PREDICTED ENERGY ASSESSMENT

energytest

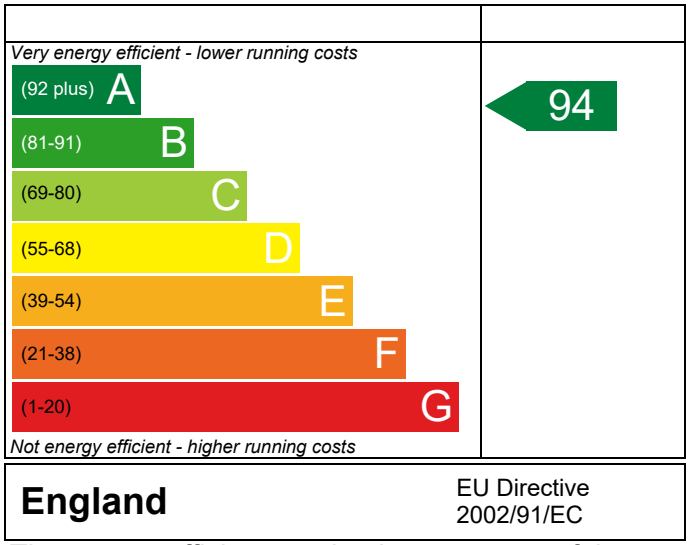
Plot 137, Grasmere Gardens,
Chestfield,
Kent

Dwelling type:	House, Semi-Detached
Date of assessment:	06/10/2022
Produced by:	Sean Wells
Total floor area:	94.62 m²
DRRN:	0202-1506-6951

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 (CO_2) emissions.

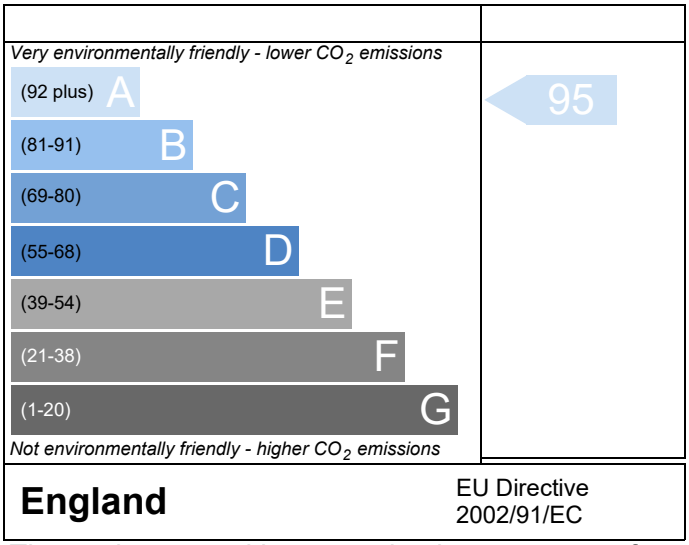
Energy Efficiency Rating



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 (CO_2) 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 (CO_2) 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.

elmhurst energy APPROVED ENERGY ASSESSOR

ELMHURST ENERGY QUALITY PROMISE ACCREDITED MEMBER

Regs Region: England
Elmhurst Energy Systems SAP2012 Calculator (Design System) version 4.14r19

FULL SAP CALCULATION PRINTOUT
Calculation Type: New Build (As Designed)

Property Reference	4227-137F	**Issued on Date**	06/10/2022
Assessment Reference	As Designed Final	**Prop Type Ref**	Type C3 - C3/C3 Adj
Property	Plot 137, Grasmere Gardens, Chestfield, Kent		

SAP Rating	94 A	**DER**	7.48	**TER**	17.72
Environmental	95 A	**% DER<TER**	57.80		
CO_2 Emissions (t/year)	0.37	**DFEE**	44.62	**TFEE**	53.28
General Requirements Compliance	Pass	**% DFEE<TFEE**	16.24		

Assessor Details	Mr. Sean Wells, Energytest, Tel: 01892577562, swells@energy-test.co.uk	**Assessor ID**	T220-0001
Client			

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

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

DWELLING AS DESIGNED

Semi-Detached House, total floor area 95 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) 17.72 kgCO□/m²
Dwelling Carbon Dioxide Emission Rate (DER) 7.48 kgCO□/m²OK

1b TFEE and DFEE
Target Fabric Energy Efficiency (TFEE)53.3 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)44.6 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.19 (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	1.42 (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 East: 11.49 m², No overhang
Windows facing South: 1.26 m², No overhang
Windows facing West: 5.94 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
Photovoltaic array 2.35 kW

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 (m2)		Storey height (m)		Volume (m3)	
Ground floor	47.3100	(1b)	x 2.4000	(2b) =	113.5440	(1b) - (3b)
First floor	47.3100	(1c)	x 2.7000	(2c) =	127.7370	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	94.6200					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		241.2810	(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							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) =	0.1658	(8)
Pressure test		Yes	
Measured/design AP50		5.0000	
Infiltration rate		0.4158	(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) =	0.3534	(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	0.4506	0.4418	0.4329	0.3888	0.3799	0.3357	0.3357	0.3269	0.3534	0.3799	0.3976	0.4153	(22b)
Effective ac	0.6015	0.5976	0.5937	0.5756	0.5722	0.5564	0.5564	0.5534	0.5625	0.5722	0.5790	0.5862	(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)			18.6900	1.3258	24.7784			(27)
external door			1.8900	1.6000	3.0240			(26a)
ground floor			47.3100	0.1200	5.6772			(28a)
external wall - brick	47.2800	11.6700	35.6100	0.2000	7.1220			(29a)
external wall - weatherboard	53.1900	8.9100	44.2800	0.1800	7.9704			(29a)
pitch cold roof	47.3100		47.3100	0.1100	5.2041			(30)
Total net area of external elements Aum(A, m2)			195.0900					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	53.7761			(33)
Party Wall 1			42.3300	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	184.0000	(35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)	8.1661	(36)
Total fabric heat loss (33) + (36) =	61.9422	(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	47.8948	47.5809	47.2732	45.8281	45.5577	44.2991	44.2991	44.0660	44.7839	45.5577	46.1047	46.6765	(38)
Heat transfer coeff	109.8370	109.5231	109.2155	107.7703	107.4999	106.2413	106.2413	106.0082	106.7261	107.4999	108.0469	108.6187	(39)
Average = Sum(39)m / 12 =												107.7690	(39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1608	1.1575	1.1543	1.1390	1.1361	1.1228	1.1228	1.1204	1.1279	1.1361	1.1419	1.1479	(40)
HLP (average)												1.1390	(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	2.6838 (42)
Average daily hot water use (litres/day)	97.9410 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	107.7351	103.8174	99.8998	95.9821	92.0645	88.1469	88.1469	92.0645	95.9821	99.8998	103.8174	107.7351	(44)
Energy conte	159.7680	139.7341	144.1931	125.7110	120.6227	104.0882	96.4530	110.6813	112.0032	130.5289	142.4825	154.7268	(45)
Energy content (annual)										Total = Sum(45)m =		1540.9927	(45)
Distribution loss (46)m = 0.15 x (45)m	23.9652	20.9601	21.6290	18.8567	18.0934	15.6132	14.4680	16.6022	16.8005	19.5793	21.3724	23.2090	(46)
Water storage loss:													
Total storage loss													

CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

	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	1.7049	1.5513	1.6566	1.3876	1.2771	1.0551	0.9777	1.1718	1.2363	1.4996	1.5819	1.6511	(61)
Total heat required for water heating calculated for each month													
	161.4729	141.2854	145.8496	127.0986	121.8998	105.1434	97.4308	111.8531	113.2394	132.0285	144.0643	156.3779	(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)
								Solar input (sum of months) = Sum(63)m =				0.0000	(63)
Output from w/h													
	161.4729	141.2854	145.8496	127.0986	121.8998	105.1434	97.4308	111.8531	113.2394	132.0285	144.0643	156.3779	(64)
								Total per year (kWh/year) = Sum(64)m =				1557.7437	(64)
Heat gains from water heating, kWh/month													
	53.5491	46.8494	48.3583	42.1458	40.4263	34.8731	32.3151	37.0945	37.5501	43.7757	47.7709	51.8594	(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	134.1915	134.1915	134.1915	134.1915	134.1915	134.1915	134.1915	134.1915	134.1915	134.1915	134.1915	134.1915	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	22.2345	19.7485	16.0605	12.1589	9.0889	7.6732	8.2912	10.7772	14.4651	18.3668	21.4368	22.8525	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	247.3255	249.8920	243.4246	229.6562	212.2762	195.9413	185.0287	182.4622	188.9296	202.6980	220.0780	236.4129	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	36.4191	36.4191	36.4191	36.4191	36.4191	36.4191	36.4191	36.4191	36.4191	36.4191	36.4191	36.4191	(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)													
	-107.3532	-107.3532	-107.3532	-107.3532	-107.3532	-107.3532	-107.3532	-107.3532	-107.3532	-107.3532	-107.3532	-107.3532	(71)
Water heating gains (Table 5)													
	71.9746	69.7164	64.9978	58.5358	54.3365	48.4349	43.4342	49.8582	52.1529	58.8384	66.3485	69.7035	(72)
Total internal gains													
	407.7920	405.6143	390.7403	366.6084	341.9590	318.3069	303.0116	309.3551	321.8052	346.1606	374.1207	395.2263	(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	11.4900	19.6403	0.6300	0.7000	0.7700	68.9667	(76)
South	1.2600	46.7521	0.6300	0.7000	0.7700	18.0029	(78)
West	5.9400	19.6403	0.6300	0.7000	0.7700	35.6538	(80)

Solar gains	122.6234	234.1439	374.6031	534.0090	646.6598	659.2593	628.7068	544.7145	431.2312	274.6475	151.7890	101.5909	(83)
Total gains	530.4154	639.7582	765.3434	900.6174	988.6188	977.5662	931.7183	854.0696	753.0364	620.8081	525.9097	496.8172	(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	44.0301	44.1563	44.2807	44.8744	44.9873	45.5203	45.5203	45.6204	45.3135	44.9873	44.7596	44.5239	
alpha	3.9353	3.9438	3.9520	3.9916	3.9992	4.0347	4.0347	4.0414	4.0209	3.9992	3.9840	3.9683	
util living area													
	0.9946	0.9882	0.9700	0.9162	0.8044	0.6372	0.4858	0.5439	0.7918	0.9553	0.9900	0.9958	(86)
MIT	19.3650	19.5837	19.9458	20.3978	20.7427	20.9280	20.9812	20.9708	20.8233	20.3395	19.7669	19.3309	(87)
Th 2	19.9515	19.9541	19.9568	19.9691	19.9714	19.9822	19.9822	19.9842	19.9781	19.9714	19.9668	19.9619	(88)
util rest of house													
	0.9932	0.9852	0.9621	0.8942	0.7555	0.5550	0.3806	0.4354	0.7219	0.9392	0.9870	0.9948	(89)
MIT 2	17.7665	18.0863	18.6109	19.2552	19.7092	19.9282	19.9734	19.9692	19.8235	19.1893	18.3633	17.7235	(90)
Living area fraction									fLA = Living area / (4) =			0.3710	(91)
MIT	18.3595	18.6417	19.1061	19.6791	20.0926	20.2991	20.3473	20.3408	20.1944	19.6160	18.8840	18.3197	(92)
Temperature adjustment												-0.1500	
adjusted MIT	18.2095	18.4917	18.9561	19.5291	19.9426	20.1491	20.1973	20.1908	20.0444	19.4660	18.7340	18.1697	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9898	0.9793	0.9522	0.8829	0.7540	0.5693	0.4035	0.4584	0.7270	0.9289	0.9817	0.9920	(94)
Useful gains	524.9992	626.5037	728.7494	795.1551	745.3788	556.5408	375.9222	391.5133	547.4943	576.6551	516.2808	492.8229	(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													
	1527.7726	1488.6103	1360.3953	1145.4987	886.0765	589.5423	382.1797	401.8526	634.4209	953.0937	1257.0171	1517.3757	(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													
	746.0634	579.3356	469.9445	252.2474	104.6791	0.0000	0.0000	0.0000	0.0000	280.0703	533.3301	762.2673	(98)
Space heating												3727.9378	(98)
Space heating per m2											(98) / (4) =	39.3990	(99)

8c. Space cooling requirement

Not applicable

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												4132.9687	(211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement													
	746.0634	579.3356	469.9445	252.2474	104.6791	0.0000	0.0000	0.0000	0.0000	280.0703	533.3301	762.2673	(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)													
	827.1213	642.2790	521.0028	279.6534	116.0522	0.0000	0.0000	0.0000	0.0000	310.4992	591.2751	845.0857	(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													
Water heating requirement													
	161.4729	141.2854	145.8496	127.0986	121.8998	105.1434	97.4308	111.8531	113.2394	132.0285	144.0643	156.3779	(64)
Efficiency of water heater												76.2000	(216)
(217)m	87.3447	87.0638	86.4386	84.9695	82.0862	76.2000	76.2000	76.2000	76.2000	85.1857	86.8081	87.4645	(217)
Fuel for water heating, kWh/month													
	184.8685	162.2780	168.7321	149.5814	148.5022	137.9834	127.8619	146.7888	148.6082	154.9889	165.9573	178.7900	(219)
Water heating fuel used												1874.9408	(219)
Annual totals kWh/year													
Space heating fuel - main system												4132.9687	(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)												392.6681	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV Unit 0 (0.80 * 2.35 * 853 * 1.00) =											-1603.6963	-1603.6963	(233)
Total delivered energy for all uses												4871.8814	(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	4132.9687	0.2160	892.7212	(261)
Space heating - secondary	0.0000	0.0000	0.0000	(263)
Water heating (other fuel)	1874.9408	0.2160	404.9872	(264)
Space and water heating			1297.7085	(265)
Pumps and fans	75.0000	0.5190	38.9250	(267)
Energy for lighting	392.6681	0.5190	203.7947	(268)
Energy saving/generation technologies				
PV Unit	-1603.6963	0.5190	-832.3184	(269)
Total CO2, kg/year			708.1099	(272)
Dwelling Carbon Dioxide Emission Rate (DER)			7.4800	(273)

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

DER		7.4800	ZC1
Total Floor Area	TFA	94.6200	
Assumed number of occupants	N	2.6838	
CO2 emission factor in Table 12 for electricity displaced from grid	EF	0.5190	
CO2 emissions from appliances, equation (L14)		15.4893	ZC2
CO2 emissions from cooking, equation (L16)		1.9384	ZC3
Total CO2 emissions		24.9077	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		24.9077	ZC8

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 (m2)		Storey height (m)		Volume (m3)	
Ground floor	47.3100	(1b)	x 2.4000	(2b) =	113.5440	(1b) - (3b)
First floor	47.3100	(1c)	x 2.7000	(2c) =	127.7370	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	94.6200					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		241.2810	(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) =	0.1243	(8)
Pressure test		Yes	
Measured/design AP50		5.0000	
Infiltration rate		0.3743	(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) =	0.3182	(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	0.4057	0.3977	0.3898	0.3500	0.3420	0.3023	0.3023	0.2943	0.3182	0.3420	0.3580	0.3739	(22b)
Effective ac	0.5823	0.5791	0.5760	0.5613	0.5585	0.5457	0.5457	0.5433	0.5506	0.5585	0.5641	0.5699	(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)			18.6900	1.3258	24.7784			(27)
ground floor			47.3100	0.1300	6.1503			(28a)
external wall - brick	47.2800	11.6700	35.6100	0.1800	6.4098			(29a)
external wall - weatherboard	53.1900	8.9100	44.2800	0.1800	7.9704			(29a)
pitch cold roof	47.3100		47.3100	0.1300	6.1503			(30)
Total net area of external elements Aum(A, m2)			195.0900					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	53.7272			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	250.0000	(35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)	10.4040	(36)
Total fabric heat loss (33) + (36) =	64.1312	(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	46.3636	46.1092	45.8598	44.6884	44.4692	43.4490	43.4490	43.2600	43.8420	44.4692	44.9126	45.3761	(38)
Heat transfer coeff	110.4948	110.2404	109.9910	108.8196	108.6004	107.5802	107.5802	107.3913	107.9732	108.6004	109.0438	109.5073	(39)
Average = Sum(39)m / 12 =												108.8185	(39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1678	1.1651	1.1624	1.1501	1.1478	1.1370	1.1370	1.1350	1.1411	1.1478	1.1524	1.1573	(40)
HLP (average)												1.1501	(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	2.6838 (42)
Average daily hot water use (litres/day)	97.9410 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	107.7351	103.8174	99.8998	95.9821	92.0645	88.1469	88.1469	92.0645	95.9821	99.8998	103.8174	107.7351	(44)
Energy conte	159.7680	139.7341	144.1931	125.7110	120.6227	104.0882	96.4530	110.6813	112.0032	130.5289	142.4825	154.7268	(45)
Energy content (annual)										Total = Sum(45)m =		1540.9927	(45)
Distribution loss (46)m = 0.15 x (45)m	23.9652	20.9601	21.6290	18.8567	18.0934	15.6132	14.4680	16.6022	16.8005	19.5793	21.3724	23.2090	(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)

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	(57)
Combi loss	50.9589	46.0274	50.9078	47.3337	46.9151	43.4697	44.9187	46.9151	47.3337	50.9078	49.3151	50.9589 (61)
Total heat required for water heating calculated for each month												
	210.7269	185.7615	195.1009	173.0447	167.5378	147.5579	141.3717	157.5963	159.3368	181.4367	191.7976	205.6857 (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)
								Solar input (sum of months) = Sum(63)m =				0.0000 (63)
Output from w/h												
	210.7269	185.7615	195.1009	173.0447	167.5378	147.5579	141.3717	157.5963	159.3368	181.4367	191.7976	205.6857 (64)
								Total per year (kWh/year) = Sum(64)m =				2116.9544 (64)
Heat gains from water heating, kWh/month												
	65.8626	57.9684	60.6712	53.6323	51.8358	45.4768	43.3003	48.5303	49.0745	56.1278	59.7042	64.1864 (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	134.1915	134.1915	134.1915	134.1915	134.1915	134.1915	134.1915	134.1915	134.1915	134.1915	134.1915	134.1915	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	22.2345	19.7485	16.0605	12.1589	9.0889	7.6732	8.2912	10.7772	14.4651	18.3668	21.4368	22.8525	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	247.3255	249.8920	243.4246	229.6562	212.2762	195.9413	185.0287	182.4622	188.9296	202.6980	220.0780	236.4129	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	36.4191	36.4191	36.4191	36.4191	36.4191	36.4191	36.4191	36.4191	36.4191	36.4191	36.4191	36.4191	(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)													
	-107.3532	-107.3532	-107.3532	-107.3532	-107.3532	-107.3532	-107.3532	-107.3532	-107.3532	-107.3532	-107.3532	-107.3532	(71)
Water heating gains (Table 5)													
	88.5250	86.2626	81.5472	74.4893	69.6718	63.1622	58.1993	65.2289	68.1590	75.4406	82.9225	86.2720	(72)
Total internal gains													
	424.3424	422.1605	407.2898	382.5619	357.2943	333.0342	317.7767	324.7258	337.8112	362.7629	390.6948	411.7948	(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	11.4900	19.6403	0.6300	0.7000	0.7700	68.9667	(76)
South	1.2600	46.7521	0.6300	0.7000	0.7700	18.0029	(78)
West	5.9400	19.6403	0.6300	0.7000	0.7700	35.6538	(80)

Solar gains	122.6234	234.1439	374.6031	534.0090	646.6598	659.2593	628.7068	544.7145	431.2312	274.6475	151.7890	101.5909 (83)
Total gains	546.9658	656.3044	781.8929	916.5709	1003.9541	992.2934	946.4834	869.4403	769.0424	637.4103	542.4838	513.3857 (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	59.4673	59.6046	59.7397	60.3828	60.5047	61.0785	61.0785	61.1859	60.8562	60.5047	60.2587	60.0036	
alpha	4.9645	4.9736	4.9826	5.0255	5.0336	5.0719	5.0719	5.0791	5.0571	5.0336	5.0172	5.0002	
util living area													
	0.9983	0.9955	0.9852	0.9445	0.8368	0.6565	0.4926	0.5538	0.8214	0.9747	0.9963	0.9988	(86)
MIT	19.7146	19.8899	20.1834	20.5524	20.8313	20.9631	20.9929	20.9876	20.8873	20.4954	20.0324	19.6847	(87)
Th 2	19.9459	19.9480	19.9502	19.9602	19.9620	19.9708	19.9708	19.9724	19.9674	19.9620	19.9582	19.9543	(88)
util rest of house													
	0.9977	0.9940	0.9799	0.9248	0.7841	0.5660	0.3813	0.4374	0.7450	0.9622	0.9948	0.9984	(89)
MIT 2	18.2315	18.4888	18.9157	19.4427	19.8020	19.9472	19.9682	19.9674	19.8791	19.3753	18.7050	18.1937	(90)
Living area fraction									fLA = Living area / (4) =			0.3710	(91)
MIT	18.7817	19.0085	19.3859	19.8543	20.1838	20.3241	20.3483	20.3459	20.2531	19.7908	19.1974	18.7468	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.7817	19.0085	19.3859	19.8543	20.1838	20.3241	20.3483	20.3459	20.2531	19.7908	19.1974	18.7468	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9968	0.9920	0.9762	0.9224	0.7965	0.5984	0.4228	0.4808	0.7684	0.9595	0.9931	0.9976	(94)
Useful gains	545.2177	651.0821	763.2655	845.4190	799.6510	593.8043	400.1740	418.0353	590.9616	611.5853	538.7666	512.1750	(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													
	1600.1528	1555.3290	1417.3376	1192.0476	921.3472	615.7986	403.2468	423.7516	664.3715	998.1280	1319.1475	1592.9810	(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													
	784.8717	607.6539	486.6296	249.5726	90.5420	0.0000	0.0000	0.0000	0.0000	287.5878	561.8742	804.1196	(98)
Space heating												3872.8515	(98)
Space heating per m2											(98) / (4) =	40.9306	(99)

8c. Space cooling requirement

Not applicable

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												4146.5220	(211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement													
	784.8717	607.6539	486.6296	249.5726	90.5420	0.0000	0.0000	0.0000	0.0000	287.5878	561.8742	804.1196	(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)													
	840.3337	650.5931	521.0167	267.2084	96.9401	0.0000	0.0000	0.0000	0.0000	307.9098	601.5784	860.9418	(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													
Water heating requirement													
	210.7269	185.7615	195.1009	173.0447	167.5378	147.5579	141.3717	157.5963	159.3368	181.4367	191.7976	205.6857	(64)
Efficiency of water heater												80.3000	(216)
(217)m	88.0558	87.8140	87.2590	85.9723	83.5759	80.3000	80.3000	80.3000	80.3000	86.2056	87.5962	88.1418	(217)
Fuel for water heating, kWh/month													
	239.3107	211.5397	223.5882	201.2795	200.4618	183.7583	176.0544	196.2594	198.4269	210.4698	218.9566	233.3576	(219)
Water heating fuel used												2493.4628	(219)
Annual totals kWh/year													
Space heating fuel - main system												4146.5220	(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)												392.6681	(232)
Total delivered energy for all uses												7107.6529	(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	4146.5220	0.2160	895.6487	(261)
Space heating - secondary	0.0000	0.0000	0.0000	(263)
Water heating (other fuel)	2493.4628	0.2160	538.5880	(264)
Space and water heating			1434.2367	(265)
Pumps and fans	75.0000	0.5190	38.9250	(267)
Energy for lighting	392.6681	0.5190	203.7947	(268)
Total CO2, kg/m2/year			1676.9565	(272)
Emissions per m2 for space and water heating			15.1579	(272a)
Fuel factor (mains gas)			1.0000	
Emissions per m2 for lighting			2.1538	(272b)
Emissions per m2 for pumps and fans			0.4114	(272c)
Target Carbon Dioxide Emission Rate (TER) = (15.1579 * 1.00) + 2.1538 + 0.4114, rounded to 2 d.p.			17.7200	(273)

FULL SAP CALCULATION PRINTOUT
Calculation Type: New Build (As Designed)

energytest

Property Reference	4227-137F	**Issued on Date**	06/10/2022
Assessment Reference	As Designed Final	**Prop Type Ref**	Type C3 - C3/C3 Adj
Property	Plot 137, Grasmere Gardens, Chestfield, Kent		

SAP Rating	94 A	**DER**	7.48	**TER**	17.72
Environmental	95 A	**% DER<TER**	57.80		
CO_2 Emissions (t/year)	0.37	**DFEE**	44.62	**TFEE**	53.28
General Requirements Compliance	Pass	**% DFEE<TFEE**	16.24		

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 (m2)		Storey height (m)		Volume (m3)	
Ground floor	47.3100	(1b)	x 2.4000	(2b) =	113.5440	(1b) - (3b)
First floor	47.3100	(1c)	x 2.7000	(2c) =	127.7370	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	94.6200					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		241.2810	(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) =	0.1243	(8)
Pressure test			Yes	
Measured/design AP50			5.0000	
Infiltration rate			0.3743	(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) =	0.3182	(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	0.4057	0.3977	0.3898	0.3500	0.3420	0.3023	0.3023	0.2943	0.3182	0.3420	0.3580	0.3739	(22b)
Effective ac	0.5823	0.5791	0.5760	0.5613	0.5585	0.5457	0.5457	0.5433	0.5506	0.5585	0.5641	0.5699	(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)			18.6900	1.3258	24.7784			(27)
external door			1.8900	1.6000	3.0240			(26a)
ground floor			47.3100	0.1200	5.6772			(28a)
external wall - brick	47.2800	11.6700	35.6100	0.2000	7.1220			(29a)
external wall - weatherboard	53.1900	8.9100	44.2800	0.1800	7.9704			(29a)
pitch cold roof	47.3100		47.3100	0.1100	5.2041			(30)
Total net area of external elements Aum(A, m2)			195.0900					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		53.7761			(33)
Party Wall 1			42.3300	0.0000	0.0000			(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							184.0000	(35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							8.1661	(36)
Total fabric heat loss					(33) + (36) =		61.9422	(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	46.3636	46.1092	45.8598	44.6884	44.4692	43.4490	43.4490	43.2600	43.8420	44.4692	44.9126	45.3761	(38)
Heat transfer coeff	108.3058	108.0514	107.8020	106.6306	106.4114	105.3912	105.3912	105.2023	105.7842	106.4114	106.8548	107.3183	(39)
Average = Sum(39)m / 12 =												106.6295	(39)

CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1446	1.1420	1.1393	1.1269	1.1246	1.1138	1.1138	1.1118	1.1180	1.1246	1.1293	1.1342	(40)
HLP (average)												1.1269	(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 2.6838 (42)

Average daily hot water use (litres/day) 97.9410 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	107.7351	103.8174	99.8998	95.9821	92.0645	88.1469	88.1469	92.0645	95.9821	99.8998	103.8174	107.7351	(44)
Energy conte	159.7680	139.7341	144.1931	125.7110	120.6227	104.0882	96.4530	110.6813	112.0032	130.5289	142.4825	154.7268	(45)
Energy content (annual)										Total = Sum(45)m =		1540.9927	(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	33.9507	29.6935	30.6410	26.7136	25.6323	22.1187	20.4963	23.5198	23.8007	27.7374	30.2775	32.8794	(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	134.1915	134.1915	134.1915	134.1915	134.1915	134.1915	134.1915	134.1915	134.1915	134.1915	134.1915	134.1915	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	22.2345	19.7485	16.0605	12.1589	9.0889	7.6732	8.2912	10.7772	14.4651	18.3668	21.4368	22.8525	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	247.3255	249.8920	243.4246	229.6562	212.2762	195.9413	185.0287	182.4622	188.9296	202.6980	220.0780	236.4129	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.4191	36.4191	36.4191	36.4191	36.4191	36.4191	36.4191	36.4191	36.4191	36.4191	36.4191	36.4191	(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)	-107.3532	-107.3532	-107.3532	-107.3532	-107.3532	-107.3532	-107.3532	-107.3532	-107.3532	-107.3532	-107.3532	-107.3532	(71)
Water heating gains (Table 5)	45.6327	44.1867	41.1842	37.1022	34.4520	30.7205	27.5488	31.6126	33.0565	37.2814	42.0521	44.1928	(72)
Total internal gains	378.4501	377.0847	363.9267	342.1747	319.0746	297.5925	284.1261	288.1095	299.7087	321.6037	346.8244	366.7156	(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	11.4900	19.6403	0.6300	0.7000	0.7700	68.9667	(76)
South	1.2600	46.7521	0.6300	0.7000	0.7700	18.0029	(78)
West	5.9400	19.6403	0.6300	0.7000	0.7700	35.6538	(80)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Solar gains	122.6234	234.1439	374.6031	534.0090	646.6598	659.2593	628.7068	544.7145	431.2312	274.6475	151.7890	101.5909	(83)
Total gains	501.0735	611.2286	738.5298	876.1837	965.7344	956.8518	912.8329	832.8240	730.9399	596.2512	498.6134	468.3065	(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	44.6526	44.7577	44.8613	45.3541	45.4475	45.8875	45.8875	45.9699	45.7170	45.4475	45.2589	45.0634	
alpha	3.9768	3.9838	3.9908	4.0236	4.0298	4.0592	4.0592	4.0647	4.0478	4.0298	4.0173	4.0042	
util living area	0.9956	0.9899	0.9729	0.9211	0.8109	0.6443	0.4915	0.5524	0.8013	0.9601	0.9917	0.9966	(86)
MIT	19.3550	19.5742	19.9379	20.3907	20.7394	20.9266	20.9809	20.9698	20.8178	20.3259	19.7512	19.3178	(87)
Th 2	19.9645	19.9667	19.9689	19.9789	19.9808	19.9895	19.9895	19.9912	19.9862	19.9808	19.9770	19.9730	(88)
util rest of house	0.9945	0.9873	0.9657	0.9001	0.7629	0.5623	0.3860	0.4435	0.7330	0.9454	0.9891	0.9958	(89)
MIT 2	18.4597	18.6792	19.0399	19.4837	19.7986	19.9517	19.9834	19.9805	19.8764	19.4326	18.8644	18.4291	(90)
Living area fraction										fLA = Living area / (4) =		0.3710	(91)
MIT	18.7918	19.0112	19.3731	19.8202	20.1476	20.3133	20.3534	20.3475	20.2256	19.7640	19.1934	18.7587	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.7918	19.0112	19.3731	19.8202	20.1476	20.3133	20.3534	20.3475	20.2256	19.7640	19.1934	18.7587	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9927	0.9841	0.9606	0.8963	0.7715	0.5899	0.4250	0.4834	0.7509	0.9416	0.9865	0.9944	(94)

CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

Useful gains	497.4228	601.5290	709.4040	785.3549	745.0425	564.4592	387.9440	402.6042	548.8665	561.4057	491.8796	465.6668 (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												
	1569.5447	1524.7382	1387.7404	1164.4230	898.9175	602.1354	395.5787	415.2839	647.9924	975.1507	1292.2333	1562.4200 (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												
	797.6587	620.3966	504.6823	272.9290	114.4831	0.0000	0.0000	0.0000	0.0000	307.8263	576.2546	815.9844 (98)
Space heating												4010.2150 (98)
Space heating per m2											(98) / (4) =	42.3823 (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	990.6771	779.8948	799.5371	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8761	0.9257	0.9010	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	867.9674	721.9366	720.3597	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1220.3795	1166.7544	1075.0300	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													
	0.0000	0.0000	0.0000	0.0000	0.0000	253.7367	330.9445	263.8747	0.0000	0.0000	0.0000	0.0000	(104)
Space cooling												848.5559	(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	63.4342	82.7361	65.9687	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling												212.1390	(107)
Space cooling per m2												2.2420	(108)
Energy for space heating												42.3823	(99)
Energy for space cooling												2.2420	(108)
Total												44.6243	(109)
Dwelling Fabric Energy Efficiency (DFEE)												44.6	(109)

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 (m2)		Storey height (m)		Volume (m3)	
Ground floor	47.3100	(1b)	x 2.4000	(2b) =	113.5440	(1b) - (3b)
First floor	47.3100	(1c)	x 2.7000	(2c) =	127.7370	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	94.6200					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	241.2810	(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) =	0.1243	(8)
Pressure test		Yes	
Measured/design AP50		5.0000	
Infiltration rate		0.3743	(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) =	0.3182	(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	0.4057	0.3977	0.3898	0.3500	0.3420	0.3023	0.3023	0.2943	0.3182	0.3420	0.3580	0.3739	(22b)
Effective ac	0.5823	0.5791	0.5760	0.5613	0.5585	0.5457	0.5457	0.5433	0.5506	0.5585	0.5641	0.5699	(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)			18.6900	1.3258	24.7784			(27)
ground floor			47.3100	0.1300	6.1503			(28a)
external wall - brick	47.2800	11.6700	35.6100	0.1800	6.4098			(29a)
external wall - weatherboard	53.1900	8.9100	44.2800	0.1800	7.9704			(29a)
pitch cold roof	47.3100		47.3100	0.1300	6.1503			(30)
Total net area of external elements Aum(A, m2)			195.0900					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	53.7272			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	250.0000	(35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)	10.4040	(36)
Total fabric heat loss (33) + (36) =	64.1312	(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	46.3636	46.1092	45.8598	44.6884	44.4692	43.4490	43.4490	43.2600	43.8420	44.4692	44.9126	45.3761	(38)
Heat transfer coeff	110.4948	110.2404	109.9910	108.8196	108.6004	107.5802	107.5802	107.3913	107.9732	108.6004	109.0438	109.5073	(39)
Average = Sum(39)m / 12 =												108.8185	(39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1678	1.1651	1.1624	1.1501	1.1478	1.1370	1.1370	1.1350	1.1411	1.1478	1.1524	1.1573	(40)
HLP (average)												1.1501	(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	2.6838 (42)
Average daily hot water use (litres/day)	97.9410 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	107.7351	103.8174	99.8998	95.9821	92.0645	88.1469	88.1469	92.0645	95.9821	99.8998	103.8174	107.7351	(44)
Energy conte	159.7680	139.7341	144.1931	125.7110	120.6227	104.0882	96.4530	110.6813	112.0032	130.5289	142.4825	154.7268	(45)
Energy content (annual)										Total = Sum(45)m =		1540.9927	(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)

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													
	33.9507	29.6935	30.6410	26.7136	25.6323	22.1187	20.4963	23.5198	23.8007	27.7374	30.2775	32.8794	(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	134.1915	134.1915	134.1915	134.1915	134.1915	134.1915	134.1915	134.1915	134.1915	134.1915	134.1915	134.1915	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	22.2345	19.7485	16.0605	12.1589	9.0889	7.6732	8.2912	10.7772	14.4651	18.3668	21.4368	22.8525	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	247.3255	249.8920	243.4246	229.6562	212.2762	195.9413	185.0287	182.4622	188.9296	202.6980	220.0780	236.4129	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	36.4191	36.4191	36.4191	36.4191	36.4191	36.4191	36.4191	36.4191	36.4191	36.4191	36.4191	36.4191	(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)													
	-107.3532	-107.3532	-107.3532	-107.3532	-107.3532	-107.3532	-107.3532	-107.3532	-107.3532	-107.3532	-107.3532	-107.3532	(71)
Water heating gains (Table 5)													
	45.6327	44.1867	41.1842	37.1022	34.4520	30.7205	27.5488	31.6126	33.0565	37.2814	42.0521	44.1928	(72)
Total internal gains													
	378.4501	377.0847	363.9267	342.1747	319.0746	297.5925	284.1261	288.1095	299.7087	321.6037	346.8244	366.7156	(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	11.4900	19.6403	0.6300	0.7000	0.7700	68.9667	(76)
South	1.2600	46.7521	0.6300	0.7000	0.7700	18.0029	(78)
West	5.9400	19.6403	0.6300	0.7000	0.7700	35.6538	(80)

Solar gains	122.6234	234.1439	374.6031	534.0090	646.6598	659.2593	628.7068	544.7145	431.2312	274.6475	151.7890	101.5909	(83)
Total gains	501.0735	611.2286	738.5298	876.1837	965.7344	956.8518	912.8329	832.8240	730.9399	596.2512	498.6134	468.3065	(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	59.4673	59.6046	59.7397	60.3828	60.5047	61.0785	61.0785	61.1859	60.8562	60.5047	60.2587	60.0036	
alpha	4.9645	4.9736	4.9826	5.0255	5.0336	5.0719	5.0719	5.0791	5.0571	5.0336	5.0172	5.0002	
util living area													
	0.9989	0.9967	0.9883	0.9527	0.8524	0.6756	0.5095	0.5754	0.8428	0.9806	0.9975	0.9992	(86)
MIT	19.6696	19.8462	20.1434	20.5216	20.8145	20.9581	20.9917	20.9853	20.8717	20.4591	19.9897	19.6402	(87)
Th 2	19.9459	19.9480	19.9502	19.9602	19.9620	19.9708	19.9708	19.9724	19.9674	19.9620	19.9582	19.9543	(88)
util rest of house													
	0.9985	0.9956	0.9840	0.9353	0.8021	0.5844	0.3950	0.4558	0.7700	0.9707	0.9964	0.9989	(89)
MIT 2	18.7305	18.9083	19.2048	19.5789	19.8403	19.9523	19.9687	19.9683	19.8971	19.5271	19.0601	18.7079	(90)
Living area fraction									fLA = Living area / (4) =			0.3710	(91)
MIT	19.0788	19.2562	19.5530	19.9286	20.2017	20.3254	20.3482	20.3456	20.2587	19.8729	19.4049	19.0538	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.0788	19.2562	19.5530	19.9286	20.2017	20.3254	20.3482	20.3456	20.2587	19.8729	19.4049	19.0538	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9980	0.9946	0.9820	0.9346	0.8150	0.6173	0.4378	0.5006	0.7931	0.9695	0.9956	0.9986	(94)
Useful gains	500.0874	607.9119	725.2136	818.9204	787.0377	590.7005	399.6391	416.8811	579.6789	578.0941	496.4250	467.6467	(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													
	1632.9840	1582.6377	1435.7094	1200.1316	923.2857	615.9391	403.2347	423.7200	664.9707	1007.0360	1341.7744	1626.5947	(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													
	842.8751	655.0157	528.6088	274.4721	101.3686	0.0000	0.0000	0.0000	0.0000	319.1328	608.6516	862.2574	(98)
Space heating												4192.3820	(98)
Space heating per m2											(98) / (4) =	44.3076	(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	1011.2537	796.0934	816.1735	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9030	0.9493	0.9269	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	913.1170	755.7453	756.4862	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1220.3795	1166.7544	1075.0300	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													
	0.0000	0.0000	0.0000	0.0000	0.0000	221.2290	305.7908	236.9966	0.0000	0.0000	0.0000	0.0000	(104)

CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

Space cooling											764.0164	(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	55.3072	76.4477	59.2491	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling											191.0041	(107)
Space cooling per m2											2.0186	(108)
Energy for space heating											44.3076	(99)
Energy for space cooling											2.0186	(108)
Total											46.3262	(109)
Target Fabric Energy Efficiency (TFEE)											53.3	(109)

BASIC COMPLIANCE REPORT
Calculation Type: New Build (As Designed)

energytest

Property Reference	4227-137F	**Issued on Date**	06/10/2022
Assessment Reference	As Designed Final	**Prop Type Ref**	Type C3 - C3/C3 Adj
Property	Plot 137, Grasmere Gardens, Chestfield, Kent		

SAP Rating	94 A	**DER**	7.48	**TER**	17.72
Environmental	95 A	**% DER<TER**	57.80		
CO_2 Emissions (t/year)	0.37	**DFEE**	44.62	**TFEE**	53.28
General Requirements Compliance	Pass	**% DFEE<TFEE**	16.24		

Assessor Details	Mr. Sean Wells, Energytest, Tel: 01892577562, swells@energy-test.co.uk	**Assessor ID**	T220-0001
Client			

SUMARY 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)	17.72	$kgCO_2/m^2$	
Dwelling Carbon Dioxide Emission Rate (DER)	7.48	$kgCO_2/m^2$	Pass
	-10.24 (-57.8%)	$kgCO_2/m^2$	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	53.28	$kWh/m^2/yr$	
Dwelling Fabric Energy Efficiency (DFEE)	44.62	$kWh/m^2/yr$	
	-8.7 (-16.3%)	$kWh/m^2/yr$	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.19 (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	1.42 (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

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 East	11.49 m², No overhang
Windows facing South	1.26 m², No overhang
Windows facing West	5.94 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		
Filled Cavity with Edge Sealing	0.00	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
Photovoltaic array	2.35	kW

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