

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

Property Reference	Plot 36			Issued on Date	15/09/2023
Assessment Reference	plot 36	Prop Type Ref	21809		
Property	3 Red Oak Road, Southampton, SO30 0AU				
SAP Rating	87 B	DER	17.24	TER	24.06
Environmental	88 B	% DER<TER	28.35		
CO ₂ Emissions (t/year)	0.82	DFEE	76.38	TFEE	78.29
General Requirements Compliance	Pass	% DFEE<TFEE	2.43		
Assessor Details	Mr. Ben Tunningley, Ben Tunningley, Tel: 01904217325, ben.tunningley@jspsustainability.co.uk			Assessor ID	AU36-0001
Client					

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

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DWELLING AS BUILT

Detached Maisonette, total floor area 73 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) 24.06 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 17.24 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)78.3 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)76.4 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.27 (max. 0.30)	0.27 (max. 0.70)	OK
Floor	0.19 (max. 0.25)	0.20 (max. 0.70)	OK
Roof	0.11 (max. 0.20)	0.11 (max. 0.35)	OK
Openings	1.29 (max. 2.00)	1.40 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals: 4.26 (measured in this dwelling)
Maximum 10.0 OK

4 Heating efficiency

Main heating system: Boiler system with radiators or underfloor - Mains gas
Data from database
Ideal LOGIC COMBI ESPl 35
Combi boiler
Efficiency: 89.6% SEDBUK2009
Minimum: 88.0% OK

Secondary heating system: None

5 Cylinder insulation

Hot water storage No cylinder

6 Controls

Space heating controls: Programmer, room thermostat and TRVs OK

Hot water controls: No cylinder

Boiler interlock Yes OK

7 Low energy lights

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

8 Mechanical ventilation

Continuous extract system (decentralised)
Specific fan power: 0.1600 0.1800
Maximum 0.7 OK

9 Summertime temperature

Overheating risk (Southern England): Not significant OK

Based on:

Overshading: Average
Windows facing East: 4.85 m², No overhang
Windows facing West: 6.50 m², No overhang
Air change rate: 0.00 ach
Blinds/curtains: None

10 Key features

Roof U-value 0.11 W/m²K
Floor U-value 0.12 W/m²K
Door U-value 1.00 W/m²K
Photovoltaic array 1.48 kW

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CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Built) (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	4.3000 (1b)	x 2.4500 (2b)	= 10.5350 (1b) - (3b)
First floor	68.5000 (1c)	x 2.6000 (2c)	= 178.1000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	72.8000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 188.6350 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					0 * 10 = 0.0000 (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)					0.0000 / (5) = 0.0000 (8)
Pressure test					Yes
Measured/design AP50					4.2600
Infiltration rate					0.2130 (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)	=	0.1811 (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	0.2308	0.2263	0.2218	0.1992	0.1946	0.1720	0.1720	0.1675	0.1811	0.1946	0.2037	0.2127 (22b)
Mechanical extract ventilation - decentralised												
If mechanical ventilation:												0.5000 (23a)
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
entrance			4.0500	1.0000	4.0500		(26)
front (Uw = 1.40)			11.3500	1.3258	15.0473		(27)
ground			4.3000	0.1200	0.5160	75.0000	322.5000 (28a)
exposed			64.2000	0.2000	12.8400	75.0000	4814.9998 (28b)
external	116.2200	15.4000	100.8200	0.2700	27.2214	150.0000	15123.0002 (29a)
cd	68.5000		68.5000	0.1100	7.5350	9.0000	616.5000 (30)
Total net area of external elements Aum(A, m ²)			253.2200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	67.2097		(33)
stud			81.9000			9.0000	737.1000 (32c)
Heat capacity Cm = Sum(A x k)				(28)...(30) + (32) + (32a)...(32e) =			21614.1000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							296.8970 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							18.7191 (36)
Total fabric heat loss				(33) + (36) =			85.9288 (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	31.1248	31.1248	31.1248	31.1248	31.1248	31.1248	31.1248	31.1248	31.1248	31.1248	31.1248	31.1248 (38)
Heat transfer coeff	117.0536	117.0536	117.0536	117.0536	117.0536	117.0536	117.0536	117.0536	117.0536	117.0536	117.0536	117.0536 (39)
Average = Sum(39)m / 12 =												117.0536 (39)
HLP	1.6079	1.6079	1.6079	1.6079	1.6079	1.6079	1.6079	1.6079	1.6079	1.6079	1.6079	1.6079 (40)
HLP (average)												1.6079 (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												2.3121 (42)
Average daily hot water use (litres/day)												89.1133 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	98.0246	94.4601	90.8956	87.3310	83.7665	80.2020	80.2020	83.7665	87.3310	90.8956	94.4601	98.0246 (44)
Energy content	145.3677	127.1395	131.1966	114.3804	109.7507	94.7065	87.7595	100.7053	101.9080	118.7640	129.6402	140.7808 (45)
Energy content (annual)	Total = Sum(45)m =											1402.0990 (45)

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Distribution loss (46)m = 0.15 x (45)m	21.8052	19.0709	19.6795	17.1571	16.4626	14.2060	13.1639	15.1058	15.2862	17.8146	19.4460	21.1171 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	14.0986	12.7135	14.0428	13.5525	13.9772	13.4951	13.9255	13.9590	13.5264	14.0156	13.6067	14.0878 (61)
Total heat required for water heating calculated for each month	159.4662	139.8530	145.2393	127.9329	123.7279	108.2016	101.6850	114.6643	115.4344	132.7796	143.2469	154.8686 (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	159.4662	139.8530	145.2393	127.9329	123.7279	108.2016	101.6850	114.6643	115.4344	132.7796	143.2469	154.8686 (64)
Heat gains from water heating, kWh/month	51.8594	45.4523	47.1336	41.4196	39.9864	34.8637	32.6614	36.9743	37.2660	42.9929	46.5070	50.3316 (65)
Solar input (sum of months) = Sum(63)m = 0.0000 (63)												
Total per year (kWh/year) = Sum(64)m = 1567.0997 (64)												

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	115.6069	115.6069	115.6069	115.6069	115.6069	115.6069	115.6069	115.6069	115.6069	115.6069	115.6069	115.6069	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	19.0484	16.9186	13.7592	10.4166	7.7865	6.5737	7.1031	9.2329	12.3924	15.7350	18.3650	19.5778	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	203.7419	205.8561	200.5284	189.1863	174.8689	161.4126	152.4230	150.3088	155.6365	166.9786	181.2960	194.7523	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.5607	34.5607	34.5607	34.5607	34.5607	34.5607	34.5607	34.5607	34.5607	34.5607	34.5607	34.5607	(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)	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	(71)
Water heating gains (Table 5)	69.7035	67.6373	63.3515	57.5272	53.7452	48.4218	43.8997	49.6966	51.7584	57.7862	64.5931	67.6500	(72)
Total internal gains	353.1759	351.0941	338.3212	317.8121	297.0827	277.0902	264.1079	269.9203	280.4693	301.1818	324.9362	342.6621	(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				4.8500	19.6403	0.4500	0.0000	0.7700	33.0060			
West				6.5000	19.6403	0.4500	0.0000	0.7700	44.2348 (76)			
Solar gains	77.2407	151.0993	248.8390	362.9168	444.7682	455.2994	433.4635	372.3388	289.4100	179.2920	96.3101	63.5190 (83)
Total gains	430.4166	502.1934	587.1601	680.7289	741.8508	732.3895	697.5715	642.2591	569.8793	480.4738	421.2463	406.1811 (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)													
tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
alpha	51.2920	51.2920	51.2920	51.2920	51.2920	51.2920	51.2920	51.2920	51.2920	51.2920	51.2920	51.2920	
util living area	4.4195	4.4195	4.4195	4.4195	4.4195	4.4195	4.4195	4.4195	4.4195	4.4195	4.4195	4.4195	
	0.9990	0.9979	0.9940	0.9792	0.9331	0.8246	0.6757	0.7373	0.9257	0.9900	0.9981	0.9993	(86)
MIT	19.4030	19.5510	19.8336	20.2147	20.5849	20.8479	20.9542	20.9320	20.7066	20.2232	19.7362	19.3654	(87)
Th 2	19.6076	19.6076	19.6076	19.6076	19.6076	19.6076	19.6076	19.6076	19.6076	19.6076	19.6076	19.6076	(88)
util rest of house	0.9986	0.9969	0.9911	0.9681	0.8931	0.7151	0.4922	0.5606	0.8620	0.9829	0.9971	0.9989	(89)
MIT 2	18.1810	18.3288	18.6101	18.9850	19.3321	19.5422	19.5984	19.5915	19.4468	18.9979	18.5141	18.1436	(90)
Living area fraction	18.7366	18.8845	19.1664	19.5441	19.9017	20.1359	20.2149	20.2010	20.0196	19.5550	19.0697	18.6991	(92)
MIT	18.7366	18.8845	19.1664	19.5441	19.9017	20.1359	20.2149	20.2010	20.0196	19.5550	19.0697	18.6991	(92)
Temperature adjustment												-0.1500	
adjusted MIT	18.5866	18.7345	19.0164	19.3941	19.7517	19.9859	20.0649	20.0510	19.8696	19.4050	18.9197	18.5491	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9982	0.9961	0.9894	0.9658	0.8983	0.7497	0.5580	0.6241	0.8774	0.9814	0.9964	0.9986	(94)
Ext temp.	429.6223	500.2290	580.9311	657.4333	666.4027	549.0853	389.2600	400.8121	500.0300	471.5355	419.7149	405.6002	(95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Month fracti	1672.2984	1619.3776	1465.0860	1228.3751	942.4779	630.4346	405.5761	427.3598	675.3551	1030.6530	1383.5436	1679.6150	(97)
Space heating kWh	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	1.0000	(97a)
Space heating	924.5511	752.0678	657.8113	411.0781	205.4000	0.0000	0.0000	0.0000	0.0000	415.9834	693.9567	947.8670	(98)
Space heating per m2												5008.7154	(98)
												68.8010	(99)

8c. Space cooling requirement

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CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Not applicable

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000	(201)
Fraction of space heat from main system(s)													1.0000	(202)
Efficiency of main space heating system 1 (in %)													90.5000	(206)
Efficiency of secondary/supplementary heating system, %													0.0000	(208)
Space heating requirement													5534.4921	(211)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
Space heating requirement	924.5511	752.0678	657.8113	411.0781	205.4000	0.0000	0.0000	0.0000	0.0000	415.9834	693.9567	947.8670	(98)	
Space heating efficiency (main heating system 1)	90.5000	90.5000	90.5000	90.5000	90.5000	0.0000	0.0000	0.0000	0.0000	90.5000	90.5000	90.5000	(210)	
Space heating fuel (main heating system)	1021.6034	831.0142	726.8633	454.2299	226.9613	0.0000	0.0000	0.0000	0.0000	459.6502	766.8030	1047.3668	(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	159.4662	139.8530	145.2393	127.9329	123.7279	108.2016	101.6850	114.6643	115.4344	132.7796	143.2469	154.8686	(64)	
Efficiency of water heater (217)m	90.0146	89.9828	89.9040	89.7194	89.2699	87.3000	87.3000	87.3000	87.3000	89.7044	89.9359	90.0365	(216)	
Fuel for water heating, kWh/month	177.1559	155.4219	161.5494	142.5922	138.5998	123.9422	116.4776	131.3451	132.2273	148.0191	159.2766	172.0064	(219)	
Water heating fuel used												1758.6135	(219)	
Annual totals kWh/year														
Space heating fuel - main system												5534.4921	(211)	
Space heating fuel - secondary												0.0000	(215)	
Electricity for pumps and fans:														
(MEV)Decentralised, Database: total watage = 4.2640, total flow = 21.0000, SFP = 0.2030)														
mechanical ventilation fans (SFP = 0.2030)													46.7283	(230a)
central heating pump													30.0000	(230c)
main heating flue fan													45.0000	(230e)
Total electricity for the above, kWh/year													121.7283	(231)
Electricity for lighting (calculated in Appendix L)													336.4009	(232)
Energy saving/generation technologies (Appendices M ,N and Q)														
PV Unit 0 (0.80 * 1.48 * 908 * 1.00) =										-1074.8994		-1074.8994	(233)	
Total delivered energy for all uses													6676.3354	(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	5534.4921	0.2160	1195.4503	(261)
Space heating - secondary	0.0000	0.0000	0.0000	(263)
Water heating (other fuel)	1758.6135	0.2160	379.8605	(264)
Space and water heating			1575.3108	(265)
Pumps and fans	121.7283	0.5190	63.1770	(267)
Energy for lighting	336.4009	0.5190	174.5921	(268)
Energy saving/generation technologies				
PV Unit	-1074.8994	0.5190	-557.8728	(269)
Total CO2, kg/year			1255.2071	(272)
Dwelling Carbon Dioxide Emission Rate (DER)			17.2400	(273)

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

DER			17.2400	ZC1
Total Floor Area		TFA	72.8000	
Assumed number of occupants		N	2.3121	
CO2 emission factor in Table 12 for electricity displaced from grid		EF	0.5190	
CO2 emissions from appliances, equation (L14)			16.5842	ZC2
CO2 emissions from cooking, equation (L16)			2.3969	ZC3
Total CO2 emissions			36.2211	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			36.2211	ZC8

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CALCULATION OF TARGET EMISSIONS 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Built) (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	4.3000 (1b)	x 2.4500 (2b)	= 10.5350 (1b) - (3b)
First floor	68.5000 (1c)	x 2.6000 (2c)	= 178.1000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	72.8000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 188.6350 (5)

2. Ventilation rate

										main	secondary	other	total	m3 per hour
										heating	heating			
Number of chimneys					0	+	0	+	0	=	0 * 40 =	0.0000 (6a)		
Number of open flues					0	+	0	+	0	=	0 * 20 =	0.0000 (6b)		
Number of intermittent fans											3 * 10 =	30.0000 (7a)		
Number of passive vents											0 * 10 =	0.0000 (7b)		
Number of flueless gas fires											0 * 40 =	0.0000 (7c)		
												Air changes per hour		
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(7a)+(7b)+(7c) =										30.0000	/ (5) =	0.1590 (8)	
Pressure test												Yes		
Measured/design AP50												5.0000		
Infiltration rate												0.4090 (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) =	0.3477 (21)		
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Wind factor	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)		
Adj infilt rate	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)		
	0.4433	0.4346	0.4259	0.3824	0.3738	0.3303	0.3303	0.3216	0.3477	0.3738	0.3911	0.4085 (22b)		
Effective ac	0.5983	0.5944	0.5907	0.5731	0.5698	0.5545	0.5545	0.5517	0.5604	0.5698	0.5765	0.5834 (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 Opaque door			4.0500	1.0000	4.0500			(26)					
TER Opening Type (Uw = 1.40)			11.3500	1.3258	15.0473			(27)					
ground			4.3000	0.1300	0.5590			(28a)					
exposed			64.2000	0.1300	8.3460			(28b)					
external	116.2200	15.4000	100.8200	0.1800	18.1476			(29a)					
cd	68.5000		68.5000	0.1300	8.9050			(30)					
Total net area of external elements Aum(A, m2)			253.2200					(31)					
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		55.0549			(33)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000	(35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							18.8290	(36)					
Total fabric heat loss						(33) + (36) =	73.8839	(37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 37.2411	Feb 37.0036	Mar 36.7708	Apr 35.6773	May 35.4727	Jun 34.5204	Jul 34.5204	Aug 34.3440	Sep 34.8872	Oct 35.4727	Nov 35.8866	Dec 36.3193	(38)
Heat transfer coeff	111.1250	110.8875	110.6547	109.5613	109.3567	108.4043	108.4043	108.2280	108.7712	109.3567	109.7706	110.2032	(39)
Average = Sum(39)m / 12 =												109.5603	(39)
HLP	Jan 1.5264	Feb 1.5232	Mar 1.5200	Apr 1.5050	May 1.5022	Jun 1.4891	Jul 1.4891	Aug 1.4866	Sep 1.4941	Oct 1.5022	Nov 1.5078	Dec 1.5138	(40)
HLP (average)												1.5049	(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												2.3121 (42)
Average daily hot water use (litres/day)												89.1133 (43)
Daily hot water use	Jan 98.0246	Feb 94.4601	Mar 90.8956	Apr 87.3310	May 83.7665	Jun 80.2020	Jul 80.2020	Aug 83.7665	Sep 87.3310	Oct 90.8956	Nov 94.4601	Dec 98.0246 (44)
Energy conte	145.3677	127.1395	131.1966	114.3804	109.7507	94.7065	87.7595	100.7053	101.9080	118.7640	129.6402	140.7808 (45)
Energy content (annual)										Total = Sum(45)m =		1402.0990 (45)
Distribution loss (46)m = 0.15 x (45)m	21.8052	19.0709	19.6795	17.1571	16.4626	14.2060	13.1639	15.1058	15.2862	17.8146	19.4460	21.1171 (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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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	49.9523	43.4775	46.3194	43.0674	42.6865	39.5517	40.8700	42.6865	43.0674	46.3194	46.5831	49.9523	(61)
Total heat required for water heating calculated for each month	195.3199	170.6170	177.5160	157.4477	152.4372	134.2581	128.6295	143.3918	144.9754	165.0834	176.2232	190.7331	(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	195.3199	170.6170	177.5160	157.4477	152.4372	134.2581	128.6295	143.3918	144.9754	165.0834	176.2232	190.7331	(64)
Heat gains from water heating, kWh/month	60.8228	53.1433	55.2027	48.7983	47.1637	41.3778	39.3975	44.1561	44.6513	51.0689	54.7511	59.2977	(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	115.6069	115.6069	115.6069	115.6069	115.6069	115.6069	115.6069	115.6069	115.6069	115.6069	115.6069	115.6069	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	19.0484	16.9186	13.7592	10.4166	7.7865	6.5737	7.1031	9.2329	12.3924	15.7350	18.3650	19.5778	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	203.7419	205.8561	200.5284	189.1863	174.8689	161.4126	152.4230	150.3088	155.6365	166.9786	181.2960	194.7523	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.5607	34.5607	34.5607	34.5607	34.5607	34.5607	34.5607	34.5607	34.5607	34.5607	34.5607	34.5607	(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)	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	(71)
Water heating gains (Table 5)	81.7511	79.0822	74.1972	67.7754	63.3921	57.4692	52.9537	59.3496	62.0156	68.6410	76.0432	79.7012	(72)
Total internal gains	365.2235	362.5390	349.1668	328.0603	306.7296	286.1376	273.1619	279.5734	290.7266	312.0366	336.3863	354.7134	(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	4.8500				19.6403		0.6300		0.7000		0.7700		29.1113 (76)	
West	6.5000				19.6403		0.6300		0.7000		0.7700		39.0151 (80)	
Solar gains	68.1263	133.2696	219.4760	320.0926	392.2855	401.5740	382.3149	328.4028	255.2596	158.1356	84.9455	56.0238 (83)		
Total gains	433.3498	495.8086	568.6428	648.1530	699.0151	687.7116	655.4767	607.9762	545.9862	470.1721	421.3318	410.7371 (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	45.4943	45.5917	45.6877	46.1436	46.2300	46.6361	46.6361	46.7121	46.4788	46.2300	46.0557	45.8748	
alpha	4.0330	4.0394	4.0458	4.0762	4.0820	4.1091	4.1091	4.1141	4.0986	4.0820	4.0704	4.0583	
util living area	0.9978	0.9959	0.9902	0.9716	0.9205	0.8078	0.6608	0.7170	0.9078	0.9839	0.9962	0.9983	(86)
MIT	19.2816	19.4399	19.7414	20.1567	20.5471	20.8320	20.9468	20.9247	20.6906	20.1820	19.6604	19.2561	(87)
Th 2	19.6677	19.6702	19.6725	19.6838	19.6859	19.6957	19.6957	19.6975	19.6919	19.6859	19.6816	19.6772	(88)
util rest of house	0.9970	0.9944	0.9864	0.9590	0.8813	0.7079	0.4955	0.5580	0.8447	0.9746	0.9944	0.9976	(89)
MIT 2	17.4120	17.6448	18.0852	18.6901	19.2290	19.5790	19.6765	19.6662	19.4305	18.7353	17.9750	17.3808	(90)
Living area fraction	18.2621	18.4610	18.8382	19.3569	19.8283	20.1487	20.2540	20.2384	20.0034	19.3931	18.7413	18.2335	(91)
MIT	18.2621	18.4610	18.8382	19.3569	19.8283	20.1487	20.2540	20.2384	20.0034	19.3931	18.7413	18.2335	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.2621	18.4610	18.8382	19.3569	19.8283	20.1487	20.2540	20.2384	20.0034	19.3931	18.7413	18.2335	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	431.5244	492.0351	558.9338	618.9231	619.6117	513.7484	374.6927	383.3955	471.2448	456.8701	418.2338	409.3463	(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	1551.5351	1503.7427	1365.2795	1145.6736	888.8871	601.5030	396.1129	415.4219	642.1212	961.5822	1277.8711	1546.5320	(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	833.2879	679.8675	599.9212	379.2603	200.3409	0.0000	0.0000	0.0000	0.0000	375.5058	618.9389	846.0661	(98)
Space heating												4533.1887	(98)
Space heating per m2												62.2691	(99)

8c. Space cooling requirement

Not applicable

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Calculation Type: New Build (As Built)

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												4853.5211 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	833.2879	679.8675	599.9212	379.2603	200.3409	0.0000	0.0000	0.0000	0.0000	375.5058	618.9389	846.0661 (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)	892.1712	727.9096	642.3139	406.0603	214.4977	0.0000	0.0000	0.0000	0.0000	402.0404	662.6755	905.8524 (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	195.3199	170.6170	177.5160	157.4477	152.4372	134.2581	128.6295	143.3918	144.9754	165.0834	176.2232	190.7331 (64)
Efficiency of water heater (217)m	88.2913	88.1751	87.8762	87.1831	85.7401	80.3000	80.3000	80.3000	80.3000	87.0562	87.9484	80.3000 (216)
Fuel for water heating, kWh/month	221.2223	193.4979	202.0068	180.5943	177.7899	167.1957	160.1862	178.5701	180.5422	189.6285	200.3711	215.8699 (219)
Water heating fuel used												2267.4748 (219)
Annual totals kWh/year												
Space heating fuel - main system												4853.5211 (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)												336.4009 (232)
Total delivered energy for all uses												7532.3968 (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	4853.5211	0.2160	1048.3606 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2267.4748	0.2160	489.7745 (264)
Space and water heating			1538.1351 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	336.4009	0.5190	174.5921 (268)
Total CO2, kg/m2/year			1751.6522 (272)
Emissions per m2 for space and water heating			21.1282 (272a)
Fuel factor (mains gas)			1.0000
Emissions per m2 for lighting			2.3982 (272b)
Emissions per m2 for pumps and fans			0.5347 (272c)
Target Carbon Dioxide Emission Rate (TER) = (21.1282 * 1.00) + 2.3982 + 0.5347, rounded to 2 d.p.			24.0600 (273)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Built) (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	4.3000 (1b)	x 2.4500 (2b)	= 10.5350 (1b) - (3b)
First floor	68.5000 (1c)	x 2.6000 (2c)	= 178.1000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	72.8000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 188.6350 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					3 * 10 = 30.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c)					30.0000 / (5) = 0.1590 (8)
Pressure test					Yes
Measured/design AP50					4.2600
Infiltration rate					0.3720 (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) =	0.3162 (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	0.4032	0.3953	0.3874	0.3479	0.3399	0.3004	0.3004	0.2925	0.3162	0.3399	0.3558	0.3716 (22b)
Effective ac	0.5813	0.5781	0.5750	0.5605	0.5578	0.5451	0.5451	0.5428	0.5500	0.5578	0.5633	0.5690 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
entrance			4.0500	1.0000	4.0500		(26)
front (Uw = 1.40)			11.3500	1.3258	15.0473		(27)
ground			4.3000	0.1200	0.5160	75.0000	322.5000 (28a)
exposed			64.2000	0.2000	12.8400	75.0000	4814.9998 (28b)
external	116.2200	15.4000	100.8200	0.2700	27.2214	150.0000	15123.0002 (29a)
cd	68.5000		68.5000	0.1100	7.5350	9.0000	616.5000 (30)
Total net area of external elements Aum(A, m ²)			253.2200				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		67.2097		(33)
stud			81.9000			9.0000	737.1000 (32c)
Heat capacity Cm = Sum(A x k)			(28)...(30) + (32) + (32a)...(32e) =				21614.1000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							296.8970 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							18.7191 (36)
Total fabric heat loss						(33) + (36) =	85.9288 (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	36.1846	35.9881	35.7956	34.8910	34.7217	33.9339	33.9339	33.7880	34.2373	34.7217	35.0641	35.4220 (38)
Heat transfer coeff	122.1134	121.9169	121.7244	120.8198	120.6505	119.8627	119.8627	119.7168	120.1661	120.6505	120.9929	121.3508 (39)
Average = Sum(39)m / 12 =												120.8190 (39)
HLP	1.6774	1.6747	1.6720	1.6596	1.6573	1.6465	1.6465	1.6445	1.6506	1.6573	1.6620	1.6669 (40)
HLP (average)												1.6596 (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												2.3121 (42)
Average daily hot water use (litres/day)												89.1133 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	98.0246	94.4601	90.8956	87.3310	83.7665	80.2020	80.2020	83.7665	87.3310	90.8956	94.4601	98.0246 (44)
Energy content (annual)	145.3677	127.1395	131.1966	114.3804	109.7507	94.7065	87.7595	100.7053	101.9080	118.7640	129.6402	140.7808 (45)
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		1402.0990 (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)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

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	30.8906	27.0171	27.8793	24.3058	23.3220	20.1251	18.6489	21.3999	21.6555	25.2373	27.5485	29.9159 (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	115.6069	115.6069	115.6069	115.6069	115.6069	115.6069	115.6069	115.6069	115.6069	115.6069	115.6069	115.6069	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	19.0484	16.9186	13.7592	10.4166	7.7865	6.5737	7.1031	9.2329	12.3924	15.7350	18.3650	19.5778	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	203.7419	205.8561	200.5284	189.1863	174.8689	161.4126	152.4230	150.3088	155.6365	166.9786	181.2960	194.7523	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.5607	34.5607	34.5607	34.5607	34.5607	34.5607	34.5607	34.5607	34.5607	34.5607	34.5607	34.5607	(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)	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	(71)
Water heating gains (Table 5)	41.5197	40.2041	37.4721	33.7581	31.3468	27.9516	25.0657	28.7633	30.0770	33.9212	38.2619	40.2096	(72)
Total internal gains	321.9920	320.6609	309.4417	291.0430	271.6843	253.6200	242.2739	245.9870	255.7880	274.3168	295.6049	312.2217	(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				4.8500	19.6403	0.4500	0.0000	0.7700	33.0060				
West				6.5000	19.6403	0.4500	0.0000	0.7700	44.2348 (76)				
Solar gains	77.2407	151.0993	248.8390	362.9168	444.7682	455.2994	433.4635	372.3388	289.4100	179.2920	96.3101	63.5190	(83)
Total gains	399.2328	471.7601	558.2807	653.9598	716.4525	708.9193	675.7374	618.3258	545.1980	453.6088	391.9150	375.7408	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Thl (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	49.1667	49.2460	49.3239	49.6932	49.7629	50.0900	50.0900	50.1510	49.9635	49.7629	49.6221	49.4757	
alpha	4.2778	4.2831	4.2883	4.3129	4.3175	4.3393	4.3393	4.3434	4.3309	4.3175	4.3081	4.2984	
util living area	0.9992	0.9983	0.9951	0.9826	0.9426	0.8433	0.7008	0.7630	0.9376	0.9921	0.9986	0.9994	(86)
MIT	19.2994	19.4527	19.7451	20.1483	20.5355	20.8237	20.9439	20.9178	20.6691	20.1632	19.6591	19.2731	(87)
Th 2	19.5571	19.5590	19.5609	19.5699	19.5716	19.5794	19.5794	19.5809	19.5764	19.5716	19.5682	19.5646	(88)
util rest of house	0.9989	0.9975	0.9927	0.9729	0.9063	0.7370	0.5123	0.5847	0.8801	0.9863	0.9978	0.9992	(89)
MIT 2	18.0390	18.1936	18.4864	18.8913	19.2593	19.5020	19.5680	19.5608	19.3909	18.9113	18.4070	18.0185	(90)
Living area fraction									fLA = Living area / (4) =			0.4547	(91)
MIT	18.6121	18.7660	19.0587	19.4628	19.8395	20.1029	20.1936	20.1778	19.9720	19.4805	18.9763	18.5889	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.6121	18.7660	19.0587	19.4628	19.8395	20.1029	20.1936	20.1778	19.9720	19.4805	18.9763	18.5889	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9986	0.9969	0.9915	0.9719	0.9147	0.7823	0.6014	0.6692	0.9004	0.9858	0.9973	0.9989	(94)
Ext temp.	398.6760	470.3212	553.5424	635.5984	655.3698	554.5790	406.4133	413.8093	490.9101	447.1458	390.8571	375.3408	(95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Month fracti	1747.6958	1690.5061	1528.7015	1276.1957	982.0402	659.5932	430.7414	452.2655	705.6198	1071.4377	1436.9497	1746.1089	(97)
Space heating kWh	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	1.0000	(97a)
Space heating per m2	1003.6707	819.9643	725.5183	461.2300	243.0428	0.0000	0.0000	0.0000	0.0000	464.4731	753.1867	1019.8515	(98)
												5490.9374	(98)
												75.4250	(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	1126.7090	886.9837	909.8473	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7199	0.8069	0.7621	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	811.0717	715.6679	693.4352	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	914.8960	874.3939	808.8159	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													

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

	0.0000	0.0000	0.0000	0.0000	0.0000	74.7535	118.0922	85.8432	0.0000	0.0000	0.0000	0.0000 (104)
Space cooling												278.6889 (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	18.6884	29.5230	21.4608	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling												69.6722 (107)
Space cooling per m2												0.9570 (108)
Energy for space heating												75.4250 (99)
Energy for space cooling												0.9570 (108)
Total												76.3820 (109)
Dwelling Fabric Energy Efficiency (DFEE)												76.4 (109)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Built) (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	4.3000 (1b)	x 2.4500 (2b)	= 10.5350 (1b) - (3b)
First floor	68.5000 (1c)	x 2.6000 (2c)	= 178.1000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	72.8000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 188.6350 (5)

2. Ventilation rate

										main	secondary	other	total	m3 per hour			
										heating	heating						
Number of chimneys										0	+	0	+	0	=	0 * 40 =	0.0000 (6a)
Number of open flues										0	+	0	+	0	=	0 * 20 =	0.0000 (6b)
Number of intermittent fans																3 * 10 =	30.0000 (7a)
Number of passive vents																0 * 10 =	0.0000 (7b)
Number of flueless gas fires																0 * 40 =	0.0000 (7c)
										Air changes per hour							
Infiltration due to chimneys, flues and fans										= (6a)+(6b)+(7a)+(7b)+(7c) =					30.0000	/ (5) =	0.1590 (8)
Pressure test										Yes							
Measured/design AP50										5.0000							
Infiltration rate										0.4090 (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) =					0.3477 (21)		
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec					
Wind factor	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)				
Adj infilt rate	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)				
	0.4433	0.4346	0.4259	0.3824	0.3738	0.3303	0.3303	0.3216	0.3477	0.3738	0.3911	0.4085	(22b)				
Effective ac	0.5983	0.5944	0.5907	0.5731	0.5698	0.5545	0.5545	0.5517	0.5604	0.5698	0.5765	0.5834	(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 Opaque door			4.0500	1.0000	4.0500			(26)					
TER Opening Type (Uw = 1.40)			11.3500	1.3258	15.0473			(27)					
ground			4.3000	0.1300	0.5590			(28a)					
exposed			64.2000	0.1300	8.3460			(28b)					
external	116.2200	15.4000	100.8200	0.1800	18.1476			(29a)					
cd	68.5000		68.5000	0.1300	8.9050			(30)					
Total net area of external elements Aum(A, m2)			253.2200					(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	55.0549			(33)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000	(35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							18.8290	(36)					
Total fabric heat loss						(33) + (36) =	73.8839	(37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 37.2411	Feb 37.0036	Mar 36.7708	Apr 35.6773	May 35.4727	Jun 34.5204	Jul 34.5204	Aug 34.3440	Sep 34.8872	Oct 35.4727	Nov 35.8866	Dec 36.3193	(38)
Heat transfer coeff	111.1250	110.8875	110.6547	109.5613	109.3567	108.4043	108.4043	108.2280	108.7712	109.3567	109.7706	110.2032	(39)
Average = Sum(39)m / 12 =												109.5603	(39)
HLP	Jan 1.5264	Feb 1.5232	Mar 1.5200	Apr 1.5050	May 1.5022	Jun 1.4891	Jul 1.4891	Aug 1.4866	Sep 1.4941	Oct 1.5022	Nov 1.5078	Dec 1.5138	(40)
HLP (average)												1.5049	(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												2.3121 (42)
Average daily hot water use (litres/day)												89.1133 (43)
Daily hot water use	Jan 98.0246	Feb 94.4601	Mar 90.8956	Apr 87.3310	May 83.7665	Jun 80.2020	Jul 80.2020	Aug 83.7665	Sep 87.3310	Oct 90.8956	Nov 94.4601	Dec 98.0246 (44)
Energy conte	145.3677	127.1395	131.1966	114.3804	109.7507	94.7065	87.7595	100.7053	101.9080	118.7640	129.6402	140.7808 (45)
Energy content (annual)										Total = Sum(45)m =		1402.0990 (45)
Distribution loss (46)m = 0.15 x (45)m												
Water storage loss:	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

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	30.8906	27.0171	27.8793	24.3058	23.3220	20.1251	18.6489	21.3999	21.6555	25.2373	27.5485	29.9159 (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	115.6069	115.6069	115.6069	115.6069	115.6069	115.6069	115.6069	115.6069	115.6069	115.6069	115.6069	115.6069	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	19.0484	16.9186	13.7592	10.4166	7.7865	6.5737	7.1031	9.2329	12.3924	15.7350	18.3650	19.5778	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	203.7419	205.8561	200.5284	189.1863	174.8689	161.4126	152.4230	150.3088	155.6365	166.9786	181.2960	194.7523	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.5607	34.5607	34.5607	34.5607	34.5607	34.5607	34.5607	34.5607	34.5607	34.5607	34.5607	34.5607	(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)	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	(71)
Water heating gains (Table 5)	41.5197	40.2041	37.4721	33.7581	31.3468	27.9516	25.0657	28.7633	30.0770	33.9212	38.2619	40.2096	(72)
Total internal gains	321.9920	320.6609	309.4417	291.0430	271.6843	253.6200	242.2739	245.9870	255.7880	274.3168	295.6049	312.2217	(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					4.8500	19.6403		0.6300	0.7000	0.7700		29.1113 (76)	
West					6.5000	19.6403		0.6300	0.7000	0.7700		39.0151 (80)	

Solar gains	68.1263	133.2696	219.4760	320.0926	392.2855	401.5740	382.3149	328.4028	255.2596	158.1356	84.9455	56.0238 (83)	
Total gains	390.1184	453.9304	528.9177	611.1356	663.9698	655.1940	624.5888	574.3898	511.0476	432.4524	380.5504	368.2455 (84)	

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	45.4943	45.5917	45.6877	46.1436	46.2300	46.6361	46.6361	46.7121	46.4788	46.2300	46.0557	45.8748	
alpha	4.0330	4.0394	4.0458	4.0762	4.0820	4.1091	4.1091	4.1141	4.0986	4.0820	4.0704	4.0583	
util living area	0.9985	0.9970	0.9924	0.9766	0.9312	0.8266	0.6840	0.7431	0.9231	0.9879	0.9974	0.9989	(86)
MIT	19.2298	19.3902	19.6952	20.1168	20.5166	20.8151	20.9395	20.9137	20.6616	20.1392	19.6117	19.2050	(87)
Th 2	19.6677	19.6702	19.6725	19.6838	19.6859	19.6957	19.6957	19.6975	19.6919	19.6859	19.6816	19.6772	(88)
util rest of house	0.9980	0.9959	0.9894	0.9659	0.8958	0.7304	0.5171	0.5849	0.8670	0.9808	0.9962	0.9984	(89)
MIT 2	18.0760	18.2378	18.5433	18.9675	19.3482	19.6060	19.6804	19.6721	19.4914	18.9955	18.4681	18.0584	(90)
Living area fraction									fLA = Living area / (4) =				0.4547 (91)
MIT	18.6006	18.7618	19.0671	19.4900	19.8795	20.1557	20.2529	20.2366	20.0234	19.5155	18.9881	18.5797	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.6006	18.7618	19.0671	19.4900	19.8795	20.1557	20.2529	20.2366	20.0234	19.5155	18.9881	18.5797	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9974	0.9949	0.9875	0.9639	0.9021	0.7690	0.5945	0.6578	0.8846	0.9795	0.9953	0.9979	(94)
Ext temp.	389.0969	451.6068	522.3055	589.0832	598.9823	503.8467	371.2999	377.8353	452.0545	423.5965	378.7594	367.4881	(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	1589.1596	1537.0977	1390.6058	1160.2585	894.4803	602.2612	395.9865	415.2297	644.3005	974.9715	1304.9606	1584.6930	(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	892.8467	729.4499	646.0154	411.2462	219.8505	0.0000	0.0000	0.0000	0.0000	410.2230	666.8649	905.6005	(98)
Space heating												4882.0971	(98)
Space heating per m2										(98) / (4) =		67.0618	(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	1019.0007	802.1920	822.5325	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7266	0.8104	0.7700	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	740.3846	650.0943	633.3328	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	852.1002	814.6098	757.4622	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	80.4352	122.3995	92.3522	0.0000	0.0000	0.0000	0.0000	(104)
Space cooling												295.1869	(104)

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Calculation Type: New Build (As Built)

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	0.0000 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	20.1088	30.5999	23.0881	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling												73.7967 (107)
Space cooling per m2												1.0137 (108)
Energy for space heating												67.0618 (99)
Energy for space cooling												1.0137 (108)
Total												68.0755 (109)
Target Fabric Energy Efficiency (TFEE)												78.3 (109)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF HEAT DEMAND 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Built) (Version 9.92, January 2014)
CALCULATION OF HEAT DEMAND 09 Jan 2014

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	4.3000 (1b)	x 2.4500 (2b)	= 10.5350 (1b) - (3b)
First floor	68.5000 (1c)	x 2.6000 (2c)	= 178.1000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	72.8000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 188.6350 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					0 * 10 = 0.0000 (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) =					0.0000 / (5) = 0.0000 (8)
Pressure test					Yes
Measured/design AP50					4.2600
Infiltration rate					0.2130 (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) =		0.1811 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.7000	4.4000	4.4000	4.0000	4.1000	3.9000	3.9000	3.8000	3.8000	4.1000	4.0000	4.1000 (22)
Wind factor	1.1750	1.1000	1.1000	1.0000	1.0250	0.9750	0.9750	0.9500	0.9500	1.0250	1.0000	1.0250 (22a)
Adj infilt rate	0.2127	0.1992	0.1992	0.1811	0.1856	0.1765	0.1765	0.1720	0.1720	0.1856	0.1811	0.1856 (22b)
Mechanical extract ventilation - decentralised												
If mechanical ventilation:												0.5000 (23a)
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
entrance			4.0500	1.0000	4.0500		(26)
front (Uw = 1.40)			11.3500	1.3258	15.0473		(27)
ground			4.3000	0.1200	0.5160	75.0000	322.5000 (28a)
exposed			64.2000	0.2000	12.8400	75.0000	4814.9998 (28b)
external	116.2200	15.4000	100.8200	0.2700	27.2214	150.0000	15123.0002 (29a)
cd	68.5000		68.5000	0.1100	7.5350	9.0000	616.5000 (30)
Total net area of external elements Aum(A, m ²)			253.2200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	67.2097		(33)
stud			81.9000			9.0000	737.1000 (32c)
Heat capacity Cm = Sum(A x k)				(28)...(30) + (32) + (32a)...(32e) =			21614.1000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							296.8970 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							18.7191 (36)
Total fabric heat loss						(33) + (36) =	85.9288 (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	31.1248	31.1248	31.1248	31.1248	31.1248	31.1248	31.1248	31.1248	31.1248	31.1248	31.1248	31.1248 (38)
Heat transfer coeff	117.0536	117.0536	117.0536	117.0536	117.0536	117.0536	117.0536	117.0536	117.0536	117.0536	117.0536	117.0536 (39)
Average = Sum(39)m / 12 =												117.0536 (39)
HLP	1.6079	1.6079	1.6079	1.6079	1.6079	1.6079	1.6079	1.6079	1.6079	1.6079	1.6079	1.6079 (40)
HLP (average)												1.6079 (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												2.3121 (42)
Average daily hot water use (litres/day)												89.1133 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	98.0246	94.4601	90.8956	87.3310	83.7665	80.2020	80.2020	83.7665	87.3310	90.8956	94.4601	98.0246 (44)
Energy content	145.3677	127.1395	131.1966	114.3804	109.7507	94.7065	87.7595	100.7053	101.9080	118.7640	129.6402	140.7808 (45)
Energy content (annual)	Total = Sum(45)m =											1402.0990 (45)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF HEAT DEMAND 09 Jan 2014

Distribution loss (46)m = 0.15 x (45)m	21.8052	19.0709	19.6795	17.1571	16.4626	14.2060	13.1639	15.1058	15.2862	17.8146	19.4460	21.1171 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	14.0986	12.7135	14.0428	13.5525	13.9772	13.4951	13.9255	13.9590	13.5264	14.0156	13.6067	14.0878 (61)
Total heat required for water heating calculated for each month	159.4662	139.8530	145.2393	127.9329	123.7279	108.2016	101.6850	114.6643	115.4344	132.7796	143.2469	154.8686 (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	159.4662	139.8530	145.2393	127.9329	123.7279	108.2016	101.6850	114.6643	115.4344	132.7796	143.2469	154.8686 (64)
RHI water heating demand												
Heat gains from water heating, kWh/month	51.8594	45.4523	47.1336	41.4196	39.9864	34.8637	32.6614	36.9743	37.2660	42.9929	46.5070	50.3316 (65)
												1567 (64)
												1567 (64)

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	138.7283	138.7283	138.7283	138.7283	138.7283	138.7283	138.7283	138.7283	138.7283	138.7283	138.7283	138.7283	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	47.6210	42.2966	34.3979	26.0414	19.4663	16.4342	17.7578	23.0822	30.9809	39.3374	45.9125	48.9446	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	304.0924	307.2479	299.2961	282.3676	260.9984	240.9144	227.4970	224.3415	232.2933	249.2218	270.5910	290.6750	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	51.1850	51.1850	51.1850	51.1850	51.1850	51.1850	51.1850	51.1850	51.1850	51.1850	51.1850	51.1850	(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)	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	(71)
Water heating gains (Table 5)	69.7035	67.6373	63.3515	57.5272	53.7452	48.4218	43.8997	49.6966	51.7584	57.7862	64.5931	67.6500	(72)
Total internal gains	521.8446	517.6095	497.4732	466.3640	434.6375	406.1981	389.5822	397.5480	415.4603	446.7731	481.5244	507.6973	(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					4.8500	25.1733	0.4500		0.0000			0.7700			42.3043 (76)
West					6.5000	25.1733	0.4500		0.0000			0.7700			56.6965 (80)

Solar gains	99.0007	164.7446	275.3344	401.0125	460.6155	520.9267	476.8113	428.6689	334.5441	210.7513	123.0382	77.0609	(83)		
Total gains	620.8454	682.3541	772.8076	867.3765	895.2531	927.1248	866.3936	826.2169	750.0044	657.5244	604.5626	584.7582	(84)		

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	51.2920	51.2920	51.2920	51.2920	51.2920	51.2920	51.2920	51.2920	51.2920	51.2920	51.2920	51.2920	
alpha	4.4195	4.4195	4.4195	4.4195	4.4195	4.4195	4.4195	4.4195	4.4195	4.4195	4.4195	4.4195	
util living area	0.9941	0.9906	0.9773	0.9336	0.8284	0.6078	0.4388	0.4457	0.7568	0.9474	0.9877	0.9952	(86)
MIT	19.7584	19.8689	20.1482	20.5118	20.8083	20.9650	20.9936	20.9934	20.9079	20.5613	20.1052	19.7337	(87)
Th 2	19.6076	19.6076	19.6076	19.6076	19.6076	19.6076	19.6076	19.6076	19.6076	19.6076	19.6076	19.6076	(88)
util rest of house	0.9915	0.9864	0.9667	0.9010	0.7443	0.4593	0.2572	0.2556	0.6175	0.9118	0.9810	0.9930	(89)
MIT 2	18.5349	18.6442	18.9179	19.2605	19.5076	19.5990	19.6071	19.6072	19.5768	19.3151	18.8792	18.5107	(90)
Living area fraction									fLA = Living area / (4) =			0.4547	(91)
MIT	19.0912	19.2011	19.4773	19.8295	20.0990	20.2200	20.2375	20.2374	20.1820	19.8817	19.4366	19.0668	(92)
Temperature adjustment												-0.1500	
adjusted MIT	18.9412	19.0511	19.3273	19.6795	19.9490	20.0700	20.0875	20.0874	20.0320	19.7317	19.2866	18.9168	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	0.9897	0.9841	0.9639	0.9031	0.7679	0.5114	0.3211	0.3226	0.6652	0.9159	0.9788	0.9915	(94)
Useful gains	614.4567	671.4990	744.9069	783.3292	687.4385	474.1175	278.1897	266.5066	498.9276	602.2234	591.7508	579.7964	(95)
Ext temp.	5.6000	6.0000	7.6000	10.1000	13.1000	15.9000	17.7000	17.8000	15.4000	12.1000	8.6000	5.7000	(96)
Heat loss rate W	1561.6353	1527.6738	1372.7202	1121.3096	801.6994	488.1189	279.4675	267.7537	542.1946	893.3189	1250.9067	1547.0712	(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	704.7009	575.3495	467.0931	243.3459	85.0102	0.0000	0.0000	0.0000	0.0000	216.5751	474.5923	719.6525	(98)
Space heating												3486.3194	(98)
RHI space heating demand												3486	(98)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF HEAT DEMAND 09 Jan 2014

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF ENERGY RATINGS 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Built) (Version 9.92, January 2014)
CALCULATION OF ENERGY RATINGS 09 Jan 2014

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	4.3000 (1b)	x 2.4500 (2b)	= 10.5350 (1b) - (3b)
First floor	68.5000 (1c)	x 2.6000 (2c)	= 178.1000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	72.8000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 188.6350 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					0 * 10 = 0.0000 (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)					0.0000 / (5) = 0.0000 (8)
Pressure test					Yes
Measured/design AP50					4.2600
Infiltration rate					0.2130 (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)	=	0.1811 (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	0.2308	0.2263	0.2218	0.1992	0.1946	0.1720	0.1720	0.1675	0.1811	0.1946	0.2037	0.2127 (22b)
Mechanical extract ventilation - decentralised												
If mechanical ventilation:												0.5000 (23a)
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
entrance			4.0500	1.0000	4.0500		(26)
front (Uw = 1.40)			11.3500	1.3258	15.0473		(27)
ground			4.3000	0.1200	0.5160	75.0000	322.5000 (28a)
exposed			64.2000	0.2000	12.8400	75.0000	4814.9998 (28b)
external	116.2200	15.4000	100.8200	0.2700	27.2214	150.0000	15123.0002 (29a)
cd	68.5000		68.5000	0.1100	7.5350	9.0000	616.5000 (30)
Total net area of external elements Aum(A, m ²)			253.2200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	67.2097		(33)
stud			81.9000			9.0000	737.1000 (32c)
Heat capacity Cm = Sum(A x k)				(28)...(30) + (32) + (32a)...(32e) =			21614.1000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							296.8970 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							18.7191 (36)
Total fabric heat loss				(33) + (36) =			85.9288 (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	31.1248	31.1248	31.1248	31.1248	31.1248	31.1248	31.1248	31.1248	31.1248	31.1248	31.1248	31.1248 (38)
Heat transfer coeff	117.0536	117.0536	117.0536	117.0536	117.0536	117.0536	117.0536	117.0536	117.0536	117.0536	117.0536	117.0536 (39)
Average = Sum(39)m / 12 =												117.0536 (39)
HLP	1.6079	1.6079	1.6079	1.6079	1.6079	1.6079	1.6079	1.6079	1.6079	1.6079	1.6079	1.6079 (40)
HLP (average)												1.6079 (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												2.3121 (42)
Average daily hot water use (litres/day)												89.1133 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	98.0246	94.4601	90.8956	87.3310	83.7665	80.2020	80.2020	83.7665	87.3310	90.8956	94.4601	98.0246 (44)
Energy content	145.3677	127.1395	131.1966	114.3804	109.7507	94.7065	87.7595	100.7053	101.9080	118.7640	129.6402	140.7808 (45)
Energy content (annual)	Total = Sum(45)m =											1402.0990 (45)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF ENERGY RATINGS 09 Jan 2014

Distribution loss (46)m = 0.15 x (45)m	21.8052	19.0709	19.6795	17.1571	16.4626	14.2060	13.1639	15.1058	15.2862	17.8146	19.4460	21.1171 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	14.0986	12.7135	14.0428	13.5525	13.9772	13.4951	13.9255	13.9590	13.5264	14.0156	13.6067	14.0878 (61)
Total heat required for water heating calculated for each month	159.4662	139.8530	145.2393	127.9329	123.7279	108.2016	101.6850	114.6643	115.4344	132.7796	143.2469	154.8686 (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	159.4662	139.8530	145.2393	127.9329	123.7279	108.2016	101.6850	114.6643	115.4344	132.7796	143.2469	154.8686 (64)
Heat gains from water heating, kWh/month	51.8594	45.4523	47.1336	41.4196	39.9864	34.8637	32.6614	36.9743	37.2660	42.9929	46.5070	50.3316 (65)
Solar input (sum of months) = Sum(63)m = 0.0000 (63)												
Total per year (kWh/year) = Sum(64)m = 1567.0997 (64)												

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	138.7283	138.7283	138.7283	138.7283	138.7283	138.7283	138.7283	138.7283	138.7283	138.7283	138.7283	138.7283	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	47.6210	42.2966	34.3979	26.0414	19.4663	16.4342	17.7578	23.0822	30.9809	39.3374	45.9125	48.9446	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	304.0924	307.2479	299.2961	282.3676	260.9984	240.9144	227.4970	224.3415	232.2933	249.2218	270.5910	290.6750	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	51.1850	51.1850	51.1850	51.1850	51.1850	51.1850	51.1850	51.1850	51.1850	51.1850	51.1850	51.1850	(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)	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	(71)
Water heating gains (Table 5)	69.7035	67.6373	63.3515	57.5272	53.7452	48.4218	43.8997	49.6966	51.7584	57.7862	64.5931	67.6500	(72)
Total internal gains	521.8446	517.6095	497.4732	466.3640	434.6375	406.1981	389.5822	397.5480	415.4603	446.7731	481.5244	507.6973	(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					4.8500	19.6403	0.4500	0.0000	0.7700	33.0060		
West					6.5000	19.6403	0.4500	0.0000	0.7700	44.2348 (76)		
Solar gains	77.2407	151.0993	248.8390	362.9168	444.7682	455.2994	433.4635	372.3388	289.4100	179.2920	96.3101	63.5190 (83)
Total gains	599.0854	668.7088	746.3122	829.2807	879.4057	861.4975	823.0458	769.8868	704.8703	626.0651	577.8345	571.2163 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Thl (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
alpha	51.2920	51.2920	51.2920	51.2920	51.2920	51.2920	51.2920	51.2920	51.2920	51.2920	51.2920	51.2920	
util living area	4.4195	4.4195	4.4195	4.4195	4.4195	4.4195	4.4195	4.4195	4.4195	4.4195	4.4195	4.4195	
	0.9963	0.9934	0.9850	0.9588	0.8908	0.7544	0.5937	0.6488	0.8664	0.9736	0.9933	0.9970	(86)
MIT	19.5777	19.7219	19.9922	20.3493	20.6803	20.8961	20.9724	20.9592	20.7937	20.3634	19.8970	19.5368	(87)
Th 2	19.6076	19.6076	19.6076	19.6076	19.6076	19.6076	19.6076	19.6076	19.6076	19.6076	19.6076	19.6076	(88)
util rest of house	0.9947	0.9906	0.9783	0.9390	0.8357	0.6351	0.4219	0.4770	0.7774	0.9569	0.9900	0.9957	(89)
MIT 2	18.3550	18.4982	18.7653	19.1104	19.4079	19.5667	19.6026	19.5990	19.5062	19.1307	18.6733	18.3143	(90)
Living area fraction									fLA = Living area / (4) =			0.4547	(91)
MIT	18.9109	19.0546	19.3232	19.6737	19.9864	20.1711	20.2254	20.2174	20.0916	19.6911	19.2297	18.8702	(92)
Temperature adjustment												-0.1500	
adjusted MIT	18.7609	18.9046	19.1732	19.5237	19.8364	20.0211	20.0754	20.0674	19.9416	19.5411	19.0797	18.7202	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9934	0.9887	0.9755	0.9375	0.8464	0.6745	0.4829	0.5381	0.8029	0.9558	0.9882	0.9946	(94)
Ext temp.	595.1431	661.1235	728.0619	777.4123	744.3685	581.0816	397.4645	414.2830	565.9285	598.3910	571.0255	568.1456	(95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Month fracti	1692.7050	1639.2858	1483.4377	1243.5418	952.3969	634.5645	406.8063	429.2850	683.7790	1046.5927	1402.2658	1699.6358	(97)
Space heating kWh	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	(97a)
Space heating per m ²	816.5861	657.3251	561.9996	335.6132	154.7732	0.0000	0.0000	0.0000	0.0000	333.4621	598.4931	841.8287	(98)
												4300.0810	(98)
												59.0670	(99)

8c. Space cooling requirement

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF ENERGY RATINGS 09 Jan 2014

Not applicable

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													90.5000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													4751.4707 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	816.5861	657.3251	561.9996	335.6132	154.7732	0.0000	0.0000	0.0000	0.0000	333.4621	598.4931	841.8287	(98)
Space heating efficiency (main heating system 1)	90.5000	90.5000	90.5000	90.5000	90.5000	0.0000	0.0000	0.0000	0.0000	90.5000	90.5000	90.5000	(210)
Space heating fuel (main heating system)	902.3050	726.3261	620.9940	370.8434	171.0201	0.0000	0.0000	0.0000	0.0000	368.4664	661.3183	930.1975	(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	159.4662	139.8530	145.2393	127.9329	123.7279	108.2016	101.6850	114.6643	115.4344	132.7796	143.2469	154.8686	(64)
Efficiency of water heater (217)m	89.9613	89.9217	89.8238	89.5936	89.0499	87.3000	87.3000	87.3000	87.3000	89.5650	89.8639	89.9875	(216)
Fuel for water heating, kWh/month	177.2610	155.5275	161.6935	142.7924	138.9422	123.9422	116.4776	131.3451	132.2273	148.2494	159.4043	172.1002	(219)
Water heating fuel used													(219)
Annual totals kWh/year													
Space heating fuel - main system													4751.4707 (211)
Space heating fuel - secondary													0.0000 (215)
Electricity for pumps and fans:													
(MEV)Decentralised, Database: total watage = 4.2640, total flow = 21.0000, SFP = 0.2030)													
mechanical ventilation fans (SFP = 0.2030)													46.7283 (230a)
central heating pump													30.0000 (230c)
main heating flue fan													45.0000 (230e)
Total electricity for the above, kWh/year													121.7283 (231)
Electricity for lighting (calculated in Appendix L)													336.4009 (232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV Unit 0 (0.80 * 1.48 * 908 * 1.00) =										-1074.8994			-1074.8994 (233)
Total delivered energy for all uses													5894.6633 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	4751.4707	3.4800	165.3512 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1759.9628	3.4800	61.2467 (247)
Mechanical ventilation fans	46.7283	13.1900	6.1635 (249)
Pumps and fans for heating	75.0000	13.1900	9.8925 (249)
Energy for lighting	336.4009	13.1900	44.3713 (250)
Additional standing charges			120.0000 (251)
Energy saving/generation technologies			
PV Unit	-1074.8994	13.1900	-141.7792 (252)
Total energy cost			265.2459 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.4200 (256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	0.9457 (257)
SAP value		86.8075
SAP rating (Section 12)		87 (258)
SAP band		B

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	4751.4707	0.2160	1026.3177 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1759.9628	0.2160	380.1520 (264)
Space and water heating			1406.4696 (265)
Pumps and fans	121.7283	0.5190	63.1770 (267)
Energy for lighting	336.4009	0.5190	174.5921 (268)
Energy saving/generation technologies			
PV Unit	-1074.8994	0.5190	-557.8728 (269)
Total kg/year			1086.3659 (272)
CO2 emissions per m2			14.9200 (273)
EI value			87.6424
EI rating			88 (274)
EI band			B

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)



CALCULATION OF ENERGY RATINGS 09 Jan 2014

Calculation of stars for heating and DHW

Main heating energy efficiency	$3.48 \times (1 + 0.29 \times 0.00) / 0.9050 = 3.845$, stars = 4
Main heating environmental impact	$0.216 \times (1 + 0.29 \times 0.00) / 0.9050 = 0.2387$, stars = 4
Water heating energy efficiency	$3.48 / 0.8891 = 3.914$, stars = 4
Water heating environmental impact	$0.216 / 0.8891 = 0.2429$, stars = 4

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Built) (Version 9.92, January 2014)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY 09 Jan 2014

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	4.3000 (1b)	x 2.4500 (2b)	= 10.5350 (1b) - (3b)
First floor	68.5000 (1c)	x 2.6000 (2c)	= 178.1000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	72.8000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 188.6350 (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											0 * 10 =	0.0000 (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) =											0.0000 / (5) =	0.0000 (8)
Pressure test											Yes	
Measured/design AP50												4.2600
Infiltration rate												0.2130 (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) =	0.1811 (21)
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	4.7000	4.4000	4.4000	4.0000	4.1000	3.9000	3.9000	3.8000	3.8000	4.1000	4.0000	4.1000 (22)
Wind factor	1.1750	1.1000	1.1000	1.0000	1.0250	0.9750	0.9750	0.9500	0.9500	1.0250	1.0000	1.0250 (22a)
Adj infilt rate												
	0.2127	0.1992	0.1992	0.1811	0.1856	0.1765	0.1765	0.1720	0.1720	0.1856	0.1811	0.1856 (22b)
Mechanical extract ventilation - decentralised												
If mechanical ventilation:												0.5000 (23a)
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
entrance			4.0500	1.0000	4.0500		(26)
front (Uw = 1.40)			11.3500	1.3258	15.0473		(27)
ground			4.3000	0.1200	0.5160	75.0000	322.5000 (28a)
exposed			64.2000	0.2000	12.8400	75.0000	4814.9998 (28b)
external	116.2200	15.4000	100.8200	0.2700	27.2214	150.0000	15123.0002 (29a)
cd	68.5000		68.5000	0.1100	7.5350	9.0000	616.5000 (30)
Total net area of external elements Aum(A, m ²)			253.2200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	67.2097		(33)
stud			81.9000			9.0000	737.1000 (32c)
Heat capacity Cm = Sum(A x k)				(28)...(30) + (32) + (32a)...(32e) =			21614.1000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							296.8970 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							18.7191 (36)
Total fabric heat loss				(33) + (36) =			85.9288 (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	31.1248	31.1248	31.1248	31.1248	31.1248	31.1248	31.1248	31.1248	31.1248	31.1248	31.1248	31.1248 (38)
Heat transfer coeff	117.0536	117.0536	117.0536	117.0536	117.0536	117.0536	117.0536	117.0536	117.0536	117.0536	117.0536	117.0536 (39)
Average = Sum(39)m / 12 =												117.0536 (39)
HLP	1.6079	1.6079	1.6079	1.6079	1.6079	1.6079	1.6079	1.6079	1.6079	1.6079	1.6079	1.6079 (40)
HLP (average)												1.6079 (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												2.3121 (42)
Average daily hot water use (litres/day)												89.1133 (43)
Daily hot water use	Jan 98.0246	Feb 94.4601	Mar 90.8956	Apr 87.3310	May 83.7665	Jun 80.2020	Jul 80.2020	Aug 83.7665	Sep 87.3310	Oct 90.8956	Nov 94.4601	Dec 98.0246 (44)
Energy conte	145.3677	127.1395	131.1966	114.3804	109.7507	94.7065	87.7595	100.7053	101.9080	118.7640	129.6402	140.7808 (45)
Energy content (annual)										Total = Sum(45)m =		1402.0990 (45)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY 09 Jan 2014

Distribution loss (46)m = 0.15 x (45)m	21.8052	19.0709	19.6795	17.1571	16.4626	14.2060	13.1639	15.1058	15.2862	17.8146	19.4460	21.1171 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	14.0986	12.7135	14.0428	13.5525	13.9772	13.4951	13.9255	13.9590	13.5264	14.0156	13.6067	14.0878 (61)
Total heat required for water heating calculated for each month	159.4662	139.8530	145.2393	127.9329	123.7279	108.2016	101.6850	114.6643	115.4344	132.7796	143.2469	154.8686 (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	159.4662	139.8530	145.2393	127.9329	123.7279	108.2016	101.6850	114.6643	115.4344	132.7796	143.2469	154.8686 (64)
Heat gains from water heating, kWh/month	51.8594	45.4523	47.1336	41.4196	39.9864	34.8637	32.6614	36.9743	37.2660	42.9929	46.5070	50.3316 (65)
Solar input (sum of months) = Sum(63)m = 0.0000 (63)												
Total per year (kWh/year) = Sum(64)m = 1567.0997 (64)												

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	138.7283	138.7283	138.7283	138.7283	138.7283	138.7283	138.7283	138.7283	138.7283	138.7283	138.7283	138.7283 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	47.6210	42.2966	34.3979	26.0414	19.4663	16.4342	17.7578	23.0822	30.9809	39.3374	45.9125	48.9446 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	304.0924	307.2479	299.2961	282.3676	260.9984	240.9144	227.4970	224.3415	232.2933	249.2218	270.5910	290.6750 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	51.1850	51.1850	51.1850	51.1850	51.1850	51.1850	51.1850	51.1850	51.1850	51.1850	51.1850	51.1850 (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)	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855	-92.4855 (71)
Water heating gains (Table 5)	69.7035	67.6373	63.3515	57.5272	53.7452	48.4218	43.8997	49.6966	51.7584	57.7862	64.5931	67.6500 (72)
Total internal gains	521.8446	517.6095	497.4732	466.3640	434.6375	406.1981	389.5822	397.5480	415.4603	446.7731	481.5244	507.6973 (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												4.8500	25.1733		0.4500		0.0000	0.7700	42.3043 (76)
West												6.5000	25.1733		0.4500		0.0000	0.7700	56.6965 (80)
Solar gains	99.0007	164.7446	275.3344	401.0125	460.6155	520.9267	476.8113	428.6689	334.5441	210.7513	123.0382	77.0609 (83)							
Total gains	620.8454	682.3541	772.8076	867.3765	895.2531	927.1248	866.3936	826.2169	750.0044	657.5244	604.5626	584.7582 (84)							

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Thl (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	51.2920	51.2920	51.2920	51.2920	51.2920	51.2920	51.2920	51.2920	51.2920	51.2920	51.2920	51.2920
alpha	4.4195	4.4195	4.4195	4.4195	4.4195	4.4195	4.4195	4.4195	4.4195	4.4195	4.4195	4.4195
util living area	0.9941	0.9906	0.9773	0.9336	0.8284	0.6078	0.4388	0.4457	0.7568	0.9474	0.9877	0.9952 (86)
MIT	19.7584	19.8689	20.1482	20.5118	20.8083	20.9650	20.9936	20.9934	20.9079	20.5613	20.1052	19.7337 (87)
Th 2	19.6076	19.6076	19.6076	19.6076	19.6076	19.6076	19.6076	19.6076	19.6076	19.6076	19.6076	19.6076 (88)
util rest of house	0.9915	0.9864	0.9667	0.9010	0.7443	0.4593	0.2572	0.2556	0.6175	0.9118	0.9810	0.9930 (89)
MIT 2	18.5349	18.6442	18.9179	19.2605	19.5076	19.5990	19.6071	19.6072	19.5768	19.3151	18.8792	18.5107 (90)
Living area fraction	19.0912	19.2011	19.4773	19.8295	20.0990	20.2200	20.2375	20.2374	20.1820	19.8817	19.4366	19.0668 (92)
Temperature adjustment	18.9412	19.0511	19.3273	19.6795	19.9490	20.0700	20.0875	20.0874	20.0320	19.7317	19.2866	-0.1500
adjusted MIT												18.9168 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	614.4567	671.4990	744.9069	783.3292	687.4385	474.1175	278.1897	266.5066	498.9276	602.2234	591.7508	579.7964 (95)
Ext temp.	5.6000	6.0000	7.6000	10.1000	13.1000	15.9000	17.7000	17.8000	15.4000	12.1000	8.6000	5.7000 (96)
Heat loss rate W	1561.6353	1527.6738	1372.7202	1121.3096	801.6994	488.1189	279.4675	267.7537	542.1946	893.3189	1250.9067	1547.0712 (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	704.7009	575.3495	467.0931	243.3459	85.0102	0.0000	0.0000	0.0000	0.0000	216.5751	474.5923	719.6525 (98)
Space heating												3486.3194 (98)
Space heating per m ²										(98) / (4) =		47.8890 (99)

8c. Space cooling requirement

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY 09 Jan 2014

Not applicable

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000	(201)
Fraction of space heat from main system(s)													1.0000	(202)
Efficiency of main space heating system 1 (in %)													90.5000	(206)
Efficiency of secondary/supplementary heating system, %													0.0000	(208)
Space heating requirement													3852.2866	(211)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
Space heating requirement	704.7009	575.3495	467.0931	243.3459	85.0102	0.0000	0.0000	0.0000	0.0000	216.5751	474.5923	719.6525	(98)	
Space heating efficiency (main heating system 1)	90.5000	90.5000	90.5000	90.5000	90.5000	0.0000	0.0000	0.0000	0.0000	90.5000	90.5000	90.5000	(210)	
Space heating fuel (main heating system)	778.6750	635.7453	516.1249	268.8905	93.9339	0.0000	0.0000	0.0000	0.0000	239.3095	524.4113	795.1961	(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	159.4662	139.8530	145.2393	127.9329	123.7279	108.2016	101.6850	114.6643	115.4344	132.7796	143.2469	154.8686	(64)	
Efficiency of water heater (217)m	89.8920	89.8559	89.7200	89.3712	88.5755	87.3000	87.3000	87.3000	87.3000	89.2565	89.7374	89.9163	(217)	
Fuel for water heating, kWh/month	177.3976	155.6414	161.8808	143.1478	139.6863	123.9422	116.4776	131.3451	132.2273	148.7618	159.6290	172.2363	(219)	
Water heating fuel used												1762.3733	(219)	
Annual totals kWh/year														
Space heating fuel - main system												3852.2866	(211)	
Space heating fuel - secondary												0.0000	(215)	
Electricity for pumps and fans:														
(MEV)Decentralised, Database: total watage = 4.2640, total flow = 21.0000, SFP = 0.2030)														
mechanical ventilation fans (SFP = 0.2030)													46.7283	(230a)
central heating pump													30.0000	(230c)
main heating flue fan													45.0000	(230e)
Total electricity for the above, kWh/year													121.7283	(231)
Electricity for lighting (calculated in Appendix L)													336.4009	(232)
Energy saving/generation technologies (Appendices M ,N and Q)														
PV Unit 0 (0.80 * 1.48 * 1030 * 1.00) =										-1219.5903		-1219.5903	(233)	
Total delivered energy for all uses												4853.1989	(238)	

10a. Fuel costs - using BEDF prices (526)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	3852.2866	10.2300	394.0889 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1762.3733	10.2300	180.2908 (247)
Mechanical ventilation fans	46.7283	36.7200	17.1586 (249)
Pumps and fans for heating	75.0000	36.7200	27.5400 (249)
Energy for lighting	336.4009	36.7200	123.5264 (250)
Additional standing charges			103.0000 (251)
Energy saving/generation technologies			
PV Unit	-1219.5903	36.7200	-447.8336 (252)
Total energy cost			397.7712 (255)

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	3852.2866	0.2160	832.0939 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1762.3733	0.2160	380.6726 (264)
Space and water heating			1212.7666 (265)
Pumps and fans	121.7283	0.5190	63.1770 (267)
Energy for lighting	336.4009	0.5190	174.5921 (268)
Energy saving/generation technologies			
PV Unit	-1219.5903	0.5190	-632.9674 (269)
Total kg/year			817.5682 (272)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	3852.2866	1.2200	4699.7897 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1762.3733	1.2200	2150.0955 (264)
Space and water heating			6849.8852 (265)
Pumps and fans	121.7283	3.0700	373.7059 (267)
Energy for lighting	336.4009	3.0700	1032.7508 (268)
Energy saving/generation technologies			
PV Unit	-1219.5903	3.0700	-3744.1423 (269)
Primary energy kWh/year			4512.1995 (272)
Primary energy kWh/m2/year			61.9808 (273)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY 09 Jan 2014

SAP 2012 EPC IMPROVEMENTS

Current energy efficiency rating: B 87
Current environmental impact rating: B 88

(For testing purposes):

A	Not considered
B	Not considered
C	Not considered
D	Not considered
E Low energy lighting	Already installed
F	Not considered
G	Not considered
H	Not considered
I	Not considered
J	Not considered
K	Not considered
M	Not considered
N Solar water heating	Not applicable
O	Not considered
P	Not considered
R	Not considered
S	Not considered
T	Not considered
U Solar photovoltaic panels	Not applicable
A2	Not considered
A3	Not considered
T2	Not considered
W	Not considered
X	Not considered
Y	Not considered
J2	Not considered
Q2	Not considered
Z1	Not considered
Z2	Not considered
Z3	Not considered
Z4	Not considered
Z5	Not considered
V2 Wind turbine	Not applicable
L2	Not considered
Q3	Not considered
O3	Not considered

Recommended measures: (none) SAP change Cost change CO2 change

Recommended measures (none) Typical annual savings Energy efficiency Environmental impact

Total Savings £0 0.00 kg/m²

Potential energy efficiency rating: B 87
Potential environmental impact rating: B 88

Fuel prices for cost data on this page from database revision number 526 TEST (30 Aug 2023)
Recommendation texts revision number 4.9c (22 Feb 2014)

Typical heating and lighting costs of this home (per year, Southern England):

	Current	Potential	Saving
Electricity	£168	£168	£0
Mains gas	£677	£677	£0
Space heating	£542	£542	£0
Water heating	£180	£180	£0
Lighting	£124	£124	£0
Generated (PV)	-£448	-£448	£0
Total cost of fuels	£397	£397	£0
Total cost of uses	£398	£398	£0
Delivered energy	67 kWh/m²	67 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.8 tonnes	0.8 tonnes	0.0 tonnes
CO2 emissions per m²	11 kg/m²	11 kg/m²	0 kg/m²
Primary energy	62 kWh/m²	62 kWh/m²	0 kWh/m²

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF ENERGY RATINGS FOR IMPROVED DWELLING 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Built) (Version 9.92, January 2014)
CALCULATION OF ENERGY RATINGS FOR IMPROVED DWELLING 09 Jan 2014

No improvements selected / applicable

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Built) (Version 9.92, January 2014)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING 09 Jan 2014

No improvements selected / applicable

SAP 2012 OVERHEATING ASSESSMENT FOR New Build (As Built) 9.92

Overheating Calculation Input Data

Dwelling type	Detached Maisonette
Number of storeys	2
Cross ventilation possible	Yes
SAP Region	Southern England
Front of dwelling faces	West
Overshading	Average or unknown
Thermal mass parameter	296.9 (calculated from construction elements)
Night ventilation	No
Ventilation rate during hot weather (ach)	4.00 (Windows half open)

Overheating Calculation

Summer ventilation heat loss coefficient	249.00 (P1)
Transmission heat loss coefficient	85.93 (37)
Summer heat loss coefficient	334.93 (P2)

Overhangs	Ratio	Z_overhangs	Overhang type
Orientation			
East	0.000	1.000	None
West	0.000	1.000	None

Solar shading	Z blinds	Solar access	Z overhangs	Z summer
Orientation				
East	1.000	0.90	1.000	0.900 (P8)
West	1.000	0.90	1.000	0.900 (P8)

[Jul]	Area m2	Solar flux Table 6a W/m2	Specific data g or Table 6b	Specific data FF or Table 6c	Shading	Gains W
East	4.8500	125.2818	0.4500	0.0000	0.9000	246.0847
West	6.5000	125.2818	0.4500	0.0000	0.9000	329.8043
total:						575.8890

Solar gains	Jun	Jul	Aug	
	619	576	507	(P4)
Internal gains	403	387	395	
Total summer gains	1023	962	901	(P5)
Summer gain/loss ratio	3.05	2.87	2.69	(P6)
Summer external temperature	15.40	17.30	17.30	
Thermal mass temperature increment (TMP = 296.9)	0.00	0.00	0.00	
Threshold temperature	18.45	20.17	19.99	(P7)
Likelihood of high internal temperature	Not significant	Not significant	Not significant	
Assessment of likelihood of high internal temperature:	Not significant			

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Built)

Property Reference	Plot 36	Issued on Date	15/09/2023
Assessment Reference	plot 36	Prop Type Ref	21809
Property	3 Red Oak Road, Southampton, SO30 0AU		
SAP Rating	87 B	DER	17.24
Environmental	88 B	TER	24.06
CO₂ Emissions (t/year)	0.82	% DER<TER	28.35
General Requirements Compliance	Pass	DFEE	76.38
		TFEE	78.29
		% DFEE<TFEE	2.43
Assessor Details	Mr. Ben Tunningley, Ben Tunningley, Tel: 01904217325, ben.tunningley@jspsustainability.co.uk		Assessor ID AU36-0001
Client			

SUMMARY FOR INPUT DATA FOR New Build (As Built)

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)	24.06	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	17.24	kgCO ₂ /m ²	Pass
	-6.82 (-28.3%)	kgCO ₂ /m ²	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	78.29	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	76.38	kWh/m ² /yr	
	-1.9 (-2.4%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.27 (max. 0.30)	0.27 (max. 0.70)	Pass
Floor	0.19 (max. 0.25)	0.20 (max. 0.70)	Pass
Roof	0.11 (max. 0.20)	0.11 (max. 0.35)	Pass
Openings	1.29 (max. 2.00)	1.40 (max. 3.30)	Pass

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	4.26 (measured in this dwelling)	
Maximum	10.0	Pass

Limiting System Efficiencies

4 Heating efficiency

Main heating system	Boiler system with radiators or underfloor - Mains gas Data from database Ideal LOGIC COMBI ESP1 35 Combi boiler Efficiency: 89.6% SEDBUK2009 Minimum: 88.0%	Pass
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BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Built)

Secondary heating system

None

5 Cylinder insulation

Hot water storage

No cylinder

6 Controls

Space heating controls

Programmer, room thermostat and TRVs

Pass

Hot water controls

No cylinder

Boiler interlock

Yes

Pass

7 Low energy lights

Percentage of fixed lights with low-energy fittings

100

%

Minimum

75

%

Pass

8 Mechanical ventilation

Continuous extract system (decentralised)

Specific fan power

0.1600 0.1800

Maximum

0.7

Pass

Criterion 3 – Limiting the effects of heat gains in summer

9 Summertime temperature

Overheating risk (Southern England)

Not significant

Pass

Based on:

Overshading

Average

Windows facing East

4.85 m², No overhang

Windows facing West

6.50 m², No overhang

Air change rate

0.00 ach

Blinds/curtains

None

Criterion 4 – Building performance consistent with DER and DFEE rate

Air permeability and pressure testing

3 Air permeability

Air permeability at 50 pascals

4.26 (measured in this dwelling)

Maximum

10.0

Pass

10 Key features

Roof U-value

0.11

W/m²K

Floor U-value

0.12

W/m²K

Door U-value

1.00

W/m²K

Photovoltaic array

1.48

kW

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

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Built)

Property Reference	Plot 36	Issued on Date	15/09/2023
Assessment Reference	plot 36	Prop Type Ref	21809
Property	3 Red Oak Road, Southampton, SO30 0AU		
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CO ₂ Emissions (t/year)	0.82	% DER<TER	28.35
General Requirements Compliance	Pass	DFEE	76.38
		TFEE	78.29
		% DFEE<TFEE	2.43
Assessor Details	Mr. Ben Tunningley, Ben Tunningley, Tel: 01904217325, ben.tunningley@jspsustainability.co.uk		Assessor ID
			AU36-0001
Client			

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

Orientation	West
Property Tenure	Owner-occupied
Transaction Type	Marketed sale
Terrain Type	Suburban
1.0 Property Type	Maisonette, Detached
2.0 Number of Storeys	2
3.0 Date Built	2021
4.0 Sheltered Sides	2
5.0 Sunlight/Shade	Average or unknown

6.0 Measurements		Heat Loss Perimeter	Internal Floor Area	Average Storey Height
	Ground Floor:	1.00 m	4.30 m ²	2.45 m
	1st Storey:	1.00 m	68.50 m ²	2.60 m

7.0 Living Area	33.10	m ²
8.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	296.9	kJ/m ² K

9.0 External Walls						
Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Gross Area (m ²)	Nett Area (m ²)
external	Cavity Wall	Cavity wall : plasterboard on dabs, dense block, filled cavity, any outside structure	0.27	150.00	116.22	100.82

9.2 Internal Walls				
Description	Construction		Kappa (kJ/m ² K)	Area (m ²)
stud	Plasterboard on timber frame		9.00	81.90

10.0 External Roofs						
Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Gross Area (m ²)	Nett Area (m ²)
cd	External Plane Roof	Plasterboard, insulated at ceiling level	0.11	9.00	68.50	68.50

11.0 Heat Loss Floors					
Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Area (m ²)
ground	Ground Floor - Solid	Suspended concrete floor, carpeted	0.12	75.00	4.30
exposed	Exposed Floor - Solid	Suspended concrete floor, carpeted	0.20	75.00	64.20

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Built)

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	G-value	Frame Type	Frame Factor	U Value (W/m²K)
entrance	Manufacturer	Solid Door							1.00
front	BFRC data	Window	Double Low-E Soft 0.05			0.45			1.40

13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width (m)	Height (m)	Count	Area (m²)	Curtain Closed
entrance	Solid Door	[1] external	West							2.10	
garage	Solid Door	[1] external	South							1.95	
front	Window	[1] external	West	None	0.00					6.50	
rear	Window	[1] external	East	None	0.00					4.85	

14.0 Conservatory

None

15.0 Draught Proofing

100 %

16.0 Draught Lobby

No

17.0 Thermal Bridging

Calculate Bridges

17.1 List of Bridges

Source Type	Bridge Type	Length	Psi	Imported
Independently assessed	E2 Other lintels (including other steel lintels)	10.60	0.300	No
Independently assessed	E3 Sill	7.10	0.015	No
Independently assessed	E4 Jamb	24.00	0.011	No
Independently assessed	E5 Ground floor (normal)	10.40	0.020	No
Table K1 - Default	E20 Exposed floor (normal)	29.70	0.320	No
Table K1 - Default	E21 Exposed floor (inverted)	5.20	0.320	No
Independently assessed	E6 Intermediate floor within a dwelling	5.20	0.070	No
Independently assessed	E10 Eaves (insulation at ceiling level)	22.40	0.060	No
Independently assessed	E12 Gable (insulation at ceiling level)	12.50	0.063	No
Independently assessed	E16 Corner (normal)	22.65	0.067	No
Independently assessed	E17 Corner (inverted – internal area greater than external area)	2.45	-0.090	No

Y-value 0.074 W/m²K

18.0 Pressure Testing

Designed AP ₅₀	Yes	
Property Tested ?	5.01	m³/(h.m²) @ 50 Pa
As Built AP ₅₀	Yes	
	4.26	m³/(h.m²) @ 50 Pa

19.0 Mechanical Ventilation

Summer Overheating

Windows open in hot weather	Windows half open
Cross ventilation possible	Yes
Night Ventilation	No
Air change rate	0.00

Mechanical Ventilation

Mechanical Ventilation System Present	Yes
Approved Installation	No
Mechanical Ventilation data Type	Database
Type	Mechanical extract ventilation - decentralised
MV Reference Number	500229
Duct Type	Rigid

19.1 Mechanical extract ventilation - Decentralised

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Built)

SFP	Fan/Room Type	Count
0.16	Through Wall Fan Kitchen	1
0.18	In Room Fan Other Wet Room	1

20.0 Fans, Open Fireplaces, Flues

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

21.0 Fixed Cooling System

No

22.0 Lighting

Internal

Total number of light fittings	15	
Total number of L.E.L. fittings	15	
Percentage of L.E.L. fittings	100.00	%

External

External lights fitted No

23.0 Electricity Tariff

Standard

24.0 Main Heating 1

	Database	
Percentage of Heat	100	%
Database Ref. No.	17929	
Fuel Type	Mains gas	
Main Heating	BGW	
SAP Code	104	
In Winter	90.5	
In Summer	87.3	
Controls	CBE Programmer, room thermostat and TRVs	
PCDF Controls	0	
Delayed Start Stat	Yes	
Sap Code	2106	
Flue Type	Balanced	
Fan Assisted Flue	Yes	
Is MHS Pumped	Pump in heated space	
Heat Emitter	Radiators	
Flow Temperature	Normal (> 45°C)	
Combi boiler type	Standard Combi	
Combi keep hot type	None	

25.0 Main Heating 2

None

Community Heating None

28.0 Water Heating

HWP From main heating 1

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Built)

Water Heating	Main Heating 1			
Flue Gas Heat Recovery System	No			
Waste Water Heat Recovery Instantaneous System 1	No			
Waste Water Heat Recovery Instantaneous System 2	No			
Waste Water Heat Recovery Storage System	No			
Solar Panel	No			
Water use <= 125 litres/person/day	Yes			
SAP Code	901			

29.0 Hot Water Cylinder	None			
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32.0 Photovoltaic Unit	One Dwelling			
PV Cells kWp	Orientation	Elevation	Overshading	Connected to Dwelling
1.48	East	30°	None Or Little	Yes

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None