

PREDICTED ENERGY ASSESSMENT



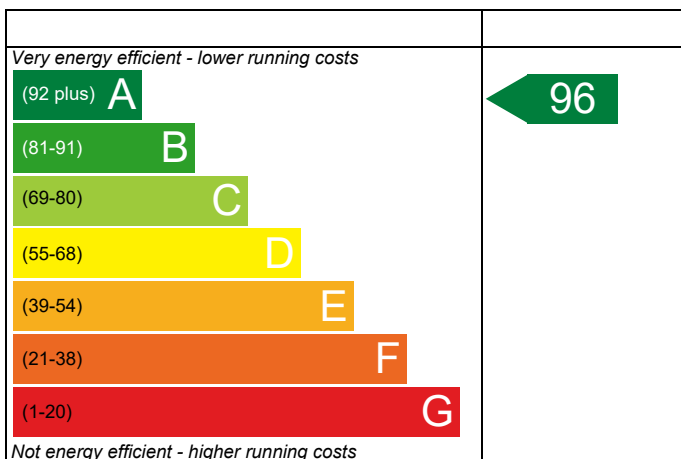
Plot 135, Grasmere Gardens,
Chestfield,
Kent

Dwelling type: House, Detached
Date of assessment: 06/10/2022
Produced by: Sean Wells
Total floor area: 97.78 m²
DRRN: 4324-6022-0926

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

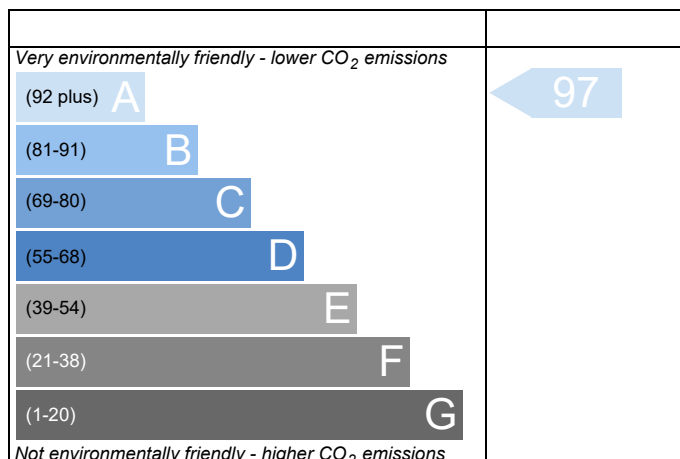


England

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 been produced by an accredited Elmhurst member whose work is subject to quality assurance audits. The data used to produce the report has been verified by the Elmhurst members' portal.



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	4227-135F			Issued on Date	06/10/2022
Assessment Reference	As Designed Final	Prop Type Ref	Type C1 - Detached		
Property	Plot 135, Grasmere Gardens, Chestfield, Kent				
SAP Rating	96 A	DER	5.00	TER	18.64
Environmental	97 A	% DER<TER	73.18		
CO ₂ Emissions (t/year)	0.14	DFEE	49.95	TFEE	59.35
General Requirements Compliance	Pass	% DFEE<TFEE	15.83		
Assessor Details	Mr. Sean Wells, Energytest, Tel: 01892577562, swells@energy-test.co.uk			Assessor ID	T220-0001
Client					

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

Detached House, total floor area 98 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) 18.64 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 5.00 kgCO₂/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 59.3 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE) 50.0 kWh/m²/yr OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.20 (max. 0.30)	0.20 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.12 (max. 0.25)	0.12 (max. 0.70)	OK
Roof	0.11 (max. 0.20)	0.11 (max. 0.35)	OK
Openings	1.41 (max. 2.00)	1.60 (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: 5.00 (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 830 VUW 306/6-3 (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: Time and temperature zone control 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 (Thames Valley): Not significant OK
Based on:
Overshading: Average
Windows facing North: 1.26 m², No overhang
Windows facing East: 12.34 m², No overhang
Windows facing South: 3.26 m², No overhang
Windows facing West: 7.06 m², No overhang
Air change rate: 8.00 ach
Blinds/curtains: Light-coloured curtain or roller blind, closed 100% of daylight hours

10 Key features

Party wall U-value 0.00 W/m²K
Roof U-value 0.11 W/m²K
Floor U-value 0.12 W/m²K
Thermal bridging y-value 0.034 W/m²K
Photovoltaic array 2.68 kW

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	48.8900 (1b)	x 2.4000 (2b)	= 117.3360 (1b) - (3b)
First floor	48.8900 (1c)	x 2.7000 (2c)	= 132.0030 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	97.7800		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 249.3390 (5)
Dwelling volume			

2. Ventilation rate

					main heating	+	secondary heating	+	other	=	total	m3 per hour
Number of chimneys					0	+	0	+	0	=	0 * 40 =	0.0000 (6a)
Number of open flues					0	+	0	+	0	=	0 * 20 =	0.0000 (6b)
Number of intermittent fans											4 * 10 =	40.0000 (7a)
Number of passive vents											0 * 10 =	0.0000 (7b)
Number of flueless gas fires											0 * 40 =	0.0000 (7c)
												Air changes per hour
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(7a)+(7b)+(7c) =										40.0000 / (5) =	0.1604 (8)
Pressure test											Yes	
Measured/design AP50											5.0000	
Infiltration rate											0.4104 (18)	
Number of sides sheltered											3 (19)	
Shelter factor											(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor											(21) = (18) x (20) =	0.3181 (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	0.4056	0.3976	0.3896	0.3499	0.3419	0.3022	0.3022	0.2942	0.3181	0.3419	0.3578	0.3737 (22b)
Effective ac	0.5822	0.5790	0.5759	0.5612	0.5585	0.5457	0.5457	0.5433	0.5506	0.5585	0.5640	0.5698 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K						
window (Uw = 1.40)			23.9200	1.3258	31.7121			(27)					
external door			1.8900	1.6000	3.0240			(26a)					
ground floor			48.8900	0.1200	5.8668			(28a)					
external wall - brick	71.5200	25.8100	45.7100	0.2000	9.1420			(29a)					
external wall brick first	75.6000		75.6000	0.2000	15.1200			(29a)					
pitch cold roof	48.8900		48.8900	0.1100	5.3779			(30)					
Total net area of external elements Aum(A, m2)			244.9000					(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	70.2428			(33)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K									188.0000 (35)				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)									8.3545 (36)				
Total fabric heat loss						(33) + (36) =	78.5974	(37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 47.9074	Feb 47.6447	Mar 47.3871	Apr 46.1774	May 45.9511	Jun 44.8975	Jul 44.8975	Aug 44.7024	Sep 45.3033	Oct 45.9511	Nov 46.4090	Dec 46.8876	(38)
Heat transfer coeff	126.5048	126.2420	125.9845	124.7748	124.5485	123.4949	123.4949	123.2997	123.9007	124.5485	125.0063	125.4850	(39)
Average = Sum(39)m / 12 =												124.7737	(39)
HLP	Jan 1.2938	Feb 1.2911	Mar 1.2884	Apr 1.2761	May 1.2738	Jun 1.2630	Jul 1.2630	Aug 1.2610	Sep 1.2671	Oct 1.2738	Nov 1.2784	Dec 1.2833	(40)
HLP (average)												1.2761	(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												2.7180 (42)
Average daily hot water use (litres/day)												98.7526 (43)
Daily hot water use	Jan 108.6278	Feb 104.6777	Mar 100.7276	Apr 96.7775	May 92.8274	Jun 88.8773	Jul 88.8773	Aug 92.8274	Sep 96.7775	Oct 100.7276	Nov 104.6777	Dec 108.6278 (44)
Energy conte	161.0919	140.8920	145.3879	126.7527	121.6223	104.9508	97.2523	111.5984	112.9313	131.6105	143.6632	156.0089 (45)
Energy content (annual)										Total = Sum(45)m =		1553.7622 (45)
Distribution loss (46)m = 0.15 x (45)m	24.1638	21.1338	21.8082	19.0129	18.2433	15.7426	14.5878	16.7398	16.9397	19.7416	21.5495	23.4013 (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 DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 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 (57)
Combi loss	1.7032	1.5509	1.6635	1.4107	1.2983	1.0727	0.9940	1.1913	1.2569	1.5059	1.5814	1.6495 (61)
Total heat required for water heating calculated for each month	162.7951	142.4429	147.0515	128.1634	122.9206	106.0234	98.2463	112.7898	114.1881	133.1164	145.2445	157.6584 (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	162.7951	142.4429	147.0515	128.1634	122.9206	106.0234	98.2463	112.7898	114.1881	133.1164	145.2445	157.6584 (64)
Heat gains from water heating, kWh/month	53.9889	47.2343	48.7574	42.4980	40.7640	35.1643	32.5849	37.4043	37.8639	44.1370	48.1633	52.2853 (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	135.9001	135.9001	135.9001	135.9001	135.9001	135.9001	135.9001	135.9001	135.9001	135.9001	135.9001	135.9001 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	22.5273	20.0086	16.2721	12.3190	9.2086	7.7743	8.4004	10.9191	14.6556	18.6087	21.7191	23.1534 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	252.6880	255.3102	248.7025	234.6357	216.8787	200.1898	189.0405	186.4184	193.0260	207.0929	224.8498	241.5388 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.5900	36.5900	36.5900	36.5900	36.5900	36.5900	36.5900	36.5900	36.5900	36.5900	36.5900	36.5900 (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)	-108.7201	-108.7201	-108.7201	-108.7201	-108.7201	-108.7201	-108.7201	-108.7201	-108.7201	-108.7201	-108.7201	-108.7201 (71)
Water heating gains (Table 5)	72.5657	70.2891	65.5341	59.0249	54.7903	48.8393	43.7969	50.2746	52.5887	59.3239	66.8935	70.2760 (72)
Total internal gains	414.5511	412.3779	397.2787	372.7496	347.6477	323.5734	308.0078	314.3822	327.0404	351.7955	380.2325	401.7382 (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
North				1.2600	10.6334		0.6300		0.7000		0.7700		4.0946 (74)
East				12.3400	19.6403		0.6300		0.7000		0.7700		74.0686 (76)
South				3.2600	46.7521		0.6300		0.7000		0.7700		46.5790 (78)
West				7.0600	19.6403		0.6300		0.7000		0.7700		42.3764 (80)
Solar gains	167.1186	311.9006	485.6090	678.3029	813.7313	827.3296	789.8401	688.6433	553.7982	361.8880	205.4565	139.4207	(83)
Total gains	581.6697	724.2785	882.8877	1051.0525	1161.3790	1150.9030	1097.8479	1003.0254	880.8386	713.6835	585.6890	541.1590	(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	40.3644	40.4484	40.5311	40.9240	40.9984	41.3482	41.3482	41.4136	41.2128	40.9984	40.8482	40.6924
alpha	3.6910	3.6966	3.7021	3.7283	3.7332	3.7565	3.7565	3.7609	3.7475	3.7332	3.7232	3.7128
util living area	0.9938	0.9857	0.9638	0.9039	0.7877	0.6238	0.4765	0.5346	0.7774	0.9484	0.9884	0.9952 (86)
MIT	19.2245	19.4735	19.8696	20.3499	20.7170	20.9156	20.9764	20.9640	20.8020	20.2813	19.6548	19.1798 (87)
Th 2	19.8457	19.8478	19.8499	19.8596	19.8614	19.8699	19.8699	19.8715	19.8667	19.8614	19.8578	19.8539 (88)
util rest of house	0.9921	0.9819	0.9541	0.8782	0.7333	0.5346	0.3624	0.4166	0.7001	0.9292	0.9847	0.9939 (89)
MIT 2	17.4910	17.8540	18.4255	19.1034	19.5809	19.8092	19.8597	19.8542	19.7000	19.0268	18.1267	17.4311 (90)
Living area fraction									fLA = Living area / (4) =			0.3590 (91)
MIT	18.1133	18.4353	18.9439	19.5509	19.9887	20.2064	20.2605	20.2526	20.0956	19.4771	18.6752	18.0588 (92)
Temperature adjustment												-0.1500
adjusted MIT	17.9633	18.2853	18.7939	19.4009	19.8387	20.0564	20.1105	20.1026	19.9456	19.3271	18.5252	17.9088 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9880	0.9746	0.9422	0.8656	0.7321	0.5502	0.3875	0.4420	0.7063	0.9173	0.9783	0.9906 (94)
Useful gains	574.6976	705.8723	831.8702	909.8405	850.2397	633.2648	425.4386	443.3287	622.0926	654.6648	572.9953	536.0736 (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	1728.4670	1689.7925	1548.8409	1310.2429	1013.6632	673.8340	433.5348	456.5249	724.2698	1086.9520	1428.2249	1720.2491 (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	858.4045	661.1944	533.4262	288.2898	121.5870	0.0000	0.0000	0.0000	0.0000	321.6217	615.7653	881.0266 (98)
Space heating												4281.3154 (98)
Space heating per m2										(98) / (4) =		43.7852 (99)

8c. Space cooling requirement

Not applicable

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 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 %)													90.2000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													4746.4694 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	858.4045	661.1944	533.4262	288.2898	121.5870	0.0000	0.0000	0.0000	0.0000	321.6217	615.7653	881.0266	(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)	951.6679	733.0315	591.3816	319.6117	134.7972	0.0000	0.0000	0.0000	0.0000	356.5650	682.6666	976.7479	(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	162.7951	142.4429	147.0515	128.1634	122.9206	106.0234	98.2463	112.7898	114.1881	133.1164	145.2445	157.6584	(64)
Efficiency of water heater (217)m	87.6333	87.3553	86.7555	85.3729	82.5732	76.2000	76.2000	76.2000	76.2000	85.5964	87.1442	76.2000	(216)
Fuel for water heating, kWh/month	185.7685	163.0616	169.5010	150.1220	148.8626	139.1384	128.9322	148.0181	149.8532	155.5164	166.6714	179.6619	(219)
Water heating fuel used												1885.1073	(219)
Annual totals kWh/year													
Space heating fuel - main system												4746.4694	(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)												397.8396	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV Unit 0 (0.80 * 2.68 * 1068 * 1.00) =										-2289.9431		-2289.9431	(233)
Total delivered energy for all uses												4814.4732	(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	4746.4694	0.2160	1025.2374 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1885.1073	0.2160	407.1832 (264)
Space and water heating			1432.4206 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	397.8396	0.5190	206.4787 (268)
Energy saving/generation technologies			
PV Unit	-2289.9431	0.5190	-1188.4805 (269)
Total CO2, kg/year			489.3438 (272)
Dwelling Carbon Dioxide Emission Rate (DER)			5.0000 (273)

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

DER		5.0000	ZC1
Total Floor Area		97.7800	
Assumed number of occupants		2.7180	
CO2 emission factor in Table 12 for electricity displaced from grid		0.5190	
CO2 emissions from appliances, equation (L14)		15.3137	ZC2
CO2 emissions from cooking, equation (L16)		1.8841	ZC3
Total CO2 emissions		22.1979	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		22.1979	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	48.8900 (1b)	x 2.4000 (2b)	= 117.3360 (1b) - (3b)
First floor	48.8900 (1c)	x 2.7000 (2c)	= 132.0030 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	97.7800		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 249.3390 (5)
Dwelling volume			

2. Ventilation rate

										main	secondary	other	total	m3 per hour			
										heating	heating						
Number of chimneys										0	+	0	+	0	=	0 * 40 =	0.0000 (6a)
Number of open flues										0	+	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)
										Air changes per hour							
Infiltration due to chimneys, flues and fans										= (6a)+(6b)+(7a)+(7b)+(7c) =					30.0000	/ (5) =	0.1203 (8)
Pressure test										Yes							
Measured/design AP50										5.0000							
Infiltration rate										0.3703 (18)							
Number of sides sheltered										3 (19)							
Shelter factor										(20) = 1 - [0.075 x (19)] =							0.7750 (20)
Infiltration rate adjusted to include shelter factor										(21) = (18) x (20) =							0.2870 (21)
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec					
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	0.3659	0.3587	0.3516	0.3157	0.3085	0.2726	0.2726	0.2655	0.2870	0.3085	0.3229	0.3372	(22b)				
Effective ac	0.5669	0.5643	0.5618	0.5498	0.5476	0.5372	0.5372	0.5352	0.5412	0.5476	0.5521	0.5569	(25)				

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K						
TER Semi-glazed door			1.8900	1.2000	2.2680			(26a)					
TER Opening Type (Uw = 1.40)			22.5300	1.3258	29.8693			(27)					
ground floor			48.8900	0.1300	6.3557			(28a)					
external wall - brick	71.5200	24.4200	47.1000	0.1800	8.4780			(29a)					
external wall brick first	75.6000		75.6000	0.1800	13.6080			(29a)					
pitch cold roof	48.8900		48.8900	0.1300	6.3557			(30)					
Total net area of external elements Aum(A, m2)			244.9000					(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	66.9347			(33)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K								250.0000 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)								12.7110 (36)					
Total fabric heat loss						(33) + (36) =		79.6457 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 46.6496	Feb 46.4357	Mar 46.2260	Apr 45.2412	May 45.0570	Jun 44.1992	Jul 44.1992	Aug 44.0404	Sep 44.5296	Oct 45.0570	Nov 45.4297	Dec 45.8194	(38)
Heat transfer coeff	126.2953	126.0814	125.8718	124.8869	124.7027	123.8449	123.8449	123.6861	124.1753	124.7027	125.0754	125.4651	(39)
Average = Sum(39)m / 12 =												124.8860	(39)
HLP	Jan 1.2916	Feb 1.2894	Mar 1.2873	Apr 1.2772	May 1.2753	Jun 1.2666	Jul 1.2666	Aug 1.2649	Sep 1.2699	Oct 1.2753	Nov 1.2792	Dec 1.2831	(40)
HLP (average)												1.2772	(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												2.7180 (42)
Average daily hot water use (litres/day)												98.7526 (43)
Daily hot water use	Jan 108.6278	Feb 104.6777	Mar 100.7276	Apr 96.7775	May 92.8274	Jun 88.8773	Jul 88.8773	Aug 92.8274	Sep 96.7775	Oct 100.7276	Nov 104.6777	Dec 108.6278 (44)
Energy conte	161.0919	140.8920	145.3879	126.7527	121.6223	104.9508	97.2523	111.5984	112.9313	131.6105	143.6632	156.0089 (45)
Energy content (annual)										Total = Sum(45)m =		1553.7622 (45)
Distribution loss (46)m = 0.15 x (45)m	24.1638	21.1338	21.8082	19.0129	18.2433	15.7426	14.5878	16.7398	16.9397	19.7416	21.5495	23.4013 (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)

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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 (57)
Combi loss	50.9589	46.0274	50.9589	47.7259	47.3038	43.8299	45.2909	47.3038	47.7259	50.9589	49.3151	50.9589 (61)
Total heat required for water heating calculated for each month	212.0508	186.9194	196.3468	174.4786	168.9261	148.7807	142.5432	158.9023	160.6572	182.5694	192.9782	206.9678 (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	212.0508	186.9194	196.3468	174.4786	168.9261	148.7807	142.5432	158.9023	160.6572	182.5694	192.9782	206.9678 (64)
Heat gains from water heating, kWh/month	66.3028	58.3534	61.0812	54.0768	52.2654	45.8536	43.6591	48.9324	49.4811	56.5002	60.0968	64.6127 (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	135.9001	135.9001	135.9001	135.9001	135.9001	135.9001	135.9001	135.9001	135.9001	135.9001	135.9001	135.9001 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	22.5273	20.0086	16.2721	12.3190	9.2086	7.7743	8.4004	10.9191	14.6556	18.6087	21.7191	23.1534 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	252.6880	255.3102	248.7025	234.6357	216.8787	200.1898	189.0405	186.4184	193.0260	207.0929	224.8498	241.5388 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.5900	36.5900	36.5900	36.5900	36.5900	36.5900	36.5900	36.5900	36.5900	36.5900	36.5900	36.5900 (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)	-108.7201	-108.7201	-108.7201	-108.7201	-108.7201	-108.7201	-108.7201	-108.7201	-108.7201	-108.7201	-108.7201	-108.7201 (71)
Water heating gains (Table 5)	89.1166	86.8355	82.0984	75.1066	70.2491	63.6856	58.6816	65.7694	68.7238	75.9412	83.4677	86.8450 (72)
Total internal gains	431.1021	428.9242	413.8430	388.8313	363.1065	338.4196	322.8925	329.8770	343.1755	368.4128	396.8067	418.3073 (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	
North				1.1900	10.6334		0.6300		0.7000	0.7700	3.8671 (74)	
East				11.6300	19.6403		0.6300		0.7000	0.7700	69.8070 (76)	
South				3.0700	46.7521		0.6300		0.7000	0.7700	43.8643 (78)	
West				6.6400	19.6403		0.6300		0.7000	0.7700	39.8554 (80)	
Solar gains	157.3938	293.7516	457.3560	638.8472	766.4070	779.2189	743.9076	648.5893	521.5804	340.8311	193.5009	131.3076 (83)
Total gains	588.4959	722.6758	871.1990	1027.6784	1129.5135	1117.6385	1066.8001	978.4663	864.7559	709.2439	590.3075	549.6149 (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	53.7651	53.8563	53.9460	54.3714	54.4517	54.8289	54.8289	54.8993	54.6830	54.4517	54.2895	54.1208
alpha	4.5843	4.5904	4.5964	4.6248	4.6301	4.6553	4.6553	4.6600	4.6455	4.6301	4.6193	4.6081
util living area	0.9979	0.9944	0.9823	0.9393	0.8331	0.6606	0.4996	0.5611	0.8190	0.9713	0.9955	0.9985 (86)
MIT	19.5750	19.7717	20.0916	20.4876	20.7946	20.9489	20.9888	20.9812	20.8604	20.4291	19.9200	19.5380 (87)
Th 2	19.8474	19.8491	19.8508	19.8587	19.8602	19.8671	19.8671	19.8684	19.8645	19.8602	19.8572	19.8541 (88)
util rest of house	0.9972	0.9924	0.9759	0.9173	0.7770	0.5628	0.3767	0.4331	0.7374	0.9568	0.9936	0.9980 (89)
MIT 2	17.9594	18.2472	18.7113	19.2731	19.6677	19.8351	19.8633	19.8612	19.7569	19.2053	18.4703	17.9099 (90)
Living area fraction									fLA = Living area / (4) =			0.3590 (91)
MIT	18.5394	18.7945	19.2068	19.7091	20.0722	20.2349	20.2673	20.2633	20.1530	19.6446	18.9907	18.4943 (92)
Temperature adjustment												0.0000
adjusted MIT	18.5394	18.7945	19.2068	19.7091	20.0722	20.2349	20.2673	20.2633	20.1530	19.6446	18.9907	18.4943 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9960	0.9898	0.9711	0.9138	0.7886	0.5963	0.4211	0.4793	0.7608	0.9532	0.9915	0.9970 (94)
Useful gains	586.1276	715.3345	846.0559	939.0807	890.6983	666.3992	449.2415	469.0144	657.8904	676.0811	585.2939	547.9748 (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	1798.3641	1751.8340	1599.4228	1349.9095	1044.0328	697.8551	454.1776	477.8315	751.6386	1127.8881	1487.2318	1793.4398 (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	901.9040	696.5277	560.5050	295.7967	114.0809	0.0000	0.0000	0.0000	0.0000	336.1444	649.3953	926.6260 (98)
Space heating												4480.9798 (98)
Space heating per m2										(98) / (4) =		45.8272 (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													4797.6230 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	901.9040	696.5277	560.5050	295.7967	114.0809	0.0000	0.0000	0.0000	0.0000	336.1444	649.3953	926.6260	(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)	965.6359	745.7470	600.1124	316.6988	122.1423	0.0000	0.0000	0.0000	0.0000	359.8976	695.2840	992.1049	(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	212.0508	186.9194	196.3468	174.4786	168.9261	148.7807	142.5432	158.9023	160.6572	182.5694	192.9782	206.9678	(64)
Efficiency of water heater (217)m	88.2862	88.0566	87.5434	86.3695	84.0870	80.3000	80.3000	80.3000	80.3000	86.5677	87.8681	80.3000	(216)
Fuel for water heating, kWh/month	240.1858	212.2718	224.2850	202.0141	200.8944	185.2810	177.5133	197.8858	200.0712	210.8979	219.6226	234.2043	(219)
Water heating fuel used												2505.1271	(219)
Annual totals kWh/year													
Space heating fuel - main system												4797.6230	(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)												397.8396	(232)
Total delivered energy for all uses												7775.5897	(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	4797.6230	0.2160	1036.2866 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2505.1271	0.2160	541.1075 (264)
Space and water heating			1577.3940 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	397.8396	0.5190	206.4787 (268)
Total CO2, kg/m2/year			1822.7978 (272)
Emissions per m2 for space and water heating			16.1321 (272a)
Fuel factor (mains gas)			1.0000
Emissions per m2 for lighting			2.1117 (272b)
Emissions per m2 for pumps and fans			0.3981 (272c)
Target Carbon Dioxide Emission Rate (TER) = (16.1321 * 1.00) + 2.1117 + 0.3981, rounded to 2 d.p.			18.6400 (273)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	4227-135F	Issued on Date	06/10/2022
Assessment Reference	As Designed Final	Prop Type Ref	Type C1 - Detached
Property	Plot 135, Grasmere Gardens, Chestfield, Kent		
SAP Rating	96 A	DER	5.00
Environmental	97 A	% DER<TER	73.18
CO ₂ Emissions (t/year)	0.14	DFEE	49.95
General Requirements Compliance	Pass	% DFEE<TFEE	59.35
Assessor Details	Mr. Sean Wells, Energytest, Tel: 01892577562, swells@energy-test.co.uk	Assessor ID	T220-0001
Client			

CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	48.8900 (1b)	x 2.4000 (2b)	= 117.3360 (1b) - (3b)
First floor	48.8900 (1c)	x 2.7000 (2c)	= 132.0030 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	97.7800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 249.3390 (5)

2. Ventilation rate

	main heating	+	secondary heating	+	other	=	total	m3 per hour				
Number of chimneys	0	+	0	+	0	=	0 * 40 =	0.0000 (6a)				
Number of open flues	0	+	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)				
							Air changes per hour					
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(7a)+(7b)+(7c) =						30.0000 / (5) =	0.1203 (8)				
Pressure test							Yes					
Measured/design AP50							5.0000					
Infiltration rate							0.3703 (18)					
Number of sides sheltered							3 (19)					
Shelter factor							(20) = 1 - [0.075 x (19)] =	0.7750 (20)				
Infiltration rate adjusted to include shelter factor							(21) = (18) x (20) =	0.2870 (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	0.3659	0.3587	0.3516	0.3157	0.3085	0.2726	0.2726	0.2655	0.2870	0.3085	0.3229	0.3372 (22b)
Effective ac	0.5669	0.5643	0.5618	0.5498	0.5476	0.5372	0.5372	0.5352	0.5412	0.5476	0.5521	0.5569 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K					
window (Uw = 1.40)			23.9200	1.3258	31.7121		(27)					
external door			1.8900	1.6000	3.0240		(26a)					
ground floor			48.8900	0.1200	5.8668		(28a)					
external wall - brick	71.5200	25.8100	45.7100	0.2000	9.1420		(29a)					
external wall brick first	75.6000		75.6000	0.2000	15.1200		(29a)					
pitch cold roof	48.8900		48.8900	0.1100	5.3779		(30)					
Total net area of external elements Aum(A, m2)			244.9000				(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	70.2428		(33)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							188.0000 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							8.3545 (36)					
Total fabric heat loss						(33) + (36) =	78.5974 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 46.6496	Feb 46.4357	Mar 46.2260	Apr 45.2412	May 45.0570	Jun 44.1992	Jul 44.1992	Aug 44.0404	Sep 44.5296	Oct 45.0570	Nov 45.4297	Dec 45.8194 (38)
Heat transfer coeff	125.2470	125.0331	124.8234	123.8386	123.6543	122.7966	122.7966	122.6377	123.1270	123.6543	124.0271	124.4168 (39)
Average = Sum(39)m / 12 =												123.8377 (39)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.2809	1.2787	1.2766	1.2665	1.2646	1.2558	1.2558	1.2542	1.2592	1.2646	1.2684	1.2724	(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													2.7180 (42)
Average daily hot water use (litres/day)													98.7526 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	108.6278	104.6777	100.7276	96.7775	92.8274	88.8773	88.8773	92.8274	96.7775	100.7276	104.6777	108.6278	(44)
Energy conte	161.0919	140.8920	145.3879	126.7527	121.6223	104.9508	97.2523	111.5984	112.9313	131.6105	143.6632	156.0089	(45)
Energy content (annual)													1553.7622 (45)
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(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)
Primary 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	(59)
Heat gains from water heating, kWh/month	34.2320	29.9396	30.8949	26.9350	25.8447	22.3020	20.6661	23.7147	23.9979	27.9672	30.5284	33.1519	(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	135.9001	135.9001	135.9001	135.9001	135.9001	135.9001	135.9001	135.9001	135.9001	135.9001	135.9001	135.9001	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	22.5273	20.0086	16.2721	12.3190	9.2086	7.7743	8.4004	10.9191	14.6556	18.6087	21.7191	23.1534	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	252.6880	255.3102	248.7025	234.6357	216.8787	200.1898	189.0405	186.4184	193.0260	207.0929	224.8498	241.5388	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.5900	36.5900	36.5900	36.5900	36.5900	36.5900	36.5900	36.5900	36.5900	36.5900	36.5900	36.5900	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-108.7201	-108.7201	-108.7201	-108.7201	-108.7201	-108.7201	-108.7201	-108.7201	-108.7201	-108.7201	-108.7201	-108.7201	(71)
Water heating gains (Table 5)	46.0108	44.5529	41.5255	37.4097	34.7375	30.9751	27.7770	31.8746	33.3304	37.5904	42.4006	44.5590	(72)
Total internal gains	384.9962	383.6417	370.2701	348.1343	324.5949	302.7091	288.9880	292.9821	304.7821	327.0620	352.7395	373.0212	(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	
North					1.2600	10.6334	0.6300	0.7000	0.7700		4.0946 (74)	
East					12.3400	19.6403	0.6300	0.7000	0.7700		74.0686 (76)	
South					3.2600	46.7521	0.6300	0.7000	0.7700		46.5790 (78)	
West					7.0600	19.6403	0.6300	0.7000	0.7700		42.3764 (80)	
Solar gains	167.1186	311.9006	485.6090	678.3029	813.7313	827.3296	789.8401	688.6433	553.7982	361.8880	205.4565	139.4207 (83)
Total gains	552.1148	695.5423	855.8791	1026.4372	1138.3262	1130.0388	1078.8280	981.6254	858.5803	688.9500	558.1960	512.4420 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Thl (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	40.7698	40.8395	40.9081	41.2334	41.2949	41.5833	41.5833	41.6372	41.4717	41.2949	41.1708	41.0418	
alpha	3.7180	3.7226	3.7272	3.7489	3.7530	3.7722	3.7722	3.7758	3.7648	3.7530	3.7447	3.7361	
util living area	0.9948	0.9874	0.9667	0.9086	0.7936	0.6301	0.4817	0.5422	0.7859	0.9530	0.9900	0.9960	(86)
MIT	19.2104	19.4604	19.8589	20.3414	20.7128	20.9138	20.9759	20.9628	20.7962	20.2670	19.6372	19.1635	(87)
Th 2	19.8558	19.8575	19.8592	19.8672	19.8687	19.8756	19.8756	19.8769	19.8729	19.8687	19.8656	19.8625	(88)
util rest of house	0.9934	0.9840	0.9577	0.8838	0.7401	0.5410	0.3671	0.4236	0.7100	0.9352	0.9869	0.9950	(89)
MIT 2	18.2316	18.4811	18.8745	19.3422	19.6734	19.8331	19.8684	19.8646	19.7549	19.2843	18.6644	18.1899	(90)
Living area fraction													fLA = Living area / (4) =
MIT	18.5829	18.8326	19.2278	19.7009	20.0465	20.2210	20.2660	20.2588	20.1287	19.6371	19.0136	18.5394	(92)
Temperature adjustment													0.0000
adjusted MIT	18.5829	18.8326	19.2278	19.7009	20.0465	20.2210	20.2660	20.2588	20.1287	19.6371	19.0136	18.5394	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	0.9912	0.9800	0.9514	0.8795	0.7493	0.5699	0.4081	0.4657	0.7292	0.9306	0.9836	0.9932	(94)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

Useful gains	547.2709	681.6624	814.2798	902.7733	852.9598	644.0061	440.3116	457.1478	626.0763	641.1362	549.0364	508.9772 (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												
Month fracti	1788.8938	1742.0375	1588.7323	1337.5621	1032.0859	690.2408	450.1686	473.2323	742.2941	1117.4713	1477.6095	1784.0652 (97)
Space heating kWh	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	923.7675	712.5721	576.1926	313.0479	133.2698	0.0000	0.0000	0.0000	0.0000	354.3933	668.5726	948.6655 (98)
Space heating per m2												4630.4813 (98)
										(98) / (4) =		47.3561 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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
Heat loss rate W												
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	1154.2876	908.6945	932.0466	0.0000	0.0000	0.0000	0.0000 (100)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.8646	0.9155	0.8888	0.0000	0.0000	0.0000	0.0000 (101)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	997.9900	831.9182	828.3624	0.0000	0.0000	0.0000	0.0000 (102)
Month fracti	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000 (103a)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	307.1564	394.7556	314.2211	0.0000	0.0000	0.0000	0.0000 (104)
Space cooling												1016.1332 (104)
Cooled fraction									FC = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)	0.0000	0.0000	0.0000	0.0000	0.0000	0.2500	0.2500	0.2500	0.0000	0.0000	0.0000	0.0000 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	76.7891	98.6889	78.5553	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling												254.0333 (107)
Space cooling per m2												2.5980 (108)
Energy for space heating												47.3561 (99)
Energy for space cooling												2.5980 (108)
Total												49.9541 (109)
Dwelling Fabric Energy Efficiency (DFEE)												50.0 (109)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

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

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	48.8900 (1b)	x 2.4000 (2b)	= 117.3360 (1b) - (3b)
First floor	48.8900 (1c)	x 2.7000 (2c)	= 132.0030 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	97.7800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 249.3390 (5)

2. Ventilation rate

										main	secondary	other	total	m3 per hour			
										heating	heating						
Number of chimneys										0	+	0	+	0	=	0 * 40 =	0.0000 (6a)
Number of open flues										0	+	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)
										Air changes per hour							
Infiltration due to chimneys, flues and fans										= (6a)+(6b)+(7a)+(7b)+(7c) =					30.0000	/ (5) =	0.1203 (8)
Pressure test										Yes							
Measured/design AP50										5.0000							
Infiltration rate										0.3703 (18)							
Number of sides sheltered										3 (19)							
Shelter factor										(20) = 1 - [0.075 x (19)] =							0.7750 (20)
Infiltration rate adjusted to include shelter factor										(21) = (18) x (20) =							0.2870 (21)
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec					
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	0.3659	0.3587	0.3516	0.3157	0.3085	0.2726	0.2726	0.2655	0.2870	0.3085	0.3229	0.3372	(22b)				
Effective ac	0.5669	0.5643	0.5618	0.5498	0.5476	0.5372	0.5372	0.5352	0.5412	0.5476	0.5521	0.5569	(25)				

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K						
TER Semi-glazed door			1.8900	1.2000	2.2680			(26a)					
TER Opening Type (Uw = 1.40)			22.5300	1.3258	29.8693			(27)					
ground floor			48.8900	0.1300	6.3557			(28a)					
external wall - brick	71.5200	24.4200	47.1000	0.1800	8.4780			(29a)					
external wall brick first	75.6000		75.6000	0.1800	13.6080			(29a)					
pitch cold roof	48.8900		48.8900	0.1300	6.3557			(30)					
Total net area of external elements Aum(A, m2)			244.9000					(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	66.9347			(33)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K								250.0000 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)								12.7110 (36)					
Total fabric heat loss						(33) + (36) =		79.6457 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 46.6496	Feb 46.4357	Mar 46.2260	Apr 45.2412	May 45.0570	Jun 44.1992	Jul 44.1992	Aug 44.0404	Sep 44.5296	Oct 45.0570	Nov 45.4297	Dec 45.8194	(38)
Heat transfer coeff	126.2953	126.0814	125.8718	124.8869	124.7027	123.8449	123.8449	123.6861	124.1753	124.7027	125.0754	125.4651	(39)
Average = Sum(39)m / 12 =												124.8860	(39)
HLP	Jan 1.2916	Feb 1.2894	Mar 1.2873	Apr 1.2772	May 1.2753	Jun 1.2666	Jul 1.2666	Aug 1.2649	Sep 1.2699	Oct 1.2753	Nov 1.2792	Dec 1.2831	(40)
HLP (average)												1.2772	(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												2.7180 (42)
Average daily hot water use (litres/day)												98.7526 (43)
Daily hot water use	Jan 108.6278	Feb 104.6777	Mar 100.7276	Apr 96.7775	May 92.8274	Jun 88.8773	Jul 88.8773	Aug 92.8274	Sep 96.7775	Oct 100.7276	Nov 104.6777	Dec 108.6278 (44)
Energy conte	161.0919	140.8920	145.3879	126.7527	121.6223	104.9508	97.2523	111.5984	112.9313	131.6105	143.6632	156.0089 (45)
Energy content (annual)										Total = Sum(45)m =		1553.7622 (45)
Distribution loss (46)m = 0.15 x (45)m												
Water 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 (46)
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)

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Calculation Type: New Build (As Designed)



CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 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 (57)
Primary 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 (59)
Heat gains from water heating, kWh/month	34.2320	29.9396	30.8949	26.9350	25.8447	22.3020	20.6661	23.7147	23.9979	27.9672	30.5284	33.1519 (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	135.9001	135.9001	135.9001	135.9001	135.9001	135.9001	135.9001	135.9001	135.9001	135.9001	135.9001	135.9001	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	22.5273	20.0086	16.2721	12.3190	9.2086	7.7743	8.4004	10.9191	14.6556	18.6087	21.7191	23.1534	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	252.6880	255.3102	248.7025	234.6357	216.8787	200.1898	189.0405	186.4184	193.0260	207.0929	224.8498	241.5388	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.5900	36.5900	36.5900	36.5900	36.5900	36.5900	36.5900	36.5900	36.5900	36.5900	36.5900	36.5900	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-108.7201	-108.7201	-108.7201	-108.7201	-108.7201	-108.7201	-108.7201	-108.7201	-108.7201	-108.7201	-108.7201	-108.7201	(71)
Water heating gains (Table 5)	46.0108	44.5529	41.5255	37.4097	34.7375	30.9751	27.7770	31.8746	33.3304	37.5904	42.4006	44.5590	(72)
Total internal gains	384.9962	383.6417	370.2701	348.1343	324.5949	302.7091	288.9880	292.9821	304.7821	327.0620	352.7395	373.0212	(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	
North	1.1900	10.6334	0.6300	0.7000	0.7700	3.8671	(74)
East	11.6300	19.6403	0.6300	0.7000	0.7700	69.8070	(76)
South	3.0700	46.7521	0.6300	0.7000	0.7700	43.8643	(78)
West	6.6400	19.6403	0.6300	0.7000	0.7700	39.8554	(80)

Solar gains	157.3938	293.7516	457.3560	638.8472	766.4070	779.2189	743.9076	648.5893	521.5804	340.8311	193.5009	131.3076	(83)
Total gains	542.3900	677.3933	827.6260	986.9815	1091.0019	1081.9280	1032.8956	941.5715	826.3625	667.8931	546.2404	504.3289	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Thl (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	53.7651	53.8563	53.9460	54.3714	54.4517	54.8289	54.8289	54.8993	54.6830	54.4517	54.2895	54.1208	
alpha	4.5843	4.5904	4.5964	4.6248	4.6301	4.6553	4.6553	4.6600	4.6455	4.6301	4.6193	4.6081	
util living area	0.9985	0.9957	0.9854	0.9468	0.8465	0.6770	0.5145	0.5800	0.8374	0.9770	0.9967	0.9990	(86)
MIT	19.5323	19.7304	20.0540	20.4587	20.7782	20.9434	20.9873	20.9785	20.8451	20.3949	19.8795	19.4958	(87)
Th 2	19.8474	19.8491	19.8508	19.8587	19.8602	19.8671	19.8671	19.8684	19.8645	19.8602	19.8572	19.8541	(88)
util rest of house	0.9980	0.9941	0.9801	0.9269	0.7926	0.5788	0.3887	0.4492	0.7592	0.9650	0.9953	0.9986	(89)
MIT 2	18.5157	18.7144	19.0362	19.4327	19.7166	19.8426	19.8642	19.8627	19.7813	19.3810	18.8701	18.4846	(90)
Living area fraction									fLA = Living area / (4) =			0.3590	(91)
MIT	18.8806	19.0791	19.4015	19.8010	20.0977	20.2378	20.2673	20.2632	20.1632	19.7450	19.2324	18.8476	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.8806	19.0791	19.4015	19.8010	20.0977	20.2378	20.2673	20.2632	20.1632	19.7450	19.2324	18.8476	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9974	0.9927	0.9773	0.9257	0.8051	0.6128	0.4343	0.4967	0.7825	0.9634	0.9943	0.9981	(94)
Ext temp.	540.9786	672.4815	808.8792	913.6294	878.4049	663.0197	448.5743	467.6331	646.6592	643.4505	543.1126	503.3828	(95)
Heat loss rate W	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)
Month fracti	1841.4639	1787.7226	1623.9363	1361.3938	1047.2186	698.2095	454.1809	477.8286	752.8965	1140.4037	1517.4662	1837.7609	(97)
Space heating kWh	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 per m2	967.5611	749.4420	606.4025	322.3904	125.5974	0.0000	0.0000	0.0000	0.0000	369.7332	701.5345	992.7773	(98)
										(98) / (4) =		4835.4384	(98)
												49.4522	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
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	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	1164.1422	916.4524	940.0141	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8826	0.9342	0.9082	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	1027.4881	856.1202	853.6870	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1368.3628	1308.8165	1203.8863	0.0000	0.0000	0.0000	0.0000	(103)
Month fracti	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	(103a)
Space cooling kWh													

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CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

	0.0000	0.0000	0.0000	0.0000	0.0000	245.4298	336.8060	260.5482	0.0000	0.0000	0.0000	0.0000 (104)
Space cooling												842.7841 (104)
Cooled fraction									FC = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.2500	0.2500	0.2500	0.0000	0.0000	0.0000	0.0000 (106)
Space cooling kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	61.3574	84.2015	65.1371	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling												210.6960 (107)
Space cooling per m2												2.1548 (108)
Energy for space heating												49.4522 (99)
Energy for space cooling												2.1548 (108)
Total												51.6070 (109)
Target Fabric Energy Efficiency (TFEE)												59.3 (109)

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)



Property Reference	4227-135F	Issued on Date	06/10/2022
Assessment Reference	As Designed Final	Prop Type Ref	Type C1 - Detached
Property	Plot 135, Grasmere Gardens, Chestfield, Kent		
SAP Rating	96 A	DER	5.00
Environmental	97 A	TER	18.64
CO ₂ Emissions (t/year)	0.14	% DER<TER	73.18
General Requirements Compliance	Pass	DFEE	49.95
		TFEE	59.35
		% DFEE<TFEE	15.83
Assessor Details	Mr. Sean Wells, Energytest, Tel: 01892577562, swells@energy-test.co.uk		Assessor ID
Client			T220-0001

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)	18.64	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	5.00	kgCO ₂ /m ²	Pass
	-13.64 (-73.2%)	kgCO ₂ /m ²	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	59.35	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	49.95	kWh/m ² /yr	
	-9.3 (-15.7%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.20 (max. 0.30)	0.20 (max. 0.70)	Pass
Party wall	0.00 (max. 0.20)	-	Pass
Floor	0.12 (max. 0.25)	0.12 (max. 0.70)	Pass
Roof	0.11 (max. 0.20)	0.11 (max. 0.35)	Pass
Openings	1.41 (max. 2.00)	1.60 (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	5.00 (design value)	
Maximum	10.0	Pass

Limiting System Efficiencies

4 Heating efficiency

Main heating system	Boiler system with radiators or underfloor - Mains gas Data from database Vaillant ecoFIT sustain 830 VUW 306/6-3 (H-GB) Combi boiler Efficiency: 89.3% SEDBUK2009 Minimum: 88.0%	Pass
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BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)



Secondary heating system

None

5 Cylinder insulation

Hot water storage

No cylinder

6 Controls

Space heating controls

Time and temperature zone control

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 (Thames Valley)

Not significant

Pass

Based on:

Overshading

Average

Windows facing North

1.26 m², No overhang

Windows facing East

12.34 m², No overhang

Windows facing South

3.26 m², No overhang

Windows facing West

7.06 m², No overhang

Air change rate

8.00 ach

Blinds/curtains

Light-coloured curtain or roller blind, closed 100% of daylight hours

Criterion 4 – Building performance consistent with DER and DFEE rate

Party Walls

Type

U-value

W/m²K

Pass

Air permeability and pressure testing

3 Air permeability

Air permeability at 50 pascals

5.00 (design value)

Maximum

10.0

Pass

10 Key features

Party wall U-value

0.00

W/m²K

Roof U-value

0.11

W/m²K

Floor U-value

0.12

W/m²K

Thermal bridging y-value

0.034

W/m²K

Photovoltaic array

2.68

kW

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