

PREDICTED ENERGY ASSESSMENT



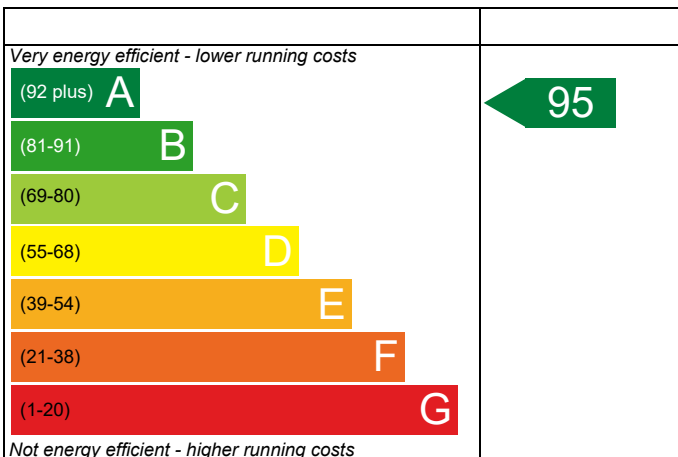
Plot 120, Grasmere Gardens,
Chestfield,
Kent

Dwelling type: House, Semi-Detached
Date of assessment: 06/10/2022
Produced by: Sean Wells
Total floor area: 86.24 m²
DRRN: 9202-7408-6905

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

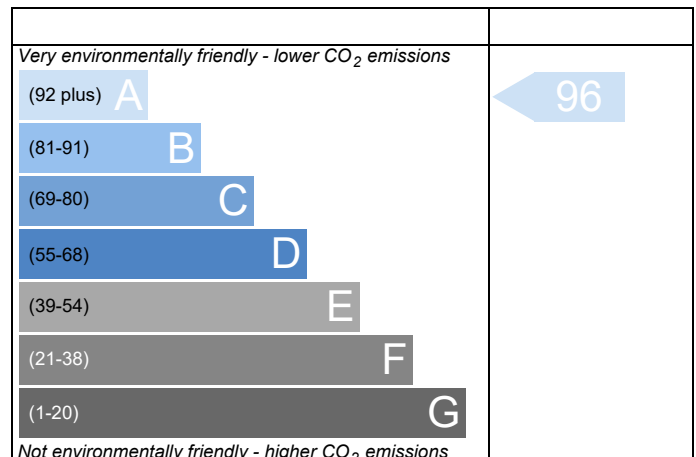


England

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	4227-120F				Issued on Date	06/10/2022
Assessment Reference	As Designed Final	Prop Type Ref	Type B - A1/B1 Adj			
Property	Plot 120, Grasmere Gardens, Chestfield, Kent					
SAP Rating	95 A	DER	5.88	TER	18.41	
Environmental	96 A	% DER<TER	68.06			
CO ₂ Emissions (t/year)	0.18	DFEE	45.80	TFEE	54.39	
General Requirements Compliance	Pass	% DFEE<TFEE	15.79			
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

Semi-Detached House, total floor area 86 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) 18.41 kgCO₂/m²

Dwelling Carbon Dioxide Emission Rate (DER) 5.88 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)54.4 kWh/m²/yr

Dwelling Fabric Energy Efficiency (DFEE)45.8 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:

10.20 m², No overhang

Windows facing West:

5.81 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 2.68 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	43.1200 (1b)	x 2.4000 (2b)	= 103.4880 (1b) - (3b)
First floor	43.1200 (1c)	x 2.7000 (2c)	= 116.4240 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	86.2400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 219.9120 (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																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) =	0.1819 (8)
Pressure test										Yes							
Measured/design AP50										5.0000							
Infiltration rate										0.4319 (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) =					0.3347 (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	0.4268	0.4184	0.4100	0.3682	0.3598	0.3180	0.3180	0.3096	0.3347	0.3598	0.3766	0.3933 (22b)					
Effective ac	0.5911	0.5875	0.5841	0.5678	0.5647	0.5506	0.5506	0.5479	0.5560	0.5647	0.5709	0.5773 (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)			16.0100	1.3258	21.2254		(27)					
external door			1.8900	1.6000	3.0240		(26a)					
ground floor			43.1200	0.1200	5.1744		(28a)					
external wall - brick	50.4000	11.0600	39.3400	0.2000	7.8680		(29a)					
external wall - weatherboard	56.7000	6.8400	49.8600	0.1800	8.9748		(29a)					
pitch cold roof	43.1200		43.1200	0.1100	4.7432		(30)					
Total net area of external elements Aum(A, m2)			193.3400				(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	51.0098		(33)					
Party Wall 1			28.5600	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)							8.0511 (36)					
Total fabric heat loss						(33) + (36) =	59.0609 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 42.8940	Feb 42.6374	Mar 42.3859	Apr 41.2044	May 40.9834	Jun 39.9543	Jul 39.9543	Aug 39.7638	Sep 40.3507	Oct 40.9834	Nov 41.4305	Dec 41.8980 (38)
Heat transfer coeff	101.9549	101.6983	101.4467	100.2653	100.0442	99.0152	99.0152	98.8247	99.4116	100.0442	100.4914	100.9589 (39)
Average = Sum(39)m / 12 =												100.2642 (39)
HLP	Jan 1.1822	Feb 1.1792	Mar 1.1763	Apr 1.1626	May 1.1601	Jun 1.1481	Jul 1.1481	Aug 1.1459	Sep 1.1527	Oct 1.1601	Nov 1.1653	Dec 1.1707 (40)
HLP (average)												1.1626 (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												2.5707 (42)
Average daily hot water use (litres/day)												95.2536 (43)
Daily hot water use	Jan 104.7790	Feb 100.9689	Mar 97.1587	Apr 93.3486	May 89.5384	Jun 85.7283	Jul 85.7283	Aug 89.5384	Sep 93.3486	Oct 97.1587	Nov 100.9689	Dec 104.7790 (44)
Energy conte	155.3842	135.9001	140.2367	122.2617	117.3130	101.2322	93.8066	107.6444	108.9300	126.9474	138.5730	150.4813 (45)
Energy content (annual)												Total = Sum(45)m = 1498.7108 (45)
Distribution loss (46)m = 0.15 x (45)m												
23.3076	20.3850	21.0355	18.3393	17.5970	15.1848	14.0710	16.1467	16.3395	19.0421	20.7860	22.5722 (46)	
Water storage loss:												
Total storage loss												

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 (56)
Combi 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 (57)
Total heat required for water heating calculated for each month	1.7087	1.5514	1.5669	1.3125	1.2080	0.9980	0.9248	1.1084	1.1694	1.4184	1.5819	1.6547 (61)
Solar input	157.0929	137.4514	141.8036	123.5742	118.5210	102.2303	94.7314	108.7528	110.0994	128.3658	140.1549	152.1361 (62)
Output from w/h	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)
Heat gains from water heating, kWh/month	157.0929	137.4514	141.8036	123.5742	118.5210	102.2303	94.7314	108.7528	110.0994	128.3658	140.1549	152.1361 (64)
	52.0924	45.5746	47.0204	40.9802	39.3086	33.9092	31.4219	36.0689	36.5116	42.5646	46.4710	50.4487 (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)
(66)m	128.5340	128.5340	128.5340	128.5340	128.5340	128.5340	128.5340	128.5340	128.5340	128.5340	128.5340	128.5340	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	21.0241	18.6734	15.1862	11.4970	8.5941	7.2555	7.8398	10.1905	13.6777	17.3670	20.2698	21.6084	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	231.9878	234.3951	228.3288	215.4143	199.1120	183.7902	173.5543	171.1470	177.2133	190.1278	206.4301	221.7519	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.8534	35.8534	35.8534	35.8534	35.8534	35.8534	35.8534	35.8534	35.8534	35.8534	35.8534	35.8534	(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)	-102.8272	-102.8272	-102.8272	-102.8272	-102.8272	-102.8272	-102.8272	-102.8272	-102.8272	-102.8272	-102.8272	-102.8272	(71)
Water heating gains (Table 5)	70.0167	67.8194	63.1995	56.9169	52.8341	47.0961	42.2337	48.4797	50.7105	57.2105	64.5431	67.8074	(72)
Total internal gains	387.5888	385.4481	371.2747	348.3883	325.1004	302.7021	288.1880	294.3773	306.1617	329.2655	355.8031	375.7279	(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	10.2000				19.6403		0.6300		0.7000		0.7700		61.2237	
West	5.8100				19.6403		0.6300		0.7000		0.7700		34.8735 (80)	
Solar gains	96.0971	187.9864	309.5868	451.5139	553.3473	566.4494	539.2829	463.2360	360.0623	223.0617	119.8218	79.0256 (83)		
Total gains	483.6859	573.4345	680.8615	799.9022	878.4477	869.1514	827.4709	757.6134	666.2240	552.3272	475.6250	454.7536 (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	43.2331	43.3422	43.4496	43.9616	44.0587	44.5166	44.5166	44.6025	44.3391	44.0587	43.8627	43.6596	
alpha	3.8822	3.8895	3.8966	3.9308	3.9372	3.9678	3.9678	3.9735	3.9559	3.9372	3.9242	3.9106	
util living area	0.9946	0.9890	0.9727	0.9240	0.8197	0.6579	0.5061	0.5658	0.8097	0.9595	0.9903	0.9957	(86)
MIT	19.3312	19.5370	19.8937	20.3494	20.7112	20.9148	20.9768	20.9643	20.7985	20.2990	19.7303	19.2970	(87)
Th 2	19.9342	19.9366	19.9390	19.9500	19.9521	19.9617	19.9617	19.9635	19.9580	19.9521	19.9479	19.9435	(88)
util rest of house	0.9932	0.9861	0.9654	0.9033	0.7720	0.5740	0.3957	0.4527	0.7413	0.9445	0.9874	0.9946	(89)
MIT 2	17.7061	18.0070	18.5244	19.1755	19.6556	19.8972	19.9508	19.9450	19.7798	19.1196	18.2978	17.6623	(90)
Living area fraction	18.1697	18.4435	18.9150	19.5104	19.9567	20.1875	20.2434	20.2357	20.0704	19.4560	18.7064	18.1286	(92)
Temperature adjustment	18.0197	18.2935	18.7650	19.3604	19.8067	20.0375	20.0934	20.0857	19.9204	19.3060	18.5564	17.9786	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	478.5302	561.7887	649.8212	711.1101	671.5253	504.6299	339.4973	353.6617	491.9752	514.7352	466.8168	450.8743	(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	1398.7867	1362.0911	1244.2433	1048.8127	811.0297	538.3933	345.9037	364.2412	578.6128	870.9860	1151.2746	1391.0720	(97)
Month fracti	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	(97a)
Space heating kWh	684.6709	537.8032	442.2500	243.1459	103.7913	0.0000	0.0000	0.0000	0.0000	265.0506	492.8096	699.5071	(98)
Space heating												3469.0285	(98)
Space heating per m2												40.2253	(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													3845.9296 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	684.6709	537.8032	442.2500	243.1459	103.7913	0.0000	0.0000	0.0000	0.0000	265.0506	492.8096	699.5071	(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)	759.0586	596.2342	490.2993	269.5631	115.0679	0.0000	0.0000	0.0000	0.0000	293.8476	546.3521	775.5067	(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	157.0929	137.4514	141.8036	123.5742	118.5210	102.2303	94.7314	108.7528	110.0994	128.3658	140.1549	152.1361	(64)
Efficiency of water heater (217)m	87.2098	86.9483	86.3482	84.9412	82.1531	76.2000	76.2000	76.2000	76.2000	85.0986	86.6739	87.3336	(217)
Fuel for water heating, kWh/month	180.1322	158.0841	164.2229	145.4820	144.2685	134.1605	124.3194	142.7202	144.4874	150.8437	161.7036	174.2010	(219)
Water heating fuel used												1824.6256	(219)
Annual totals kWh/year													
Space heating fuel - main system													3845.9296 (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)													371.2918 (232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV Unit 0 (0.80 * 2.68 * 853 * 1.00) =										-1828.8962			-1828.8962 (233)
Total delivered energy for all uses													4287.9508 (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	3845.9296	0.2160	830.7208 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1824.6256	0.2160	394.1191 (264)
Space and water heating			1224.8399 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	371.2918	0.5190	192.7004 (268)
Energy saving/generation technologies			
PV Unit	-1828.8962	0.5190	-949.1971 (269)
Total CO2, kg/year			507.2683 (272)
Dwelling Carbon Dioxide Emission Rate (DER)			5.8800 (273)

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

DER			5.8800 ZC1
Total Floor Area		TFA	86.2400
Assumed number of occupants		N	2.5707
CO2 emission factor in Table 12 for electricity displaced from grid		EF	0.5190
CO2 emissions from appliances, equation (L14)			15.9405 ZC2
CO2 emissions from cooking, equation (L16)			2.0953 ZC3
Total CO2 emissions			23.9158 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			23.9158 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	43.1200 (1b)	x 2.4000 (2b)	= 103.4880 (1b) - (3b)
First floor	43.1200 (1c)	x 2.7000 (2c)	= 116.4240 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	86.2400		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 219.9120 (5)
Dwelling volume			

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					3 * 10 = 30.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					30.0000 / (5) = 0.1364 (8)
Pressure test					Yes
Measured/design AP50					5.0000
Infiltration rate					0.3864 (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) =	0.2995 (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	0.3818	0.3743	0.3669	0.3294	0.3219	0.2845	0.2845	0.2770	0.2995	0.3219	0.3369	0.3519 (22b)
Effective ac	0.5729	0.5701	0.5673	0.5543	0.5518	0.5405	0.5405	0.5384	0.5448	0.5518	0.5568	0.5619 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
TER Semi-glazed door			1.8900	1.2000	2.2680		(26a)
TER Opening Type (Uw = 1.40)			16.0100	1.3258	21.2254		(27)
ground floor			43.1200	0.1300	5.6056		(28a)
external wall - brick	50.4000	11.0600	39.3400	0.1800	7.0812		(29a)
external wall - weatherboard	56.7000	6.8400	49.8600	0.1800	8.9748		(29a)
pitch cold roof	43.1200		43.1200	0.1300	5.6056		(30)
Total net area of external elements Aum(A, m ²)			193.3400				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	50.7606		(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							9.8700 (36)
Total fabric heat loss						(33) + (36) =	60.6306 (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	41.5757	41.3703	41.1689	40.2231	40.0462	39.2224	39.2224	39.0699	39.5397	40.0462	40.4041	40.7784 (38)
Heat transfer coeff	102.2063	102.0008	101.7995	100.8537	100.6768	99.8530	99.8530	99.7005	100.1703	100.6768	101.0347	101.4090 (39)
Average = Sum(39)m / 12 =												100.8529 (39)
HLP	1.1851	1.1828	1.1804	1.1695	1.1674	1.1579	1.1579	1.1561	1.1615	1.1674	1.1716	1.1759 (40)
HLP (average)												1.1694 (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												2.5707 (42)
Average daily hot water use (litres/day)												95.2536 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	104.7790	100.9689	97.1587	93.3486	89.5384	85.7283	85.7283	89.5384	93.3486	97.1587	100.9689	104.7790 (44)
Energy content (annual)	155.3842	135.9001	140.2367	122.2617	117.3130	101.2322	93.8066	107.6444	108.9300	126.9474	138.5730	150.4813 (45)
Distribution loss (46)m = 0.15 x (45)m	23.3076	20.3850	21.0355	18.3393	17.5970	15.1848	14.0710	16.1467	16.3395	19.0421	20.7860	22.5722 (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	0.0000	(57)
Combi loss	50.9589	46.0274	49.5110	46.0349	45.6278	42.2770	43.6862	45.6278	46.0349	49.5110	49.3151	50.9589	(61)	
Total heat required for water heating calculated for each month	206.3432	181.9275	189.7477	168.2967	162.9409	143.5092	137.4927	153.2722	154.9649	176.4584	187.8881	201.4403	(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	206.3432	181.9275	189.7477	168.2967	162.9409	143.5092	137.4927	Solar input (sum of months) = Sum(63)m =				0.0000	(63)	
	206.3432	181.9275	189.7477	168.2967	162.9409	143.5092	137.4927	153.2722	154.9649	176.4584	187.8881	201.4403	(64)	
								Total per year (kWh/year) = Sum(64)m =				2064.2817	(64)	
Heat gains from water heating, kWh/month	64.4050	56.6936	59.0065	52.1608	50.4135	44.2290	42.1122	47.1987	47.7280	54.5878	58.4043	62.7748	(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	128.5340	128.5340	128.5340	128.5340	128.5340	128.5340	128.5340	128.5340	128.5340	128.5340	128.5340	128.5340	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	21.0241	18.6734	15.1862	11.4970	8.5941	7.2555	7.8398	10.1905	13.6777	17.3670	20.2698	21.6084	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	231.9878	234.3951	228.3288	215.4143	199.1120	183.7902	173.5543	171.1470	177.2133	190.1278	206.4301	221.7519	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.8534	35.8534	35.8534	35.8534	35.8534	35.8534	35.8534	35.8534	35.8534	35.8534	35.8534	35.8534	(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)	-102.8272	-102.8272	-102.8272	-102.8272	-102.8272	-102.8272	-102.8272	-102.8272	-102.8272	-102.8272	-102.8272	-102.8272	(71)
Water heating gains (Table 5)	86.5658	84.3655	79.3097	72.4455	67.7601	61.4291	56.6025	63.4391	66.2888	73.3707	81.1171	84.3747	(72)
Total internal gains	404.1379	401.9942	387.3850	363.9169	340.0265	317.0350	302.5568	309.3368	321.7400	345.4257	372.3772	392.2952	(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					10.2000	19.6403	0.6300	0.7000	0.7700		61.2237	(76)
West					5.8100	19.6403	0.6300	0.7000	0.7700		34.8735	(80)

Solar gains	96.0971	187.9864	309.5868	451.5139	553.3473	566.4494	539.2829	463.2360	360.0623	223.0617	119.8218	79.0256 (83)
Total gains	500.2351	589.9806	696.9718	815.4308	893.3737	883.4844	841.8397	772.5729	681.8023	568.4873	492.1990	471.3208 (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	58.5961	58.7141	58.8303	59.3819	59.4863	59.9770	59.9770	60.0688	59.7871	59.4863	59.2756	59.0568		
alpha	4.9064	4.9143	4.9220	4.9588	4.9658	4.9985	4.9985	5.0046	4.9858	4.9658	4.9517	4.9371		
util living area	0.9983	0.9958	0.9867	0.9506	0.8513	0.6771	0.5120	0.5751	0.8386	0.9774	0.9964	0.9987	(86)	
MIT	19.6934	19.8582	20.1462	20.5169	20.8092	20.9555	20.9910	20.9844	20.8702	20.4665	20.0086	19.6636	(87)	
Th 2	19.9319	19.9338	19.9357	19.9445	19.9462	19.9539	19.9539	19.9553	19.9509	19.9462	19.9428	19.9393	(88)	
util rest of house	0.9977	0.9944	0.9819	0.9324	0.8004	0.5847	0.3954	0.4537	0.7643	0.9659	0.9949	0.9983	(89)	
MIT 2	18.1908	18.4326	18.8517	19.3825	19.7632	19.9252	19.9507	19.9490	19.8475	19.3231	18.6593	18.1524	(90)	
Living area fraction	18.6194	18.8393	19.2209	19.7061	20.0615	20.2191	20.2474	20.2444	fLA = Living area / (4) =				0.2853	(91)
MIT	18.6194	18.8393	19.2209	19.7061	20.0615	20.2191	20.2474	20.2444	20.1392	19.6493	19.0442	18.5835	(92)	
Temperature adjustment												0.0000		
adjusted MIT	18.6194	18.8393	19.2209	19.7061	20.0615	20.2191	20.2474	20.2444	20.1392	19.6493	19.0442	18.5835	(93)	

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	498.5337	585.3765	681.3181	756.1884	720.6865	538.4270	361.0474	377.4136	531.4745	546.6255	488.7473	470.1128	(94)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1463.5329	1421.8160	1294.9855	1089.8375	841.8127	561.0816	364.2039	383.2869	604.9501	911.0544	1206.7745	1458.6150	(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	717.9594	562.0873	456.5685	240.2273	90.1179	0.0000	0.0000	0.0000	0.0000	271.1351	516.9796	735.4457	(98)
Space heating												3590.5208	(98)
Space heating per m2												41.6341	(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												3844.2407 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	717.9594	562.0873	456.5685	240.2273	90.1179	0.0000	0.0000	0.0000	0.0000	271.1351	516.9796	735.4457 (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)	768.6931	601.8066	488.8314	257.2027	96.4860	0.0000	0.0000	0.0000	0.0000	290.2945	553.5113	787.4151 (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	206.3432	181.9275	189.7477	168.2967	162.9409	143.5092	137.4927	153.2722	154.9649	176.4584	187.8881	201.4403 (64)
Efficiency of water heater (217)m	87.9310	87.7027	87.1807	85.9466	83.6273	80.3000	80.3000	80.3000	80.3000	86.1291	87.4675	80.3000 (216)
Fuel for water heating, kWh/month	234.6649	207.4366	217.6487	195.8154	194.8417	178.7163	171.2238	190.8745	192.9825	204.8766	214.8091	228.8583 (219)
Water heating fuel used												2432.7484 (219)
Annual totals kWh/year												
Space heating fuel - main system												3844.2407 (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)												371.2918 (232)
Total delivered energy for all uses												6723.2809 (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	3844.2407	0.2160	830.3560 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2432.7484	0.2160	525.4737 (264)
Space and water heating			1355.8297 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	371.2918	0.5190	192.7004 (268)
Total CO2, kg/m2/year			1587.4551 (272)
Emissions per m2 for space and water heating			15.7216 (272a)
Fuel factor (mains gas)			1.0000
Emissions per m2 for lighting			2.2345 (272b)
Emissions per m2 for pumps and fans			0.4514 (272c)
Target Carbon Dioxide Emission Rate (TER) = (15.7216 * 1.00) + 2.2345 + 0.4514, rounded to 2 d.p.			18.4100 (273)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	4227-120F	Issued on Date	06/10/2022
Assessment Reference	As Designed Final	Prop Type Ref	Type B - A1/B1 Adj
Property	Plot 120, Grasmere Gardens, Chestfield, Kent		
SAP Rating	95 A	DER	5.88
Environmental	96 A	% DER<TER	68.06
CO ₂ Emissions (t/year)	0.18	DFEE	45.80
General Requirements Compliance	Pass	% DFEE<TFEE	15.79
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	43.1200 (1b)	x 2.4000 (2b)	= 103.4880 (1b) - (3b)
First floor	43.1200 (1c)	x 2.7000 (2c)	= 116.4240 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	86.2400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 219.9120 (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) =	0.1364 (8)				
Pressure test							Yes					
Measured/design AP50							5.0000					
Infiltration rate							0.3864 (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) =	0.2995 (21)				
Wind speed	Jan 5.1000	Feb 5.0000	Mar 4.9000	Apr 4.4000	May 4.3000	Jun 3.8000	Jul 3.8000	Aug 3.7000	Sep 4.0000	Oct 4.3000	Nov 4.5000	Dec 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	0.3818	0.3743	0.3669	0.3294	0.3219	0.2845	0.2845	0.2770	0.2995	0.3219	0.3369	0.3519 (22b)
Effective ac	0.5729	0.5701	0.5673	0.5543	0.5518	0.5405	0.5405	0.5384	0.5448	0.5518	0.5568	0.5619 (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)			16.0100	1.3258	21.2254		(27)					
external door			1.8900	1.6000	3.0240		(26a)					
ground floor			43.1200	0.1200	5.1744		(28a)					
external wall - brick	50.4000	11.0600	39.3400	0.2000	7.8680		(29a)					
external wall - weatherboard	56.7000	6.8400	49.8600	0.1800	8.9748		(29a)					
pitch cold roof	43.1200		43.1200	0.1100	4.7432		(30)					
Total net area of external elements Aum(A, m2)			193.3400				(31)					
Fabric heat loss, W/K = Sum (A x U)				(26) ... (30) + (32) =	51.0098		(33)					
Party Wall 1			28.5600	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)								8.0511 (36)				
Total fabric heat loss						(33) + (36) =	59.0609 (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	41.5757	41.3703	41.1689	40.2231	40.0462	39.2224	39.2224	39.0699	39.5397	40.0462	40.4041	40.7784 (38)
Heat transfer coeff	100.6366	100.4311	100.2298	99.2840	99.1071	98.2833	98.2833	98.1308	98.6006	99.1071	99.4650	99.8393 (39)
Average = Sum(39)m / 12 =												99.2832 (39)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.1669	1.1646	1.1622	1.1513	1.1492	1.1396	1.1396	1.1379	1.1433	1.1492	1.1534	1.1577 (40)
HLP (average)												1.1512 (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												2.5707 (42)
Average daily hot water use (litres/day)												95.2536 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	104.7790	100.9689	97.1587	93.3486	89.5384	85.7283	85.7283	89.5384	93.3486	97.1587	100.9689	104.7790 (44)
Energy content	155.3842	135.9001	140.2367	122.2617	117.3130	101.2322	93.8066	107.6444	108.9300	126.9474	138.5730	150.4813 (45)
Energy content (annual)												1498.7108 (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												
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 (57)
Heat gains from water heating, kWh/month	33.0192	28.8788	29.8003	25.9806	24.9290	21.5119	19.9339	22.8744	23.1476	26.9763	29.4468	31.9773 (65)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Metabolic gains (Table 5), Watts	128.5340	128.5340	128.5340	128.5340	128.5340	128.5340	128.5340	128.5340	128.5340	128.5340	128.5340	128.5340 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	21.0241	18.6734	15.1862	11.4970	8.5941	7.2555	7.8398	10.1905	13.6777	17.3670	20.2698	21.6084 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	231.9878	234.3951	228.3288	215.4143	199.1120	183.7902	173.5543	171.1470	177.2133	190.1278	206.4301	221.7519 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.8534	35.8534	35.8534	35.8534	35.8534	35.8534	35.8534	35.8534	35.8534	35.8534	35.8534	35.8534 (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)	-102.8272	-102.8272	-102.8272	-102.8272	-102.8272	-102.8272	-102.8272	-102.8272	-102.8272	-102.8272	-102.8272	-102.8272 (71)
Water heating gains (Table 5)	44.3806	42.9743	40.0542	36.0842	33.5068	29.8776	26.7929	30.7452	32.1495	36.2585	40.8983	42.9802 (72)
Total internal gains	358.9527	357.6031	345.1294	324.5556	302.7731	282.4835	269.7472	273.6429	284.6007	305.3135	329.1584	347.9007 (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				10.2000	19.6403	0.6300		0.7000		0.7700	61.2237 (76)				
West				5.8100	19.6403	0.6300		0.7000		0.7700	34.8735 (80)				
Solar gains				96.0971	187.9864	309.5868	451.5139	553.3473	566.4494	539.2829	463.2360	360.0623	223.0617	119.8218	79.0256 (83)
Total gains				455.0498	545.5895	654.7162	776.0695	856.1203	848.9329	809.0301	736.8789	644.6630	528.3752	448.9802	426.9263 (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	43.7994	43.8890	43.9772	44.3961	44.4754	44.8481	44.8481	44.9178	44.7038	44.4754	44.3153	44.1492
alpha	3.9200	3.9259	3.9318	3.9597	3.9650	3.9899	3.9899	3.9945	3.9803	3.9650	3.9544	3.9433
util living area	0.9956	0.9906	0.9756	0.9291	0.8269	0.6662	0.5131	0.5759	0.8201	0.9643	0.9921	0.9966 (86)
MIT	19.3172	19.5235	19.8821	20.3392	20.7058	20.9124	20.9761	20.9627	20.7910	20.2825	19.7113	19.2803 (87)
Th 2	19.9465	19.9485	19.9503	19.9592	19.9609	19.9686	19.9686	19.9700	19.9656	19.9609	19.9575	19.9540 (88)
util rest of house	0.9945	0.9882	0.9691	0.9096	0.7804	0.5826	0.4023	0.4623	0.7537	0.9508	0.9896	0.9957 (89)
MIT 2	18.4083	18.6150	18.9709	19.4198	19.7535	19.9230	19.9609	19.9567	19.8381	19.3754	18.8098	18.3772 (90)
Living area fraction												0.2853 (91)
MIT	18.6676	18.8741	19.2308	19.6821	20.0252	20.2053	20.2505	20.2436	20.1099	19.6341	19.0670	18.6348 (92)
Temperature adjustment												0.0000
adjusted MIT	18.6676	18.8741	19.2308	19.6821	20.0252	20.2053	20.2505	20.2436	20.1099	19.6341	19.0670	18.6348 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9926	0.9849	0.9633	0.9034	0.7836	0.6031	0.4337	0.4940	0.7642	0.9454	0.9867	0.9942 (94)
Useful gains	451.6826	537.3420	630.6988	701.1396	670.8420	511.9523	350.8565	364.0313	492.6660	499.5166	443.0143	424.4411 (95)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

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	1445.9024	1403.4394	1276.0099	1070.4861	825.0823	550.9031	358.7801	377.1802	592.5835	895.3472	1190.2951	1441.1597 (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	739.6995	582.0174	480.1114	265.9295	114.7548	0.0000	0.0000	0.0000	0.0000	294.4979	538.0421	756.4387 (98)
Space heating												3771.4913 (98)
Space heating per m2												(98) / (4) = 43.7325 (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	923.8632	727.2966	745.7939	0.0000	0.0000	0.0000	0.0000 (100)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.8594	0.9133	0.8857	0.0000	0.0000	0.0000	0.0000 (101)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	793.9733	664.2421	660.5499	0.0000	0.0000	0.0000	0.0000 (102)
Month fracti	0.0000	0.0000	0.0000	0.0000	0.0000	1088.8221	1040.1677	957.5178	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh						1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000 (103a)
Space cooling	0.0000	0.0000	0.0000	0.0000	0.0000	212.2912	279.6887	220.9441	0.0000	0.0000	0.0000	0.0000 (104)
Space cooling												712.9240 (104)
Cooled fraction									FC = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)												
Intermittency factor	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												
Space cooling	0.0000	0.0000	0.0000	0.0000	0.0000	53.0728	69.9222	55.2360	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling												178.2310 (107)
Space cooling per m2												2.0667 (108)
Energy for space heating												43.7325 (99)
Energy for space cooling												2.0667 (108)
Total												45.7992 (109)
Dwelling Fabric Energy Efficiency (DFEE)												45.8 (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	43.1200 (1b)	x 2.4000 (2b)	= 103.4880 (1b) - (3b)
First floor	43.1200 (1c)	x 2.7000 (2c)	= 116.4240 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	86.2400		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 219.9120 (5)
Dwelling volume			

2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					3 * 10 = 30.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					30.0000 / (5) = 0.1364 (8)
Pressure test					Yes
Measured/design AP50					5.0000
Infiltration rate					0.3864 (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) =	0.2995 (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	0.3818	0.3743	0.3669	0.3294	0.3219	0.2845	0.2845	0.2770	0.2995	0.3219	0.3369	0.3519 (22b)
Effective ac	0.5729	0.5701	0.5673	0.5543	0.5518	0.5405	0.5405	0.5384	0.5448	0.5518	0.5568	0.5619 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
TER Semi-glazed door			1.8900	1.2000	2.2680		(26a)
TER Opening Type (Uw = 1.40)			16.0100	1.3258	21.2254		(27)
ground floor			43.1200	0.1300	5.6056		(28a)
external wall - brick	50.4000	11.0600	39.3400	0.1800	7.0812		(29a)
external wall - weatherboard	56.7000	6.8400	49.8600	0.1800	8.9748		(29a)
pitch cold roof	43.1200		43.1200	0.1300	5.6056		(30)
Total net area of external elements Aum(A, m ²)			193.3400				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	50.7606		(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							9.8700 (36)
Total fabric heat loss						(33) + (36) =	60.6306 (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	41.5757	41.3703	41.1689	40.2231	40.0462	39.2224	39.2224	39.0699	39.5397	40.0462	40.4041	40.7784 (38)
Heat transfer coeff	102.2063	102.0008	101.7995	100.8537	100.6768	99.8530	99.8530	99.7005	100.1703	100.6768	101.0347	101.4090 (39)
Average = Sum(39)m / 12 =												100.8529 (39)
HLP	1.1851	1.1828	1.1804	1.1695	1.1674	1.1579	1.1579	1.1561	1.1615	1.1674	1.1716	1.1759 (40)
HLP (average)												1.1694 (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												2.5707 (42)
Average daily hot water use (litres/day)												95.2536 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	104.7790	100.9689	97.1587	93.3486	89.5384	85.7283	85.7283	89.5384	93.3486	97.1587	100.9689	104.7790 (44)
Energy content (annual)	155.3842	135.9001	140.2367	122.2617	117.3130	101.2322	93.8066	107.6444	108.9300	126.9474	138.5730	150.4813 (45)
Distribution loss (46)m = 0.15 x (45)m												1498.7108 (45)
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)

FULL SAP CALCULATION PRINTOUT

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	(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	(59)
Heat gains from water heating, kWh/month	33.0192	28.8788	29.8003	25.9806	24.9290	21.5119	19.9339	22.8744	23.1476	26.9763	29.4468	31.9773 (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	128.5340	128.5340	128.5340	128.5340	128.5340	128.5340	128.5340	128.5340	128.5340	128.5340	128.5340	128.5340	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	21.0241	18.6734	15.1862	11.4970	8.5941	7.2555	7.8398	10.1905	13.6777	17.3670	20.2698	21.6084	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	231.9878	234.3951	228.3288	215.4143	199.1120	183.7902	173.5543	171.1470	177.2133	190.1278	206.4301	221.7519	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.8534	35.8534	35.8534	35.8534	35.8534	35.8534	35.8534	35.8534	35.8534	35.8534	35.8534	35.8534	(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)	-102.8272	-102.8272	-102.8272	-102.8272	-102.8272	-102.8272	-102.8272	-102.8272	-102.8272	-102.8272	-102.8272	-102.8272	(71)
Water heating gains (Table 5)	44.3806	42.9743	40.0542	36.0842	33.5068	29.8776	26.7929	30.7452	32.1495	36.2585	40.8983	42.9802	(72)
Total internal gains	358.9527	357.6031	345.1294	324.5556	302.7731	282.4835	269.7472	273.6429	284.6007	305.3135	329.1584	347.9007	(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					10.2000	19.6403	0.6300	0.7000			0.7700			61.2237 (76)
West					5.8100	19.6403	0.6300	0.7000			0.7700			34.8735 (80)
Solar gains	96.0971	187.9864	309.5868	451.5139	553.3473	566.4494	539.2829	463.2360	360.0623	223.0617	119.8218			79.0256 (83)
Total gains	455.0498	545.5895	654.7162	776.0695	856.1203	848.9329	809.0301	736.8789	644.6630	528.3752	448.9802			426.9263 (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	58.5961	58.7141	58.8303	59.3819	59.4863	59.9770	59.9770	60.0688	59.7871	59.4863	59.2756	59.0568	
alpha	4.9064	4.9143	4.9220	4.9588	4.9658	4.9985	4.9985	5.0046	4.9858	4.9658	4.9517	4.9371	
util living area	0.9989	0.9970	0.9897	0.9586	0.8673	0.6978	0.5310	0.5991	0.8606	0.9831	0.9976	0.9992	(86)
MIT	19.6449	19.8111	20.1032	20.4831	20.7897	20.9492	20.9894	20.9814	20.8518	20.4273	19.9625	19.6158	(87)
Th 2	19.9319	19.9338	19.9357	19.9445	19.9462	19.9539	19.9539	19.9553	19.9509	19.9462	19.9428	19.9393	(88)
util rest of house	0.9985	0.9960	0.9859	0.9428	0.8193	0.6051	0.4110	0.4745	0.7909	0.9742	0.9966	0.9989	(89)
MIT 2	18.6947	18.8620	19.1535	19.5298	19.8064	19.9311	19.9513	19.9501	19.8681	19.4835	19.0207	18.6716	(90)
Living area fraction									fLA = Living area / (4) =			0.2853	(91)
MIT	18.9658	19.1327	19.4244	19.8017	20.0869	20.2215	20.2474	20.2443	20.1487	19.7527	19.2893	18.9409	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.9658	19.1327	19.4244	19.8017	20.0869	20.2215	20.2474	20.2443	20.1487	19.7527	19.2893	18.9409	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	454.1354	542.8045	643.9459	729.6723	707.6426	535.0810	360.4650	376.1537	519.6569	513.5987	447.0464	426.2990	(94)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1498.9344	1451.7520	1315.6973	1099.4777	844.3628	561.3263	364.2029	383.2750	605.8979	921.4656	1231.5427	1494.8588	(97)
Month fracti	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	(97a)
Space heating kWh	777.3305	610.8127	499.7830	266.2599	101.7198	0.0000	0.0000	0.0000	0.0000	303.4529	564.8374	795.0085	(98)
Space heating												3919.2047	(98)
Space heating per m2										(98) / (4) =		45.4453	(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	938.6184	738.9124	757.7236	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8886	0.9398	0.9143	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	834.0325	694.4625	692.7806	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1088.8221	1040.1677	957.5178	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	183.4485	257.2047	196.9645	0.0000	0.0000	0.0000	0.0000	(104)
Space cooling												637.6177	(104)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

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 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	45.8621	64.3012	49.2411	0.0000	0.0000	0.0000 (107)
Space cooling											159.4044 (107)
Space cooling per m2											1.8484 (108)
Energy for space heating											45.4453 (99)
Energy for space cooling											1.8484 (108)
Total											47.2937 (109)
Target Fabric Energy Efficiency (TFEE)											54.4 (109)

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)



Property Reference	4227-120F	Issued on Date	06/10/2022
Assessment Reference	As Designed Final	Prop Type Ref	Type B - A1/B1 Adj
Property	Plot 120, Grasmere Gardens, Chestfield, Kent		
SAP Rating	95 A	DER	5.88
Environmental	96 A	TER	18.41
CO ₂ Emissions (t/year)	0.18	% DER<TER	68.06
General Requirements Compliance	Pass	DFEE	45.80
		TFEE	54.39
		% DFEE<TFEE	15.79
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)	18.41	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	5.88	kgCO ₂ /m ²	Pass
	-12.53 (-68.1%)	kgCO ₂ /m ²	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	54.39	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	45.80	kWh/m ² /yr	
	-8.6 (-15.8%)	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
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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 East

10.20 m², No overhang

Windows facing West

5.81 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

2.68

kW

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