

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)

Property Reference	000594	Issued on Date	27/03/2022
Assessment Reference	Plot 4 As Design	Prop Type Ref	Plot 4 - Hathersage A
Property	Goldthorpe Road, Goldthorpe, Barnsley, S63 9		
SAP Rating	83 B	DER	18.59
Environmental	87 B	TER	19.29
CO ₂ Emissions (t/year)	1.06	% DER<TER	3.63
General Requirements Compliance	Pass	DFEE	45.00
		TFEE	52.30
		% DFEE<TFEE	13.96
Assessor Details	Mr. Peter Edwards, ESAP Energy Consultants Arch Des & Surv, Tel: 01455883250, esapenquiry@gmail.com		Assessor ID
			H883-0001
Client	Redmile Homes, Redmile Homes		

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Criterion 1 – Achieving the TER and TFEE rate

1a TER and DER

Fuel for main heating	Mains gas		
Fuel factor	1.00 (mains gas)		
Target Carbon Dioxide Emission Rate (TER)	19.29	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	18.59	kgCO ₂ /m ²	Pass
	-0.70 (-3.6%)	kgCO ₂ /m ²	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	52.30	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	45.00	kWh/m ² /yr	
	-7.3 (-14.0%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.27 (max. 0.30)	0.27 (max. 0.70)	Pass
Party wall	0.00 (max. 0.20)	-	Pass
Floor	0.14 (max. 0.25)	0.15 (max. 0.70)	Pass
Roof	0.10 (max. 0.20)	0.10 (max. 0.35)	Pass
Openings	1.40 (max. 2.00)	1.40 (max. 3.30)	Pass

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	6.00 (design value)	
Maximum	10.0	Pass

Limiting System Efficiencies

4 Heating efficiency

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)

Main heating system

Boiler system with radiators or underfloor - Mains gas
Data from database
Vaillant ecoFIT sustain 825 VUW 256/6-3 (H-GB)
Combi boiler
Efficiency: 89.3% SEDBUK2009
Minimum: 88.0%

Pass

Secondary heating system

None

5 Cylinder insulation

Hot water storage

No cylinder

6 Controls

Space heating controls

Programmer, room thermostat and TRVs

Pass

Hot water controls

No cylinder

Boiler interlock

Yes

Pass

7 Low energy lights

Percentage of fixed lights with low-energy fittings

100

%

Minimum

75

%

Pass

8 Mechanical ventilation

Not applicable

Criterion 3 – Limiting the effects of heat gains in summer

9 Summertime temperature

Overheating risk (East Pennines)

Not significant

Pass

Based on:

Overshading

Average

Windows facing East

6.88 m², No overhang

Windows facing West

3.47 m², No overhang

Air change rate

4.00 ach

Blinds/curtains

None

Criterion 4 – Building performance consistent with DER and DFEE rate

Party Walls

Type

U-value

Filled Cavity with Edge Sealing

0.00

W/m²K

Pass

Air permeability and pressure testing

3 Air permeability

Air permeability at 50 pascals

6.00 (design value)

Maximum

10.0

Pass

10 Key features

Party wall U-value

0.00

W/m²K

Roof U-value

0.10

W/m²K

This report has not been submitted through the Elmhurst Energy members' portal, therefore results are subject to change when the dwelling is completed.

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Designed)

Property Reference	000594	Issued on Date	27/03/2022
Assessment Reference	Plot 4 As Design	Prop Type Ref	Plot 4 - Hathersage A
Property	Goldthorpe Road, Goldthorpe, Barnsley, S63 9		
SAP Rating	83 B	DER	18.59
Environmental	87 B	% DER<TER	3.63
CO ₂ Emissions (t/year)	1.06	DFEE	45.00
General Requirements Compliance	Pass	% DFEE<TFEE	13.96
Assessor Details	Mr. Peter Edwards, ESAP Energy Consultants Arch Des & Surv, Tel: 01455883250, esapenquiry@gmail.com		Assessor ID
Client	Redmile Homes, Redmile Homes		

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	West
Property Tenure	Owner-occupied
Transaction Type	New dwelling
Terrain Type	Suburban
1.0 Property Type	House, Mid-Terrace
2.0 Number of Storeys	2
3.0 Date Built	2019
4.0 Sheltered Sides	2
5.0 Sunlight/Shade	Average or unknown

6.0 Measurements	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
	Ground Floor:	15.79 m	31.17 m ²
	1st Storey:	8.95 m	35.48 m ²

7.0 Living Area	12.89	m ²
8.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	223.08	kJ/m ² K

9.0 External Walls			U-Value (W/m ² K)	Kappa (kJ/m ² K)	Gross Area (m ²)	Nett Area (m ²)
Description	Type	Construction				
Main Wall	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.27	60.00	61.35	48.85

9.1 Party Walls			U-Value (W/m ² K)	Kappa (kJ/m ² K)	Area (m ²)
Description	Type	Construction			
Party Wall	Filled Cavity with Edge Sealing	Single plasterboard on dabs both sides, lightweight aggregate blocks, cavity or cavity fill	0.00	110.00	63.03

9.2 Internal Walls			Kappa (kJ/m ² K)	Area (m ²)
Description	Construction			
Stud Walls	Plasterboard on timber frame		9.00	126.48

10.0 External Roofs			U-Value (W/m ² K)	Kappa (kJ/m ² K)	Gross Area (m ²)	Nett Area (m ²)
Description	Type	Construction				
Main Roof	External Plane Roof	Plasterboard, insulated at ceiling level	0.10	9.00	35.48	35.48

10.2 Internal Ceilings

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Designed)

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Ground Floor Ceiling	Plasterboard ceiling, carpeted chipboard floor	9.00	31.17

11.0 Heat Loss Floors

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)
Main Floor	Ground Floor - Solid	Suspended concrete floor, carpeted	0.14	75.00	31.17
Exposed Floor	Exposed Floor - Timber	Timber exposed floor, insulation between joists	0.15	20.00	4.32

11.2 Internal Floors

Description	Construction	Kappa (kJ/m²K)	Area (m²)
First Floor	Plasterboard ceiling, carpeted chipboard floor	18.00	31.17

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Entrance Door	Manufacturer	Half Glazed Door	Double glazed			0.76		0.70	1.40
Windows	Manufacturer	Window	Double glazed			0.76		0.70	1.40
Patio Doors	Manufacturer	Window	Double glazed			0.76		0.70	1.40

13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width (m)	Height (m)	Count	Area (m²)	Curtain Closed
Front Elevation	Half Glazed Door	[1] Main Wall	West							2.15	
Front Elevation	Window	[1] Main Wall	West	None	0.00					3.47	
Rear Elevation	Window	[1] Main Wall	East	None	0.00					5.22	
Rear Elevation	Window	[1] Main Wall	East	None	0.00					1.66	

14.0 Conservatory

None

15.0 Draught Proofing

100

 %

16.0 Draught Lobby

No

17.0 Thermal Bridging

Calculate Bridges

17.1 List of Bridges

Source Type	Bridge Type	Length	Psi	Imported
Independently assessed	E1 Steel lintel with perforated steel base plate	8.40	0.030	No
Independently assessed	E3 Sill	7.38	0.015	No
Independently assessed	E4 Jamb	18.90	0.010	No
Independently assessed	E5 Ground floor (normal)	15.79	0.056	No
Table K1 - Default	E21 Exposed floor (inverted)	1.05	0.320	No
Independently assessed	E6 Intermediate floor within a dwelling	7.90	0.000	No
Table K1 - Approved	E10 Eaves (insulation at ceiling level)	8.95	0.060	No
Independently assessed	E16 Corner (normal)	4.80	0.059	No
Independently assessed	E18 Party wall between dwellings	15.28	0.038	No
Table K1 - Default	P1 Party wall - Ground floor	7.89	0.160	No
Table K1 - Default	P2 Party wall - Intermediate floor within a dwelling	7.89	0.000	No
Table K1 - Default	P7 Party Wall - Exposed floor (normal)	1.05	0.160	No
Table K1 - Default	P8 Party Wall - Exposed floor (inverted)	7.89	0.240	No
Independently assessed	P4 Party wall - Roof (insulation at ceiling level)	15.78	0.041	No

Y-value	0.054	W/m²K
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18.0 Pressure Testing

Designed AP ₅₀	Yes	
Property Tested ?	6.00	m³/(h.m²) @ 50 Pa

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Designed)

As Built AP₅₀

m³/(h.m²) @ 50 Pa

19.0 Mechanical Ventilation

Summer Overheating

Windows open in hot weather

Windows half open

Cross ventilation possible

Yes

Night Ventilation

No

Air change rate

4.00

Mechanical Ventilation

Mechanical Ventilation System Present

No

20.0 Fans, Open Fireplaces, Flues

	MHS	SHS	Other	Total
Number of Chimneys	0		0	0
Number of open flues	0		0	0
Number of intermittent fans				3
Number of passive vents				0
Number of flueless gas fires				0

21.0 Fixed Cooling System

No

22.0 Lighting

Internal

Total number of light fittings

10

Total number of L.E.L. fittings

10

Percentage of L.E.L. fittings

100.00

%

External

External lights fitted

Yes

Light and motion sensor

Yes

23.0 Electricity Tariff

Standard

24.0 Main Heating 1

Description

Database

Percentage of Heat

100

%

Database Ref. No.

17958

Fuel Type

Mains gas

Main Heating

BGW

SAP Code

104

In Winter

90.2

In Summer

75.0

Controls

CBE Programmer, room thermostat and TRVs

PCDF Controls

0

Delayed Start Stat

No

Sap Code

2106

Flue Type

Balanced

Fan Assisted Flue

Yes

Is MHS Pumped

Pump in heated space

Heat Emitter

Radiators

Flow Temperature

Normal (> 45°C)

Combi boiler type

Standard Combi

Combi keep hot type

None

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Designed)

25.0 Main Heating 2

Community Heating

28.0 Water Heating

Water Heating

Flue Gas Heat Recovery System

Waste Water Heat Recovery Instantaneous System 1

Waste Water Heat Recovery Instantaneous System 2

Waste Water Heat Recovery Storage System

Solar Panel

Water use <= 125 litres/person/day

SAP Code

29.0 Hot Water Cylinder

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

	Typical Cost	Typical savings per year	Ratings after improvement	
			SAP rating	Environmental Impact
Solar water heating	£4,000 - £6,000	£25	B 85	
	Typical Cost	Typical savings per year	Ratings after improvement	
			SAP rating	Environmental Impact
Solar photovoltaic panels, 2.5 kWp	£3,500 - £5,500	£318	A 97	

DWELLING SIGN OFF REPORT

Section 1: Dwelling Information

Dwelling Address (Please confirm final postal address and post code of the dwelling.)

House Name		
House Number		
Postcode	S63 9	
Street	Goldthorpe Road	
Locality	Goldthorpe	
Town	Barnsley	
County		

Dwelling Orientation (Please confirm orientation of main entrance door of the dwelling.)

Comments

Terrain Type

Property Type

Comments

Overshading (called Sunlight/shade in assessment)

Comments

Section 2: Dwelling Construction Details

Thermal Mass Parameter

Thermal Mass kJ/m²K

Comments

External Walls

Type

Construction

U-value W/m²K

Gross Area m²

Layer Name	Thickness (mm)	Conductivity (W/m.K)	Resistance (m ² K/W)	Bridging
Brick, outer leaf	102.5	0.7700	0.1331	82.81 Mortar
Supafil 34	100	0.0340	2.9412	100.00
Newlay, Newlite	100	0.4300	0.2326	100.00
airspace/plaster dabs	15	0.0882	0.1700	80.00 Mortar
Plaster, standard	12.5	0.4000	0.0313	100.00
Plaster, standard	3	0.4000	0.0075	100.00

Comments

Party Walls

DWELLING SIGN OFF REPORT

Type	Construction	U-Value (W/m²K)	Area (m²)
Filled Cavity with Edge Sealing	Single plasterboard on dabs both sides, lightweight aggregate blocks, cavity or cavity fill	0.00	63.03
Comments			

External Roofs

Type	External Plane Roof				
Construction	Plasterboard, insulated at ceiling level				
U-value	0.10	W/m²K			
Gross Area	35.48	m²			
Layer Name	Thickness (mm)	Conductivity (W/m.K)	Resistance (m²K/W)	Bridging	
Mineral wool	300	0.0400	7.5000	100.00	
Mineral wool	100	0.0400	2.5000	88.89 Timber	
Plasterboard, standard	12.5	0.2100	0.0595	100.00	
Plaster, standard	3	0.4000	0.0075	100.00	
Comments					

Heat Loss Floors

Type	Ground Floor - Solid			
Construction	Suspended concrete floor, carpeted			
U-value	0.14	W/m²K		
Area	31.17	m²		
Layer Name	Thickness (mm)	Conductivity (W/m.K)	Resistance (m²K/W)	Bridging
AAC (600 kg/m3)/ concrete	100	0.1800	0.5556	86.30 Mortar
Kooltherm K3 Floorboard (45mm +)	100	0.0200	5.0000	100.00
Screed	65	1.1500	0.0565	100.00
Type	Exposed Floor - Timber			
Construction	Timber exposed floor, insulation between joists			
U-value	0.15	W/m²K		
Area	4.32	m²		
Layer Name	Thickness (mm)	Conductivity (W/m.K)	Resistance (m²K/W)	Bridging
Plaster, standard	3	0.4000	0.0075	100.00
Plasterboard, standard	12.5	0.2100	0.0595	100.00
Extruded polystyrene	100	0.0270	3.7037	88.89 Timber
Mineral wool	150	0.0400	3.7500	88.89 Timber
Chipboard	22	0.1300	0.1692	100.00
Foam backed carpet	20	0.0600	0.3333	100.00
Comments				

DWELLING SIGN OFF REPORT

Opening Types

Description	Type	Glazing	Frame Type	U Value (W/m ² K)
Entrance Door	Half Glazed Door	Double glazed		1.40
Windows	Window	Double glazed		1.40
Patio Doors	Window	Double glazed		1.40
Comments				

Openings

Name	Opening Type	Location	Orientation	Area (m ²)
Front Elevation	Half Glazed Door	[1] Main Wall	West	2.15
Front Elevation	Window	[1] Main Wall	West	3.47
Rear Elevation	Window	[1] Main Wall	East	5.22
Rear Elevation	Window	[1] Main Wall	East	1.66
Comments				

Thermal Bridging

Calculate Bridges

List of Bridges

Bridge Type	Source Type	Length (m)	Psi (W/mK)	Reference
E1 Steel lintel with perforated steel base plate	Independently assessed	8.40	0.030	
E3 Sill	Independently assessed	7.38	0.015	
E4 Jamb	Independently assessed	18.90	0.010	
E5 Ground floor (normal)	Independently assessed	15.79	0.056	
E21 Exposed floor (inverted)	Table K1 - Default	1.05	0.320	
E6 Intermediate floor within a dwelling	Independently assessed	7.90	0.000	
E10 Eaves (insulation at ceiling level)	Table K1 - Approved	8.95	0.060	
E16 Corner (normal)	Independently assessed	4.80	0.059	
E18 Party wall between dwellings	Independently assessed	15.28	0.038	
P1 Party wall - Ground floor	Table K1 - Default	7.89	0.160	
P2 Party wall - Intermediate floor within a dwelling	Table K1 - Default	7.89	0.000	
P7 Party Wall - Exposed floor (normal)	Table K1 - Default	1.05	0.160	
P8 Party Wall - Exposed floor (inverted)	Table K1 - Default	7.89	0.240	
P4 Party wall - Roof (insulation at ceiling level)	Independently assessed	15.78	0.041	

Y-value 0.054 W/m²K

Comments

DWELLING SIGN OFF REPORT

Where specific construction details have been used documentary evidence should be provided to the SAP assessor, usually in the form of signed checklists.

Pressure Testing

As Built AP₅₀

 m³/(h.m²) @ 50 Pa

Where an air pressure test has been carried out a copy of the test certificate should be forwarded to the SAP assessor.

Comments

Section 3: Dwelling Systems

Fans, Open Fireplaces, Flues

	MHS	SHS	Other	Total
Number of Chimneys	0		0	0
Number of open flues	0		0	0
Number of intermittent fans				3
Number of passive vents				0
Number of flueless gas fires				0

Comments

Internal Lighting

Total number of light fittings	10	
Total number of L.E.L. fittings	10	
Percentage of L.E.L. fittings	100.00	%

Comments

External Lighting

External lights fitted	Yes
Light and motion sensor	Yes

Comments

Electricity Tariff

Comments

Main Heating 1

	Database
Fuel Type	Mains gas
Main Heating	Mains gas BGW Post 98 Combi condens. with auto ign.
Efficiency (Split Efficiencies)	89.3 %
Brand, Model	Vaillant, ecoFIT sustain 825
Flue Type	Balanced
Fan Assisted Flue	Yes
Heat Emitter	Radiators
Flow Temperature	Normal (> 45°C)

DWELLING SIGN OFF REPORT

Comments

Heating Controls

Description	CBE Programmer, room thermostat and TRVs
Boiler Interlock	Yes
Delayed Start Stat	No
Compensator	

Comments

Main Heating 2

Comments

Water Heating System

Water Heating	Main Heating 1
Supplementary Immersion	

Comments

Section 4: Dwelling Renewable Energy

Section 5: Declaration

I confirm that all details provided above are accurate to the best of my knowledge.

Signed

Date