

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)



Property Reference	4907-T511-3796-219			Issued on Date	08/09/2023
Assessment Reference	As Built	Prop Type Ref	2F Flat Semi		
Property	55, Pembers Farm Avenue, Fair Oak, EASTLEIGH, SO50 7QL				
SAP Rating	80 C	DER	19.97	TER	24.89
Environmental	87 B	% DER<TER	19.76		
CO ₂ Emissions (t/year)	0.86	DFEE	69.68	TFEE	76.54
General Requirements Compliance	Pass	% DFEE<TFEE	8.95		
Assessor Details	Miss Lindsey Dean, Lindsey Dean, Tel: 01884 242050, Lindsey.dean@aessc.co.uk			Assessor ID	T510-0001
Client	Drew Smith				

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

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DWELLING AS BUILT

Top-floor flat, total floor area 52 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) 24.89 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 19.97 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)76.5 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)69.7 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.26 (max. 0.30)	0.32 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.11 (max. 0.25)	0.11 (max. 0.70)	OK
Roof	0.14 (max. 0.20)	0.30 (max. 0.35)	OK
Openings	1.40 (max. 2.00)	1.80 (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: 4.52 (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 ESP1 30
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: 0.1700 0.1800
Maximum 0.7 OK

9 Summertime temperature

Overheating risk (Southern England): Medium OK
Based on:
Overshading: Average
Windows facing South: 1.63 m², No overhang
Windows facing West: 4.85 m², No overhang
Air change rate: 4.00 ach
Blinds/curtains: None

10 Key features

Party wall U-value 0.00 W/m²K
Roof U-value 0.11 W/m²K
Exposed floor U-value 0.11 W/m²K
Door U-value 0.63 W/m²K
Photovoltaic array 439.41 kWh/Year

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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	51.5400 (1b)	x 2.3500 (2b)	= 121.1190 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.5400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 121.1190 (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					4.5200
Infiltration rate					0.2260 (18)
Number of sides sheltered					1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =				0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =				0.2091 (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	0.2665	0.2613	0.2561	0.2300	0.2247	0.1986	0.1986	0.1934	0.2091	0.2247	0.2352	0.2456 (22b)
Mechanical extract ventilation - decentralised												0.5000 (23a)
If mechanical ventilation:												0.5000 (23a)
Effective ac	0.5165	0.5113	0.5061	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
Window (Uw = 1.40)			4.3600	1.3258	5.7803		(27)
French Door (Uw = 1.40)			2.1200	1.3258	2.8106		(27)
DTC			2.1200	0.6300	1.3356		(26)
Roof Window (Uw = 1.80)			3.9400	1.6791	6.6157		(27a)
Exposed Floor to Stairwell			7.0300	0.1100	0.7733	20.0000	140.6000 (28b)
140mm Timber Frame	14.1100	1.6300	12.4800	0.1900	2.3712	9.0000	112.3200 (29a)
WTS	3.0700	2.1200	0.9500	0.1500	0.1425	18.0000	17.1000 (29a)
WTV TBC	28.3200		28.3200	0.2500	7.0800	9.0000	254.8800 (29a)
Dormer Cheek	3.1000	1.2600	1.8400	0.3200	0.5888	9.0000	16.5600 (29a)
Timber Stud Wall	8.9200	3.5900	5.3300	0.2800	1.4924	9.0000	47.9700 (29a)
Rooflight Stud Wall	23.7000		23.7000	0.3000	7.1100	9.0000	213.3000 (29a)
400mm Mineral Wool	35.7400		35.7400	0.1100	3.9314	9.0000	321.6600 (30)
Sloping	13.2100		13.2100	0.2000	2.6420	9.0000	118.8900 (30)
Dormer Roof	1.5100		1.5100	0.2800	0.4228	9.0000	13.5900 (30)
Rooflight Sloping	4.0500	3.9400	0.1100	0.3000	0.0330	9.0000	0.9900 (30)
Total net area of external elements Aum(A, m ²)			142.7600				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	43.1296	(33)
Timebr Frame					0.0000	0.0000	(32)
Party Floor						30.0000	1335.3000 (32d)
Timber						9.0000	840.5100 (32c)
Heat capacity Cm = Sum (A x k)					(28)...(30) + (32) + (32a)...(32e) =		3687.0700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							71.5380 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							27.7200 (36)
Total fabric heat loss					(33) + (36) =		70.8496 (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	20.6457	20.4368	20.2279	19.9846	19.9846	19.9846	19.9846	19.9846	19.9846	19.9846	19.9846	19.9846 (38)
Heat transfer coeff	91.4952	91.2864	91.0775	90.8342	90.8342	90.8342	90.8342	90.8342	90.8342	90.8342	90.8342	90.8342 (39)
Average = Sum(39)m / 12 =												90.9472 (39)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.7752	1.7712	1.7671	1.7624	1.7624	1.7624	1.7624	1.7624	1.7624	1.7624	1.7624	1.7624 (40)
HLP (average)												1.7646 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

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CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

4. Water heating energy requirements (kWh/year)

Assumed occupancy	1.7355 (42)											
Average daily hot water use (litres/day)	75.4181 (43)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	82.9599	79.9432	76.9265	73.9098	70.8930	67.8763	67.8763	70.8930	73.9098	76.9265	79.9432	82.9599 (44)
Energy content (annual)	123.0272	107.6004	111.0339	96.8021	92.8839	80.1517	74.2724	85.2286	86.2465	100.5120	109.7167	119.1453 (45)
Distribution loss (46)m = 0.15 x (45)m	18.4541	16.1401	16.6551	14.5203	13.9326	12.0228	11.1409	12.7843	12.9370	15.0768	16.4575	17.8718 (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	14.5231	13.0991	14.4732	13.9729	14.4145	13.9215	14.3682	14.3982	13.9495	14.4489	14.0214	14.5134 (61)
Total heat required for water heating calculated for each month	137.5503	120.6995	125.5071	110.7750	107.2983	94.0732	88.6405	99.6268	100.1961	114.9609	123.7382	133.6587 (62)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63)
Solar input (sum of months) = Sum(63)m =	0.0000 (63)											
Output from w/h	137.5503	120.6995	125.5071	110.7750	107.2983	94.0732	88.6405	99.6268	100.1961	114.9609	123.7382	133.6587 (64)
Heat gains from water heating, kWh/month	44.5373	39.0519	40.5371	35.6799	34.4875	30.1308	28.2876	31.9381	32.1644	37.0325	39.9862	43.2442 (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	86.7750	86.7750	86.7750	86.7750	86.7750	86.7750	86.7750	86.7750	86.7750	86.7750	86.7750	86.7750 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	13.4920	11.9834	9.7456	7.3780	5.5152	4.6561	5.0311	6.5396	8.7775	11.1450	13.0079	13.8669 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	151.2325	152.8018	148.8472	140.4282	129.8008	119.8125	113.1398	111.5704	115.5251	123.9440	134.5714	144.5597 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.6775	31.6775	31.6775	31.6775	31.6775	31.6775	31.6775	31.6775	31.6775	31.6775	31.6775	31.6775 (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)	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200 (71)
Water heating gains (Table 5)	59.8620	58.1130	54.4853	49.5554	46.3542	41.8484	38.0210	42.9275	44.6727	49.7748	55.5363	58.1239 (72)
Total internal gains	276.6189	274.9307	265.1106	249.3942	233.7026	218.3495	208.2243	213.0701	221.0078	236.8964	255.1482	268.5830 (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
South				1.6300	46.7521	0.7200		0.7000	0.7700			26.6166 (78)
West				2.7300	19.6403	0.7200		0.7000	0.7700			18.7272 (80)
West				2.1200	19.6403	0.7200		0.7000	0.7700			14.5428 (80)
East				3.1500	25.9287	0.6300		0.7000	1.0000			32.4170 (82)
West				0.7900	25.9287	0.6300		0.7000	1.0000			8.1300 (82)

Solar gains	100.4336	189.7977	300.9201	428.0797	519.8428	531.1522	506.0143	437.0262	345.8072	221.7047	123.9118	83.4992 (83)
Total gains	377.0525	464.7284	566.0307	677.4739	753.5454	749.5018	714.2386	650.0963	566.8150	458.6011	379.0600	352.0822 (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	11.1939	11.2195	11.2452	11.2753	11.2753	11.2753	11.2753	11.2753	11.2753	11.2753	11.2753	11.2753
alpha	1.7463	1.7480	1.7497	1.7517	1.7517	1.7517	1.7517	1.7517	1.7517	1.7517	1.7517	1.7517
util living area	0.9331	0.9046	0.8562	0.7767	0.6724	0.5539	0.4478	0.4923	0.6681	0.8319	0.9117	0.9400 (86)
MIT	17.1583	17.5672	18.2611	19.1195	19.8903	20.4546	20.7380	20.6790	20.1859	19.1516	17.9902	17.0776 (87)
Th 2	19.4874	19.4902	19.4931	19.4964	19.4964	19.4964	19.4964	19.4964	19.4964	19.4964	19.4964	19.4964 (88)
util rest of house	0.9232	0.8906	0.8347	0.7416	0.6167	0.4665	0.3251	0.3698	0.5897	0.7970	0.8963	0.9310 (89)
MIT 2	16.0854	16.4870	17.1639	17.9863	18.6973	19.1842	19.3951	19.3624	18.9846	18.0437	16.9157	16.0119 (90)
Living area fraction	16.5126	16.9171	17.6007	18.4375	19.1723	19.6900	19.9298	19.8866	19.4628	18.4848	17.3435	16.4362 (92)
Temperature adjustment	16.3626	16.7671	17.4507	18.2875	19.0223	19.5400	19.7798	19.7366	19.3128	18.3348	17.1935	-0.1500
adjusted MIT	16.3626	16.7671	17.4507	18.2875	19.0223	19.5400	19.7798	19.7366	19.3128	18.3348	17.1935	16.2862 (93)

8. Space heating requirement

Utilisation	0.8935	0.8558	0.7967	0.7072	0.5963	0.4694	0.3506	0.3917	0.5783	0.7619	0.8631	0.9031 (94)
Useful gains	336.9003	397.7349	450.9294	479.0831	449.3568	351.7795	250.4273	254.6449	327.8017	349.4041	327.1677	317.9644 (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)

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Heat loss rate W	1103.6661	1083.3048	997.3609	852.7045	665.1111	448.7233	288.8318	303.0734	473.5042	702.5813	916.8390	1097.8381 (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	570.4738	460.7030	406.5450	269.0074	160.5213	0.0000	0.0000	0.0000	0.0000	262.7638	424.5634	580.2260 (98)
Space heating												3134.8037 (98)
Space heating per m2											(98) / (4) =	60.8227 (99)

8c. Space cooling requirement

Not applicable

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												90.5000 (206)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement												3463.8715 (211)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	570.4738	460.7030	406.5450	269.0074	160.5213	0.0000	0.0000	0.0000	0.0000	262.7638	424.5634	580.2260 (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)	630.3578	509.0641	449.2210	297.2458	177.3715	0.0000	0.0000	0.0000	0.0000	290.3467	469.1308	641.1337 (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	137.5503	120.6995	125.5071	110.7750	107.2983	94.0732	88.6405	99.6268	100.1961	114.9609	123.7382	133.6587 (64)
Efficiency of water heater	89.8601	89.8165	89.7242	89.5426	89.1902	87.3000	87.3000	87.3000	87.3000	89.5015	89.7575	87.3000 (216)
(217)m	89.8601	89.8165	89.7242	89.5426	89.1902	87.3000	87.3000	87.3000	87.3000	89.5015	89.7575	89.8831 (217)
Fuel for water heating, kWh/month	153.0716	134.3845	139.8810	123.7120	120.3028	107.7586	101.5355	114.1200	114.7721	128.4457	137.8583	148.7027 (219)
Water heating fuel used												1524.5450 (219)
Annual totals kWh/year												
Space heating fuel - main system												3463.8715 (211)
Space heating fuel - secondary												0.0000 (215)
Electricity for pumps and fans:												
(MEV)Decentralised, Database: total watage = 4.7450, total flow = 21.0000, SFP = 0.2260)												
mechanical ventilation fans (SFP = 0.2260)												33.3879 (230a)
central heating pump												30.0000 (230c)
main heating flue fan												45.0000 (230e)
Total electricity for the above, kWh/year												108.3879 (231)
Electricity for lighting (calculated in Appendix L)												238.2723 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
Total delivered energy for all uses												5335.0767 (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	3463.8715	0.2160	748.1962 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1524.5450	0.2160	329.3017 (264)
Space and water heating			1077.4980 (265)
Pumps and fans	108.3879	0.5190	56.2533 (267)
Energy for lighting	238.2723	0.5190	123.6633 (268)
Energy saving/generation technologies			
PV Unit	-439.4100	0.5190	-228.0538 (269)
Total CO2, kg/year			1029.3608 (272)
Dwelling Carbon Dioxide Emission Rate (DER)			19.9700 (273)

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

DER			19.9700 ZC1
Total Floor Area		TFA	51.5400
Assumed number of occupants		N	1.7355
CO2 emission factor in Table 12 for electricity displaced from grid		EF	0.5190
CO2 emissions from appliances, equation (L14)			17.3879 ZC2
CO2 emissions from cooking, equation (L16)			3.1170 ZC3
Total CO2 emissions			40.4749 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			40.4749 ZC8

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CALCULATION OF TARGET EMISSIONS 09 Jan 2014

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1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	51.5400 (1b)	x 2.3500 (2b)	= 121.1190 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.5400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 121.1190 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ 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				2 * 10 =	20.0000 (7a)
Number of passive vents				0 * 10 =	0.0000 (7b)
Number of flueless gas fires				0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					Air changes per hour
Pressure test				20.0000 / (5) =	0.1651 (8)
Measured/design AP50					Yes
Infiltration rate					5.0000
Number of sides sheltered					0.4151 (18)
					1 (19)
Shelter factor				(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor				(21) = (18) x (20) =	0.3840 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate												
Effective ac	0.4896	0.4800	0.4704	0.4224	0.4128	0.3648	0.3648	0.3552	0.3840	0.4128	0.4320	0.4512 (22b)
	0.6198	0.6152	0.6106	0.5892	0.5852	0.5665	0.5665	0.5631	0.5737	0.5852	0.5933	0.6018 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
TER Opaque door			2.1200	1.0000	2.1200		(26)
TER Opening Type (Uw = 1.40)			6.4800	1.3258	8.5909		(27)
TER Room Window (Uw = 1.70)			3.9400	1.5918	6.2715		(27a)
Exposed Floor to Stairwell			7.0300	0.1300	0.9139		(28b)
140mm Timber Frame	14.1100	1.6300	12.4800	0.1800	2.2464		(29a)
WTS	3.0700	2.1200	0.9500	0.1800	0.1710		(29a)
WTV TBC	28.3200		28.3200	0.1800	5.0976		(29a)
Dormer Cheek	3.1000	1.2600	1.8400	0.1800	0.3312		(29a)
Timber Stud Wall	8.9200	3.5900	5.3300	0.1800	0.9594		(29a)
Rooflight Stud Wall	23.7000		23.7000	0.1800	4.2660		(29a)
400mm Mineral Wool	35.7400		35.7400	0.1300	4.6462		(30)
Sloping	13.2100		13.2100	0.1300	1.7173		(30)
Dormer Roof	1.5100		1.5100	0.1300	0.1963		(30)
Rooflight Sloping	4.0500	3.9400	0.1100	0.1300	0.0143		(30)
Total net area of external elements Aum(A, m ²)			142.7600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	37.5420		(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							23.2737 (36)
Total fabric heat loss						(33) + (36) =	60.8157 (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	24.7749	24.5889	24.4066	23.5502	23.3900	22.6441	22.6441	22.5059	22.9314	23.3900	23.7141	24.0530 (38)
Heat transfer coeff	85.5907	85.4047	85.2223	84.3659	84.2057	83.4598	83.4598	83.3217	83.7471	84.2057	84.5298	84.8687 (39)
Average = Sum(39)m / 12 =												84.3652 (39)
HLP	1.6607	1.6571	1.6535	1.6369	1.6338	1.6193	1.6193	1.6166	1.6249	1.6338	1.6401	1.6467 (40)
HLP (average)												1.6369 (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												1.7355 (42)
Average daily hot water use (litres/day)												75.4181 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	82.9599	79.9432	76.9265	73.9098	70.8930	67.8763	67.8763	70.8930	73.9098	76.9265	79.9432	82.9599 (44)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF TARGET EMISSIONS 09 Jan 2014

Energy conte	123.0272	107.6004	111.0339	96.8021	92.8839	80.1517	74.2724	85.2286	86.2465	100.5120	109.7167	119.1453 (45)
Energy content (annual)										Total =	Sum (45)m =	1186.6207 (45)
Distribution loss (46)m = 0.15 x (45)m												
	18.4541	16.1401	16.6551	14.5203	13.9326	12.0228	11.1409	12.7843	12.9370	15.0768	16.4575	17.8718 (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	42.2755	36.7958	39.2009	36.4486	36.1263	33.4732	34.5890	36.1263	36.4486	39.2009	39.4240	42.2755 (61)
Total heat required for water heating calculated for each month												
	165.3027	144.3961	150.2348	133.2507	129.0102	113.6250	108.8614	121.3549	122.6952	139.7129	149.1408	161.4207 (62)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63)
								Solar input (sum of months) =	Sum (63)m =			0.0000 (63)
Output from w/h	165.3027	144.3961	150.2348	133.2507	129.0102	113.6250	108.8614	121.3549	122.6952	139.7129	149.1408	161.4207 (64)
								Total per year (kWh/year) =	Sum (64)m =			1639.0054 (64)
Heat gains from water heating, kWh/month												
	51.4754	44.9761	46.7190	41.2989	39.9155	35.0188	33.3428	37.3701	37.7891	43.2205	46.3368	50.1847 (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	86.7750	86.7750	86.7750	86.7750	86.7750	86.7750	86.7750	86.7750	86.7750	86.7750	86.7750	86.7750 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	13.4920	11.9834	9.7456	7.3780	5.5152	4.6561	5.0311	6.5396	8.7775	11.1450	13.0079	13.8669 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	151.2325	152.8018	148.8472	140.4282	129.8008	119.8125	113.1398	111.5704	115.5251	123.9440	134.5714	144.5597 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	31.6775	31.6775	31.6775	31.6775	31.6775	31.6775	31.6775	31.6775	31.6775	31.6775	31.6775	31.6775 (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)												
	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200 (71)
Water heating gains (Table 5)												
	69.1874	66.9287	62.7944	57.3595	53.6498	48.6372	44.8156	50.2286	52.4849	58.0920	64.3567	67.4525 (72)
Total internal gains	285.9443	283.7464	273.4196	257.1983	240.9983	225.1383	215.0190	220.3712	228.8200	245.2136	263.9685	277.9117 (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
South				1.6300	46.7521	0.6300	0.7000			0.7700			23.2895 (78)
West				4.8500	19.6403	0.6300	0.7000			0.7700			29.1113 (80)
East				3.1500	25.9287	0.6300	0.7000			1.0000			32.4170 (82)
West				0.7900	25.9287	0.6300	0.7000			1.0000			8.1300 (82)

Solar gains	92.9477	176.2134	280.5813	400.6950	487.7211	498.7712	474.9894	409.5142	322.9744	206.1742	114.7826	77.2043 (83)	
Total gains	378.8921	459.9598	554.0010	657.8932	728.7194	723.9096	690.0084	629.8854	551.7944	451.3878	378.7511	355.1160 (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	41.8173	41.9083	41.9980	42.4243	42.5050	42.8849	42.8849	42.9560	42.7378	42.5050	42.3420	42.1730
alpha	3.7878	3.7939	3.7999	3.8283	3.8337	3.8590	3.8590	3.8637	3.8492	3.8337	3.8228	3.8115
util living area	0.9952	0.9895	0.9733	0.9249	0.8207	0.6603	0.5093	0.5701	0.8117	0.9602	0.9910	0.9962 (86)
MIT	19.2457	19.4655	19.8374	20.3098	20.6900	20.9058	20.9735	20.9594	20.7820	20.2593	19.6623	19.2086 (87)
Th 2	19.5692	19.5718	19.5743	19.5864	19.5886	19.5992	19.5992	19.6012	19.5951	19.5886	19.5841	19.5793 (88)
util rest of house	0.9935	0.9858	0.9634	0.8965	0.7549	0.5451	0.3581	0.4145	0.7164	0.9394	0.9872	0.9949 (89)
MIT 2	17.2971	17.6181	18.1552	18.8221	19.3086	19.5435	19.5913	19.5873	19.4357	18.7722	17.9146	17.2495 (90)
Living area fraction									fLA =	Living area / (4) =		0.3981 (91)
MIT	18.0729	18.3536	18.8249	19.4144	19.8586	20.0859	20.1416	20.1336	19.9717	19.3643	18.6104	18.0295 (92)
Temperature adjustment												0.0000
adjusted MIT	18.0729	18.3536	18.8249	19.4144	19.8586	20.0859	20.1416	20.1336	19.9717	19.3643	18.6104	18.0295 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9907	0.9812	0.9564	0.8923	0.7691	0.5880	0.4189	0.4770	0.7458	0.9350	0.9832	0.9927 (94)
Useful gains	375.3856	451.2978	529.8523	587.0201	560.4706	425.6521	289.0631	300.4298	411.5054	422.0374	372.4061	352.5076 (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												
	1178.8338	1149.0013	1050.3589	887.0571	687.0031	457.8514	295.5810	311.0871	491.7402	738.0007	972.9736	1173.6924 (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												
	597.7655	468.8567	387.2569	216.0267	94.1402	0.0000	0.0000	0.0000	0.0000	235.0767	432.4086	610.9614 (98)
Space heating												3042.4927 (98)
Space heating per m2										(98) / (4) =		59.0317 (99)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF TARGET EMISSIONS 09 Jan 2014

8c. Space cooling requirement

Not applicable

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000	(201)
Fraction of space heat from main system(s)													1.0000	(202)
Efficiency of main space heating system 1 (in %)													93.4000	(206)
Efficiency of secondary/supplementary heating system, %													0.0000	(208)
Space heating requirement													3257.4868	(211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Space heating requirement	597.7655	468.8567	387.2569	216.0267	94.1402	0.0000	0.0000	0.0000	0.0000	235.0767	432.4086	610.9614	(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)	640.0058	501.9879	414.6220	231.2919	100.7925	0.0000	0.0000	0.0000	0.0000	251.6881	462.9642	654.1343	(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	165.3027	144.3961	150.2348	133.2507	129.0102	113.6250	108.8614	121.3549	122.6952	139.7129	149.1408	161.4207	(64)	
Efficiency of water heater (217)m	88.0022	87.7998	87.3298	86.2608	84.2720	80.3000	80.3000	80.3000	80.3000	86.3512	87.5751	88.0846	(216)	
Fuel for water heating, kWh/month	187.8393	164.4608	172.0316	154.4743	153.0878	141.5006	135.5684	151.1269	152.7960	161.7961	170.3003	183.2565	(219)	
Water heating fuel used												1928.2385	(219)	
Annual totals kWh/year														
Space heating fuel - main system													3257.4868	(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)													238.2723	(232)
Total delivered energy for all uses													5498.9977	(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	3257.4868	0.2160	703.6172 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1928.2385	0.2160	416.4995 (264)
Space and water heating			1120.1167 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	238.2723	0.5190	123.6633 (268)
Total CO2, kg/m2/year			1282.7050 (272)
Emissions per m2 for space and water heating			21.7330 (272a)
Fuel factor (mains gas)			1.0000
Emissions per m2 for lighting			2.3994 (272b)
Emissions per m2 for pumps and fans			0.7552 (272c)
Target Carbon Dioxide Emission Rate (TER) = (21.7330 * 1.00) + 2.3994 + 0.7552, rounded to 2 d.p.			24.8900 (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	51.5400 (1b)	x 2.3500 (2b)	= 121.1190 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.5400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 121.1190 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					2 * 10 = 20.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
					Air changes per hour
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					20.0000 / (5) = 0.1651 (8)
Pressure test					Yes
Measured/design AP50					4.5200
Infiltration rate					0.3911 (18)
Number of sides sheltered					1 (19)
Shelter factor			(20) = 1 - [0.075 x (19)] =		0.9250 (20)
Infiltration rate adjusted to include shelter factor			(21) = (18) x (20) =		0.3618 (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												
	0.4613	0.4522	0.4432	0.3980	0.3889	0.3437	0.3437	0.3347	0.3618	0.3889	0.4070	0.4251 (22b)
Effective ac	0.6064	0.6023	0.5982	0.5792	0.5756	0.5591	0.5591	0.5560	0.5654	0.5756	0.5828	0.5904 (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
Window (Uw = 1.40)			4.3600	1.3258	5.7803		(27)
French Door (Uw = 1.40)			2.1200	1.3258	2.8106		(27)
DTC			2.1200	0.6300	1.3356		(26)
Roof Window (Uw = 1.80)			3.9400	1.6791	6.6157		(27a)
Exposed Floor to Stairwell			7.0300	0.1100	0.7733	20.0000	140.6000 (28b)
140mm Timber Frame	14.1100	1.6300	12.4800	0.1900	2.3712	9.0000	112.3200 (29a)
WTS	3.0700	2.1200	0.9500	0.1500	0.1425	18.0000	17.1000 (29a)
WTV TBC	28.3200		28.3200	0.2500	7.0800	9.0000	254.8800 (29a)
Dormer Cheek	3.1000	1.2600	1.8400	0.3200	0.5888	9.0000	16.5600 (29a)
Timber Stud Wall	8.9200	3.5900	5.3300	0.2800	1.4924	9.0000	47.9700 (29a)
Rooflight Stud Wall	23.7000		23.7000	0.3000	7.1100	9.0000	213.3000 (29a)
400mm Mineral Wool	35.7400		35.7400	0.1100	3.9314	9.0000	321.6600 (30)
Sloping	13.2100		13.2100	0.2000	2.6420	9.0000	118.8900 (30)
Dormer Roof	1.5100		1.5100	0.2800	0.4228	9.0000	13.5900 (30)
Rooflight Sloping	4.0500	3.9400	0.1100	0.3000	0.0330	9.0000	0.9900 (30)
Total net area of external elements Aum(A, m ²)			142.7600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	43.1296		(33)
Timber Frame			12.6700	0.0000	0.0000	20.0000	253.4000 (32)
Party Floor			44.5100			30.0000	1335.3000 (32d)
Timber			93.3900			9.0000	840.5100 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		3687.0700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							71.5380 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							27.7200 (36)
Total fabric heat loss						(33) + (36) =	70.8496 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	24.2370	24.0719	23.9101	23.1498	23.0076	22.3455	22.3455	22.2228	22.6005	23.0076	23.2953	23.5962 (38)
Average = Sum(39)m / 12 =	95.0866	94.9215	94.7596	93.9994	93.8572	93.1950	93.1950	93.0724	93.4501	93.8572	94.1449	94.4457 (39)
												93.9987 (39)
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.8449	1.8417	1.8386	1.8238	1.8211	1.8082	1.8082	1.8058	1.8132	1.8211	1.8266	1.8325 (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	1.7355 (42)
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FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

Average daily hot water use (litres/day)												75.4181 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	82.9599	79.9432	76.9265	73.9098	70.8930	67.8763	67.8763	70.8930	73.9098	76.9265	79.9432	82.9599 (44)
Energy content (annual)	123.0272	107.6004	111.0339	96.8021	92.8839	80.1517	74.2724	85.2286	86.2465	100.5120	109.7167	119.1453 (45)
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Heat gains from water heating, kWh/month	26.1433	22.8651	23.5947	20.5704	19.7378	17.0322	15.7829	18.1111	18.3274	21.3588	23.3148	25.3184 (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	86.7750	86.7750	86.7750	86.7750	86.7750	86.7750	86.7750	86.7750	86.7750	86.7750	86.7750	86.7750 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	13.4920	11.9834	9.7456	7.3780	5.5152	4.6561	5.0311	6.5396	8.7775	11.1450	13.0079	13.8669 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	151.2325	152.8018	148.8472	140.4282	129.8008	119.8125	113.1398	111.5704	115.5251	123.9440	134.5714	144.5597 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.6775	31.6775	31.6775	31.6775	31.6775	31.6775	31.6775	31.6775	31.6775	31.6775	31.6775	31.6775 (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)	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200 (71)
Water heating gains (Table 5)	35.1388	34.0254	31.7133	28.5701	26.5293	23.6559	21.2135	24.3429	25.4547	28.7081	32.3817	34.0301 (72)
Total internal gains	248.8958	247.8432	239.3386	225.4088	210.8778	197.1571	188.4169	191.4854	198.7898	212.8296	228.9935	241.4892 (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
South				1.6300	46.7521		0.7200		0.7000		0.7700		26.6166 (78)
West				2.7300	19.6403		0.7200		0.7000		0.7700		18.7272 (80)
West				2.1200	19.6403		0.7200		0.7000		0.7700		14.5428 (80)
East				3.1500	25.9287		0.6300		0.7000		1.0000		32.4170 (82)
West				0.7900	25.9287		0.6300		0.7000		1.0000		8.1300 (82)
Solar gains	100.4336	189.7977	300.9201	428.0797	519.8428	531.1522	506.0143	437.0262	345.8072	221.7047	123.9118		83.4992 (83)
Total gains	349.3293	437.6409	540.2587	653.4885	730.7206	728.3093	694.4312	628.5116	544.5970	434.5343	352.9053		324.9884 (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	10.7711	10.7898	10.8083	10.8957	10.9122	10.9897	10.9897	11.0042	10.9597	10.9122	10.8788	10.8442
alpha	1.7181	1.7193	1.7206	1.7264	1.7275	1.7326	1.7326	1.7336	1.7306	1.7275	1.7253	1.7229
util living area	0.9412	0.9140	0.8678	0.7903	0.6882	0.5696	0.4633	0.5094	0.6860	0.8460	0.9217	0.9475 (86)
MIT	16.9924	17.4048	18.1122	19.0081	19.8119	20.4140	20.7149	20.6514	20.1266	19.0460	17.8489	16.9113 (87)
Th 2	19.4387	19.4410	19.4431	19.4534	19.4553	19.4643	19.4643	19.4659	19.4608	19.4553	19.4514	19.4474 (88)
util rest of house	0.9321	0.9009	0.8470	0.7557	0.6321	0.4801	0.3357	0.3827	0.6071	0.8124	0.9074	0.9394 (89)
MIT 2	15.8935	16.2990	16.9903	17.8554	18.6012	19.1299	19.3551	19.3212	18.9122	17.9200	16.7514	15.8190 (90)
Living area fraction	fLA = Living area / (4) = 0.3981 (91)											
MIT	16.3310	16.7393	17.4370	18.3143	19.0833	19.6411	19.8965	19.8508	19.3957	18.3683	17.1884	16.2539 (92)
Temperature adjustment	0.0000											
adjusted MIT	16.3310	16.7393	17.4370	18.3143	19.0833	19.6411	19.8965	19.8508	19.3957	18.3683	17.1884	16.2539 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9058	0.8693	0.8120	0.7245	0.6165	0.4916	0.3751	0.4182	0.6031	0.7815	0.8779	0.9148 (94)
Ext temp.	316.4064	380.4344	438.6831	473.4536	450.4617	358.0703	260.4902	262.8215	328.4671	339.5878	309.8129	297.2943 (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	1143.9856	1123.8033	1036.3826	884.9422	692.9714	469.8072	307.2179	321.1757	494.8811	729.1112	949.7685	1138.4363 (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	615.7189	499.5439	444.6884	296.2718	180.4272	0.0000	0.0000	0.0000	0.0000	289.8054	460.7680	625.8096 (98)
Space heating per m2	(98) / (4) = 66.2211 (99)											

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CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

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	876.0332	689.6432	707.3503	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.6322	0.6920	0.6581	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	553.8089	477.2665	465.4796	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	870.8670	832.4331	763.2587	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	228.2818	264.2440	221.5477	0.0000	0.0000	0.0000	0.0000	(104)
Space cooling													
Cooled fraction													714.0734 (104)
Intermittency factor (Table 10b)													1.0000 (105)
	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	57.0705	66.0610	55.3869	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling													178.5184 (107)
Space cooling per m2													3.4637 (108)
Energy for space heating													66.2211 (99)
Energy for space cooling													3.4637 (108)
Total													69.6847 (109)
Dwelling Fabric Energy Efficiency (DFEE)													69.7 (109)

FC = cooled area / (4) =

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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	51.5400 (1b)	x 2.3500 (2b)	= 121.1190 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.5400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 121.1190 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ 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				2 * 10 =	20.0000 (7a)
Number of passive vents				0 * 10 =	0.0000 (7b)
Number of flueless gas fires				0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =				20.0000 / (5) =	0.1651 (8)
Pressure test				Yes	
Measured/design AP50				5.0000	
Infiltration rate				0.4151 (18)	
Number of sides sheltered				1 (19)	
Shelter factor			(20) = 1 - [0.075 x (19)] =		0.9250 (20)
Infiltration rate adjusted to include shelter factor			(21) = (18) x (20) =		0.3840 (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	0.4896	0.4800	0.4704	0.4224	0.4128	0.3648	0.3648	0.3552	0.3840	0.4128	0.4320	0.4512 (22b)
Effective ac	0.6198	0.6152	0.6106	0.5892	0.5852	0.5665	0.5665	0.5631	0.5737	0.5852	0.5933	0.6018 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
TER Opaque door			2.1200	1.0000	2.1200		(26)
TER Opening Type (Uw = 1.40)			6.4800	1.3258	8.5909		(27)
TER Room Window (Uw = 1.70)			3.9400	1.5918	6.2715		(27a)
Exposed Floor to Stairwell			7.0300	0.1300	0.9139		(28b)
140mm Timber Frame	14.1100	1.6300	12.4800	0.1800	2.2464		(29a)
WTS	3.0700	2.1200	0.9500	0.1800	0.1710		(29a)
WTV TBC	28.3200		28.3200	0.1800	5.0976		(29a)
Dormer Cheek	3.1000	1.2600	1.8400	0.1800	0.3312		(29a)
Timber Stud Wall	8.9200	3.5900	5.3300	0.1800	0.9594		(29a)
Rooflight Stud Wall	23.7000		23.7000	0.1800	4.2660		(29a)
400mm Mineral Wool	35.7400		35.7400	0.1300	4.6462		(30)
Sloping	13.2100		13.2100	0.1300	1.7173		(30)
Dormer Roof	1.5100		1.5100	0.1300	0.1963		(30)
Rooflight Sloping	4.0500	3.9400	0.1100	0.1300	0.0143		(30)
Total net area of external elements Aum(A, m ²)			142.7600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	37.5420		(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							23.2737 (36)
Total fabric heat loss						(33) + (36) =	60.8157 (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	24.7749	24.5889	24.4066	23.5502	23.3900	22.6441	22.6441	22.5059	22.9314	23.3900	23.7141	24.0530 (38)
Heat transfer coeff	85.5907	85.4047	85.2223	84.3659	84.2057	83.4598	83.4598	83.3217	83.7471	84.2057	84.5298	84.8687 (39)
Average = Sum(39)m / 12 =												84.3652 (39)
HLP	1.6607	1.6571	1.6535	1.6369	1.6338	1.6193	1.6193	1.6166	1.6249	1.6338	1.6401	1.6467 (40)
HLP (average)												1.6369 (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												1.7355 (42)
Average daily hot water use (litres/day)												75.4181 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	82.9599	79.9432	76.9265	73.9098	70.8930	67.8763	67.8763	70.8930	73.9098	76.9265	79.9432	82.9599 (44)

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Energy conte	123.0272	107.6004	111.0339	96.8021	92.8839	80.1517	74.2724	85.2286	86.2465	100.5120	109.7167	119.1453 (45)
Energy content (annual)										Total =	Sum (45)m =	1186.6207 (45)
Distribution loss (46)m = 0.15 x (45)m												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Heat gains from water heating, kWh/month												
	26.1433	22.8651	23.5947	20.5704	19.7378	17.0322	15.7829	18.1111	18.3274	21.3588	23.3148	25.3184 (65)

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

Metabolic gains (Table 5), Watts												
(66)m	86.7750	86.7750	86.7750	86.7750	86.7750	86.7750	86.7750	86.7750	86.7750	86.7750	86.7750	86.7750 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	13.4920	11.9834	9.7456	7.3780	5.5152	4.6561	5.0311	6.5396	8.7775	11.1450	13.0079	13.8669 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	151.2325	152.8018	148.8472	140.4282	129.8008	119.8125	113.1398	111.5704	115.5251	123.9440	134.5714	144.5597 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	31.6775	31.6775	31.6775	31.6775	31.6775	31.6775	31.6775	31.6775	31.6775	31.6775	31.6775	31.6775 (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)												
	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200 (71)
Water heating gains (Table 5)												
	35.1388	34.0254	31.7133	28.5701	26.5293	23.6559	21.2135	24.3429	25.4547	28.7081	32.3817	34.0301 (72)
Total internal gains	248.8958	247.8432	239.3386	225.4088	210.8778	197.1571	188.4169	191.4854	198.7898	212.8296	228.9935	241.4892 (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
South				1.6300	46.7521	0.6300	0.7000			0.7700			23.2895 (78)
West				4.8500	19.6403	0.6300	0.7000			0.7700			29.1113 (80)
East				3.1500	25.9287	0.6300	0.7000			1.0000			32.4170 (82)
West				0.7900	25.9287	0.6300	0.7000			1.0000			8.1300 (82)

Solar gains	92.9477	176.2134	280.5813	400.6950	487.7211	498.7712	474.9894	409.5142	322.9744	206.1742	114.7826	77.2043	(83)
Total gains	341.8435	424.0566	519.9199	626.1038	698.5989	695.9283	663.4063	600.9996	521.7642	419.0039	343.7761	318.6936	(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	41.8173	41.9083	41.9980	42.4243	42.5050	42.8849	42.8849	42.9560	42.7378	42.5050	42.3420	42.1730
alpha	3.7878	3.7939	3.7999	3.8283	3.8337	3.8590	3.8590	3.8637	3.8492	3.8337	3.8228	3.8115
util living area	0.9966	0.9920	0.9781	0.9343	0.8358	0.6787	0.5268	0.5920	0.8322	0.9682	0.9935	0.9974 (86)
MIT	19.1850	19.4080	19.7862	20.2705	20.6664	20.8962	20.9702	20.9538	20.7591	20.2128	19.6058	19.1486 (87)
Th 2	19.5692	19.5718	19.5743	19.5864	19.5886	19.5992	19.5992	19.6012	19.5951	19.5886	19.5841	19.5793 (88)
util rest of house	0.9954	0.9891	0.9698	0.9086	0.7727	0.5632	0.3718	0.4329	0.7413	0.9509	0.9907	0.9965 (89)
MIT 2	17.9577	18.1812	18.5561	19.0296	19.3802	19.5567	19.5931	19.5901	19.4720	18.9884	18.3885	17.9289 (90)
Living area fraction									fLA =	Living area / (4) =		0.3981 (91)
MIT	18.4463	18.6696	19.0459	19.5236	19.8923	20.0900	20.1414	20.1331	19.9844	19.4759	18.8731	18.4145 (92)
Temperature adjustment												0.0000
adjusted MIT	18.4463	18.6696	19.0459	19.5236	19.8923	20.0900	20.1414	20.1331	19.9844	19.4759	18.8731	18.4145 (93)

8. Space heating requirement

Utilisation	0.9940	0.9866	0.9657	0.9072	0.7881	0.6068	0.4344	0.4971	0.7705	0.9491	0.9887	0.9954 (94)
Useful gains	339.8002	418.3568	502.1075	568.0302	550.5534	422.2862	288.1799	298.7694	402.0325	397.6807	339.8847	317.2233 (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	1210.7932	1175.9911	1069.1878	896.2717	689.8355	458.1958	295.5614	311.0457	492.8033	747.3990	995.1819	1206.3686 (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	648.0188	509.1303	421.9077	236.3338	103.6259	0.0000	0.0000	0.0000	0.0000	260.1903	471.8139	661.5241 (98)
Space heating												3312.5449 (98)
Space heating per m2										(98) / (4) =		64.2713 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b												
Ext. temp.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000

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CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	784.5222	617.6026	633.2448	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8173	0.8813	0.8472	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	641.1962	544.2700	536.5036	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	833.0191	796.1703	731.1019	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	138.1125	187.4138	144.7811	0.0000	0.0000	0.0000	0.0000	(104)
Space cooling												470.3074	(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	34.5281	46.8535	36.1953	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling												117.5769	(107)
Space cooling per m2												2.2813	(108)
Energy for space heating												64.2713	(99)
Energy for space cooling												2.2813	(108)
Total												66.5526	(109)
Target Fabric Energy Efficiency (TFEE)												76.5	(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	51.5400 (1b)	x 2.3500 (2b)	= 121.1190 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.5400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 121.1190 (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					4.5200
Infiltration rate					0.2260 (18)
Number of sides sheltered					1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =				0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =				0.2091 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.4000	4.1000	4.1000	3.9000	3.9000	3.7000	3.7000	3.5000	3.5000	3.8000	3.7000	3.9000 (22)
Wind factor	1.1000	1.0250	1.0250	0.9750	0.9750	0.9250	0.9250	0.8750	0.8750	0.9500	0.9250	0.9750 (22a)
Adj infilt rate	0.2300	0.2143	0.2143	0.2038	0.2038	0.1934	0.1934	0.1829	0.1829	0.1986	0.1934	0.2038 (22b)
Mechanical extract ventilation - decentralised												0.5000 (23a)
If mechanical ventilation:												0.5000 (25)
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
Window (Uw = 1.40)			4.3600	1.3258	5.7803		(27)
French Door (Uw = 1.40)			2.1200	1.3258	2.8106		(27)
DTC			2.1200	0.6300	1.3356		(26)
Roof Window (Uw = 1.80)			3.9400	1.6791	6.6157		(27a)
Exposed Floor to Stairwell			7.0300	0.1100	0.7733	20.0000	140.6000 (28b)
140mm Timber Frame	14.1100	1.6300	12.4800	0.1900	2.3712	9.0000	112.3200 (29a)
WTS	3.0700	2.1200	0.9500	0.1500	0.1425	18.0000	17.1000 (29a)
WTV TBC	28.3200		28.3200	0.2500	7.0800	9.0000	254.8800 (29a)
Dormer Cheek	3.1000	1.2600	1.8400	0.3200	0.5888	9.0000	16.5600 (29a)
Timber Stud Wall	8.9200	3.5900	5.3300	0.2800	1.4924	9.0000	47.9700 (29a)
Rooflight Stud Wall	23.7000		23.7000	0.3000	7.1100	9.0000	213.3000 (29a)
400mm Mineral Wool	35.7400		35.7400	0.1100	3.9314	9.0000	321.6600 (30)
Sloping	13.2100		13.2100	0.2000	2.6420	9.0000	118.8900 (30)
Dormer Roof	1.5100		1.5100	0.2800	0.4228	9.0000	13.5900 (30)
Rooflight Sloping	4.0500	3.9400	0.1100	0.3000	0.0330	9.0000	0.9900 (30)
Total net area of external elements Aum(A, m ²)			142.7600				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	43.1296	(33)
Timebr Frame					0.0000	0.0000	(32)
Party Floor						30.0000	1335.3000 (32d)
Timber						9.0000	840.5100 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		3687.0700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							71.5380 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							27.7200 (36)
Total fabric heat loss					(33) + (36) =		70.8496 (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	19.9846	19.9846	19.9846	19.9846	19.9846	19.9846	19.9846	19.9846	19.9846	19.9846	19.9846	19.9846 (38)
Heat transfer coeff	90.8342	90.8342	90.8342	90.8342	90.8342	90.8342	90.8342	90.8342	90.8342	90.8342	90.8342	90.8342 (39)
Average = Sum(39)m / 12 =												90.8342 (39)
HLP	1.7624	1.7624	1.7624	1.7624	1.7624	1.7624	1.7624	1.7624	1.7624	1.7624	1.7624	1.7624 (40)
HLP (average)												1.7624 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF HEAT DEMAND 09 Jan 2014

4. Water heating energy requirements (kWh/year)

Assumed occupancy	1.7355 (42)											
Average daily hot water use (litres/day)	75.4181 (43)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	82.9599	79.9432	76.9265	73.9098	70.8930	67.8763	67.8763	70.8930	73.9098	76.9265	79.9432	82.9599 (44)
Energy content (annual)	123.0272	107.6004	111.0339	96.8021	92.8839	80.1517	74.2724	85.2286	86.2465	100.5120	109.7167	119.1453 (45)
Distribution loss (46)m = 0.15 x (45)m	18.4541	16.1401	16.6551	14.5203	13.9326	12.0228	11.1409	12.7843	12.9370	15.0768	16.4575	17.8718 (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	14.5231	13.0991	14.4732	13.9729	14.4145	13.9215	14.3682	14.3982	13.9495	14.4489	14.0214	14.5134 (61)
Total heat required for water heating calculated for each month	137.5503	120.6995	125.5071	110.7750	107.2983	94.0732	88.6405	99.6268	100.1961	114.9609	123.7382	133.6587 (62)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63)
Solar input (sum of months) = Sum(63)m =	0.0000 (63)											
Output from w/h	137.5503	120.6995	125.5071	110.7750	107.2983	94.0732	88.6405	99.6268	100.1961	114.9609	123.7382	133.6587 (64)
RHI water heating demand	1356.7246 (64)											
Heat gains from water heating, kWh/month	44.5373	39.0519	40.5371	35.6799	34.4875	30.1308	28.2876	31.9381	32.1644	37.0325	39.9862	43.2442 (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	104.1300	104.1300	104.1300	104.1300	104.1300	104.1300	104.1300	104.1300	104.1300	104.1300	104.1300	104.1300 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	33.7299	29.9586	24.3640	18.4451	13.7879	11.6404	12.5778	16.3491	21.9437	27.8626	32.5198	34.6674 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	225.7201	228.0624	222.1600	209.5944	193.7325	178.8247	168.8653	166.5230	172.4255	184.9911	200.8529	215.7608 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	47.1485	47.1485	47.1485	47.1485	47.1485	47.1485	47.1485	47.1485	47.1485	47.1485	47.1485	47.1485 (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)	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200 (71)
Water heating gains (Table 5)	59.8620	58.1130	54.4853	49.5554	46.3542	41.8484	38.0210	42.9275	44.6727	49.7748	55.5363	58.1239 (72)
Total internal gains	404.1705	400.9924	385.8677	362.4534	338.7331	317.1719	304.3226	310.6581	323.9004	347.4870	373.7675	393.4105 (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			
South				1.6300	56.7559	0.7200	0.7000	0.7700	32.3119 (78)			
West				2.7300	25.1925	0.7200	0.7000	0.7700	24.0214 (80)			
West				2.1200	25.1925	0.7200	0.7000	0.7700	18.6540 (80)			
East				3.1500	33.4886	0.6300	0.7000	1.0000	41.8686 (82)			
West				0.7900	33.4886	0.6300	0.7000	1.0000	10.5004 (82)			
Solar gains	127.3563	205.0728	327.8768	468.8626	537.9039	602.3464	553.7164	499.4421	394.9021	255.2540	156.6807	100.1840 (83)
Total gains	531.5268	606.0652	713.7445	831.3160	876.6371	919.5183	858.0390	810.1002	718.8025	602.7410	530.4482	493.5945 (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	11.2753	11.2753	11.2753	11.2753	11.2753	11.2753	11.2753	11.2753	11.2753	11.2753	11.2753	11.2753
alpha	1.7517	1.7517	1.7517	1.7517	1.7517	1.7517	1.7517	1.7517	1.7517	1.7517	1.7517	1.7517
util living area	0.8797	0.8508	0.7891	0.6935	0.5717	0.4151	0.3112	0.3263	0.5296	0.7287	0.8414	0.8903 (86)
MIT	17.8838	18.1905	18.8535	19.6127	20.2895	20.7324	20.8926	20.8838	20.5500	19.7583	18.7084	17.8213 (87)
Th 2	19.4964	19.4964	19.4964	19.4964	19.4964	19.4964	19.4964	19.4964	19.4964	19.4964	19.4964	19.4964 (88)
util rest of house	0.8624	0.8296	0.7588	0.6483	0.5023	0.3156	0.1817	0.1916	0.4310	0.6747	0.8144	0.8740 (89)
MIT 2	16.7983	17.0931	17.7272	18.4341	19.0347	19.3767	19.4725	19.4703	19.2621	18.5963	17.6061	16.7396 (90)
Living area fraction	17.2305	17.5300	18.1756	18.9034	19.5343	19.9164	20.0379	20.0331	19.7749	19.0589	18.0449	17.1703 (91)
MIT	17.2305	17.5300	18.1756	18.9034	19.5343	19.9164	20.0379	20.0331	19.7749	19.0589	18.0449	17.1703 (92)
Temperature adjustment	17.0805	17.3800	18.0256	18.7534	19.3843	19.7664	19.8879	19.8831	19.6249	18.9089	17.8949	-0.1500
adjusted MIT	17.0805	17.3800	18.0256	18.7534	19.3843	19.7664	19.8879	19.8831	19.6249	18.9089	17.8949	17.0203 (93)

8. Space heating requirement

Utilisation	0.8252	0.7912	0.7224	0.6223	0.4965	0.3349	0.2176	0.2287	0.4404	0.6494	0.7772	0.8378 (94)
Useful gains	438.6240	479.5337	515.6251	517.3580	435.2721	307.9279	186.7424	185.3007	316.5517	391.4001	412.2752	413.5495 (95)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)



CALCULATION OF HEAT DEMAND 09 Jan 2014

Ext temp.	5.4000	5.9000	7.6000	10.0000	13.1000	15.9000	17.7000	17.7000	15.3000	12.0000	8.4000	5.5000 (96)
Heat loss rate W	1060.9860	1042.7797	947.0025	795.1043	570.8277	351.2046	198.7363	198.2980	392.8448	627.5689	862.4651	1046.4335 (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	463.0373	378.5013	320.9448	199.9773	100.8534	0.0000	0.0000	0.0000	0.0000	175.7096	324.1367	470.8657 (98)
Space heating												2434.0262 (98)
RHI space heating demand												2434 (98)

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	51.5400 (1b)	x 2.3500 (2b)	= 121.1190 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.5400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 121.1190 (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					4.5200
Infiltration rate					0.2260 (18)
Number of sides sheltered					1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =				0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =				0.2091 (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	0.2665	0.2613	0.2561	0.2300	0.2247	0.1986	0.1986	0.1934	0.2091	0.2247	0.2352	0.2456 (22b)
Mechanical extract ventilation - decentralised												0.5000 (23a)
If mechanical ventilation:												0.5000 (23a)
Effective ac	0.5165	0.5113	0.5061	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
Window (Uw = 1.40)			4.3600	1.3258	5.7803		(27)
French Door (Uw = 1.40)			2.1200	1.3258	2.8106		(27)
DTC			2.1200	0.6300	1.3356		(26)
Roof Window (Uw = 1.80)			3.9400	1.6791	6.6157		(27a)
Exposed Floor to Stairwell			7.0300	0.1100	0.7733	20.0000	140.6000 (28b)
140mm Timber Frame	14.1100	1.6300	12.4800	0.1900	2.3712	9.0000	112.3200 (29a)
WTS	3.0700	2.1200	0.9500	0.1500	0.1425	18.0000	17.1000 (29a)
WTV TBC	28.3200		28.3200	0.2500	7.0800	9.0000	254.8800 (29a)
Dormer Cheek	3.1000	1.2600	1.8400	0.3200	0.5888	9.0000	16.5600 (29a)
Timber Stud Wall	8.9200	3.5900	5.3300	0.2800	1.4924	9.0000	47.9700 (29a)
Rooflight Stud Wall	23.7000		23.7000	0.3000	7.1100	9.0000	213.3000 (29a)
400mm Mineral Wool	35.7400		35.7400	0.1100	3.9314	9.0000	321.6600 (30)
Sloping	13.2100		13.2100	0.2000	2.6420	9.0000	118.8900 (30)
Dormer Roof	1.5100		1.5100	0.2800	0.4228	9.0000	13.5900 (30)
Rooflight Sloping	4.0500	3.9400	0.1100	0.3000	0.0330	9.0000	0.9900 (30)
Total net area of external elements Aum(A, m ²)			142.7600				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	43.1296	(33)
Timebr Frame					0.0000	0.0000	(32)
Party Floor						20.0000	253.4000 (32)
Timber						30.0000	1335.3000 (32d)
						9.0000	840.5100 (32c)
Heat capacity Cm = Sum(A x K)					(28)...(30) + (32) + (32a)...(32e) =		3687.0700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							71.5380 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							27.7200 (36)
Total fabric heat loss					(33) + (36) =		70.8496 (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	20.6457	20.4368	20.2279	19.9846	19.9846	19.9846	19.9846	19.9846	19.9846	19.9846	19.9846	19.9846 (38)
Heat transfer coeff	91.4952	91.2864	91.0775	90.8342	90.8342	90.8342	90.8342	90.8342	90.8342	90.8342	90.8342	90.8342 (39)
Average = Sum(39)m / 12 =												90.9472 (39)
HLP	1.7752	1.7712	1.7671	1.7624	1.7624	1.7624	1.7624	1.7624	1.7624	1.7624	1.7624	1.7624 (40)
HLP (average)												1.7646 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF ENERGY RATINGS 09 Jan 2014

4. Water heating energy requirements (kWh/year)

Assumed occupancy	1.7355 (42)											
Average daily hot water use (litres/day)	75.4181 (43)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	82.9599	79.9432	76.9265	73.9098	70.8930	67.8763	67.8763	70.8930	73.9098	76.9265	79.9432	82.9599 (44)
Energy content (annual)	123.0272	107.6004	111.0339	96.8021	92.8839	80.1517	74.2724	85.2286	86.2465	100.5120	109.7167	119.1453 (45)
Distribution loss (46)m = 0.15 x (45)m	18.4541	16.1401	16.6551	14.5203	13.9326	12.0228	11.1409	12.7843	12.9370	15.0768	16.4575	17.8718 (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	14.5231	13.0991	14.4732	13.9729	14.4145	13.9215	14.3682	14.3982	13.9495	14.4489	14.0214	14.5134 (61)
Total heat required for water heating calculated for each month	137.5503	120.6995	125.5071	110.7750	107.2983	94.0732	88.6405	99.6268	100.1961	114.9609	123.7382	133.6587 (62)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63)
Solar input (sum of months) = Sum(63)m =	0.0000 (63)											
Output from w/h	137.5503	120.6995	125.5071	110.7750	107.2983	94.0732	88.6405	99.6268	100.1961	114.9609	123.7382	133.6587 (64)
Heat gains from water heating, kWh/month	44.5373	39.0519	40.5371	35.6799	34.4875	30.1308	28.2876	31.9381	32.1644	37.0325	39.9862	43.2442 (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	104.1300	104.1300	104.1300	104.1300	104.1300	104.1300	104.1300	104.1300	104.1300	104.1300	104.1300	104.1300 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	33.7299	29.9586	24.3640	18.4451	13.7879	11.6404	12.5778	16.3491	21.9437	27.8626	32.5198	34.6674 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	225.7201	228.0624	222.1600	209.5944	193.7325	178.8247	168.8653	166.5230	172.4255	184.9911	200.8529	215.7608 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	47.1485	47.1485	47.1485	47.1485	47.1485	47.1485	47.1485	47.1485	47.1485	47.1485	47.1485	47.1485 (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)	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200 (71)
Water heating gains (Table 5)	59.8620	58.1130	54.4853	49.5554	46.3542	41.8484	38.0210	42.9275	44.6727	49.7748	55.5363	58.1239 (72)
Total internal gains	404.1705	400.9924	385.8677	362.4534	338.7331	317.1719	304.3226	310.6581	323.9004	347.4870	373.7675	393.4105 (73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a		g	FF	Access		Gains	
					W/m2		Specific data or Table 6b	Specific data or Table 6c	factor Table 6d		W	
South				1.6300	46.7521		0.7200	0.7000	0.7700		26.6166 (78)	
West				2.7300	19.6403		0.7200	0.7000	0.7700		18.7272 (80)	
West				2.1200	19.6403		0.7200	0.7000	0.7700		14.5428 (80)	
East				3.1500	25.9287		0.6300	0.7000	1.0000		32.4170 (82)	
West				0.7900	25.9287		0.6300	0.7000	1.0000		8.1300 (82)	
Solar gains	100.4336	189.7977	300.9201	428.0797	519.8428	531.1522	506.0143	437.0262	345.8072	221.7047	123.9118	83.4992 (83)
Total gains	504.6041	590.7902	686.7878	790.5331	858.5759	848.3241	810.3369	747.6843	669.7077	569.1917	497.6793	476.9097 (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	11.1939	11.2195	11.2452	11.2753	11.2753	11.2753	11.2753	11.2753	11.2753	11.2753	11.2753	11.2753
alpha	1.7463	1.7480	1.7497	1.7517	1.7517	1.7517	1.7517	1.7517	1.7517	1.7517	1.7517	1.7517
util living area	0.8984	0.8676	0.8168	0.7356	0.6314	0.5132	0.4087	0.4474	0.6153	0.7824	0.8715	0.9066 (86)
MIT	17.4898	17.8688	18.5110	19.3012	20.0067	20.5209	20.7751	20.7265	20.2954	19.3610	18.2794	17.4104 (87)
Th 2	19.4874	19.4902	19.4931	19.4964	19.4964	19.4964	19.4964	19.4964	19.4964	19.4964	19.4964	19.4964 (88)
util rest of house	0.8842	0.8495	0.7913	0.6974	0.5742	0.4274	0.2927	0.3308	0.5348	0.7414	0.8507	0.8935 (89)
MIT 2	16.4059	16.7749	17.3964	18.1467	18.7900	19.2267	19.4113	19.3850	19.0632	18.2292	17.1902	16.3346 (90)
Living area fraction	16.8374	17.2104	17.8402	18.6064	19.2744	19.7420	19.9543	19.9191	19.5538	18.6798	17.6239	16.7629 (92)
Temperature adjustment	16.6874	17.0604	17.6902	18.4564	19.1244	19.5920	19.8043	19.7691	19.4038	18.5298	17.4739	-0.1500
adjusted MIT	16.6874	17.0604	17.6902	18.4564	19.1244	19.5920	19.8043	19.7691	19.4038	18.5298	17.4739	16.6129 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.8486	0.8113	0.7531	0.6660	0.5581	0.4334	0.3185	0.3540	0.5291	0.7087	0.8136	0.8590 (94)
Useful gains	428.1850	479.3265	517.2466	526.4729	479.1545	367.6903	258.0574	264.6856	354.3733	403.4108	404.9082	409.6466 (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)

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Heat loss rate W	1133.3892	1110.0822	1019.1722	868.0435	674.3902	453.4428	291.0579	306.0300	481.7661	720.2979	942.3029	1127.5149 (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	524.6719	423.8678	373.4326	245.9308	145.2553	0.0000	0.0000	0.0000	0.0000	235.7640	386.9241	534.0940 (98)
Space heating												2869.9406 (98)
Space heating per m2											(98) / (4) =	55.6838 (99)

8c. Space cooling requirement

Not applicable

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												90.5000 (206)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement												3171.2051 (211)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	524.6719	423.8678	373.4326	245.9308	145.2553	0.0000	0.0000	0.0000	0.0000	235.7640	386.9241	534.0940 (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)	579.7480	468.3622	412.6327	271.7468	160.5031	0.0000	0.0000	0.0000	0.0000	260.5127	427.5405	590.1591 (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	137.5503	120.6995	125.5071	110.7750	107.2983	94.0732	88.6405	99.6268	100.1961	114.9609	123.7382	133.6587 (64)
Efficiency of water heater	89.8162	89.7707	89.6732	89.4814	89.1122	87.3000	87.3000	87.3000	87.3000	89.4256	89.7033	87.3000 (216)
Fuel for water heating, kWh/month	153.1465	134.4532	139.9606	123.7967	120.4081	107.7586	101.5355	114.1200	114.7721	128.5548	137.9416	148.7728 (219)
Water heating fuel used												1525.2205 (219)
Annual totals kWh/year												
Space heating fuel - main system												3171.2051 (211)
Space heating fuel - secondary												0.0000 (215)
Electricity for pumps and fans:												
(MEV)Decentralised, Database: total watage = 4.7450, total flow = 21.0000, SFP = 0.2260)												
mechanical ventilation fans (SFP = 0.2260)												33.3879 (230a)
central heating pump												30.0000 (230c)
main heating flue fan												45.0000 (230e)
Total electricity for the above, kWh/year												108.3879 (231)
Electricity for lighting (calculated in Appendix L)												238.2723 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
Total delivered energy for all uses												5043.0858 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	3171.2051	3.4800	110.3579 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1525.2205	3.4800	53.0777 (247)
Mechanical ventilation fans	33.3879	13.1900	4.4039 (249)
Pumps and fans for heating	75.0000	13.1900	9.8925 (249)
Energy for lighting	238.2723	13.1900	31.4281 (250)
Additional standing charges			120.0000 (251)
Energy saving/generation technologies			
PV Unit	0.0000	13.1900	0.0000 (252)
Total energy cost			329.1601 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.4200 (256)
Energy cost factor (ECF)		1.4320 (257)
SAP value	[(255) x (256)] / [(4) + 45.0] =	80.0233
SAP rating (Section 12)		80 (258)
SAP band		C

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	3171.2051	0.2160	684.9803 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1525.2205	0.2160	329.4476 (264)
Space and water heating			1014.4279 (265)
Pumps and fans	108.3879	0.5190	56.2533 (267)
Energy for lighting	238.2723	0.5190	123.6633 (268)

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Energy saving/generation technologies			
PV Unit	-439.4100	0.5190	-228.0538 (269)
Total kg/year			966.2908 (272)
CO2 emissions per m2			18.7500 (273)
EI value			86.5876
EI rating			87 (274)
EI band			B

----- 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	$3.48 / 0.8884 = 3.917$, stars = 4
Water heating environmental impact	$0.216 / 0.8884 = 0.2431$, 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	51.5400 (1b)	x 2.3500 (2b)	= 121.1190 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.5400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 121.1190 (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					4.5200
Infiltration rate					0.2260 (18)
Number of sides sheltered					1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =				0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =				0.2091 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.4000	4.1000	4.1000	3.9000	3.9000	3.7000	3.7000	3.5000	3.5000	3.8000	3.7000	3.9000 (22)
Wind factor	1.1000	1.0250	1.0250	0.9750	0.9750	0.9250	0.9250	0.8750	0.8750	0.9500	0.9250	0.9750 (22a)
Adj infilt rate	0.2300	0.2143	0.2143	0.2038	0.2038	0.1934	0.1934	0.1829	0.1829	0.1986	0.1934	0.2038 (22b)
Mechanical extract ventilation - decentralised												0.5000 (23a)
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
Window (Uw = 1.40)			4.3600	1.3258	5.7803		(27)
French Door (Uw = 1.40)			2.1200	1.3258	2.8106		(27)
DTC			2.1200	0.6300	1.3356		(26)
Roof Window (Uw = 1.80)			3.9400	1.6791	6.6157		(27a)
Exposed Floor to Stairwell			7.0300	0.1100	0.7733	20.0000	140.6000 (28b)
140mm Timber Frame	14.1100	1.6300	12.4800	0.1900	2.3712	9.0000	112.3200 (29a)
WTS	3.0700	2.1200	0.9500	0.1500	0.1425	18.0000	17.1000 (29a)
WTV TBC	28.3200		28.3200	0.2500	7.0800	9.0000	254.8800 (29a)
Dormer Cheek	3.1000	1.2600	1.8400	0.3200	0.5888	9.0000	16.5600 (29a)
Timber Stud Wall	8.9200	3.5900	5.3300	0.2800	1.4924	9.0000	47.9700 (29a)
Rooflight Stud Wall	23.7000		23.7000	0.3000	7.1100	9.0000	213.3000 (29a)
400mm Mineral Wool	35.7400		35.7400	0.1100	3.9314	9.0000	321.6600 (30)
Sloping	13.2100		13.2100	0.2000	2.6420	9.0000	118.8900 (30)
Dormer Roof	1.5100		1.5100	0.2800	0.4228	9.0000	13.5900 (30)
Rooflight Sloping	4.0500	3.9400	0.1100	0.3000	0.0330	9.0000	0.9900 (30)
Total net area of external elements Aum(A, m ²)			142.7600				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	43.1296	(33)
Timber Frame					0.0000	0.0000	(32)
Party Floor						30.0000	1335.3000 (32d)
Timber						9.0000	840.5100 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		3687.0700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							71.5380 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							27.7200 (36)
Total fabric heat loss					(33) + (36) =		70.8496 (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	19.9846	19.9846	19.9846	19.9846	19.9846	19.9846	19.9846	19.9846	19.9846	19.9846	19.9846	19.9846 (38)
Heat transfer coeff	90.8342	90.8342	90.8342	90.8342	90.8342	90.8342	90.8342	90.8342	90.8342	90.8342	90.8342	90.8342 (39)
Average = Sum(39)m / 12 =												90.8342 (39)
HLP	1.7624	1.7624	1.7624	1.7624	1.7624	1.7624	1.7624	1.7624	1.7624	1.7624	1.7624	1.7624 (40)
HLP (average)												1.7624 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

FULL SAP CALCULATION PRINTOUT

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

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.7355 (42)
Average daily hot water use (litres/day)												75.4181 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	82.9599	79.9432	76.9265	73.9098	70.8930	67.8763	67.8763	70.8930	73.9098	76.9265	79.9432	82.9599 (44)
Energy content (annual)	123.0272	107.6004	111.0339	96.8021	92.8839	80.1517	74.2724	85.2286	86.2465	100.5120	109.7167	119.1453 (45)
Distribution loss (46)m = 0.15 x (45)m	18.4541	16.1401	16.6551	14.5203	13.9326	12.0228	11.1409	12.7843	12.9370	15.0768	16.4575	17.8718 (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	14.5231	13.0991	14.4732	13.9729	14.4145	13.9215	14.3682	14.3982	13.9495	14.4489	14.0214	14.5134 (61)
Total heat required for water heating calculated for each month	137.5503	120.6995	125.5071	110.7750	107.2983	94.0732	88.6405	99.6268	100.1961	114.9609	123.7382	133.6587 (62)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63)
Solar input (sum of months) = Sum(63)m =												0.0000 (63)
Output from w/h	137.5503	120.6995	125.5071	110.7750	107.2983	94.0732	88.6405	99.6268	100.1961	114.9609	123.7382	133.6587 (64)
Heat gains from water heating, kWh/month	44.5373	39.0519	40.5371	35.6799	34.4875	30.1308	28.2876	31.9381	32.1644	37.0325	39.9862	43.2442 (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	104.1300	104.1300	104.1300	104.1300	104.1300	104.1300	104.1300	104.1300	104.1300	104.1300	104.1300	104.1300 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	33.7299	29.9586	24.3640	18.4451	13.7879	11.6404	12.5778	16.3491	21.9437	27.8626	32.5198	34.6674 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	225.7201	228.0624	222.1600	209.5944	193.7325	178.8247	168.8653	166.5230	172.4255	184.9911	200.8529	215.7608 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	47.1485	47.1485	47.1485	47.1485	47.1485	47.1485	47.1485	47.1485	47.1485	47.1485	47.1485	47.1485 (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)	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200	-69.4200 (71)
Water heating gains (Table 5)	59.8620	58.1130	54.4853	49.5554	46.3542	41.8484	38.0210	42.9275	44.6727	49.7748	55.5363	58.1239 (72)
Total internal gains	404.1705	400.9924	385.8677	362.4534	338.7331	317.1719	304.3226	310.6581	323.9004	347.4870	373.7675	393.4105 (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
South				1.6300	56.7559		0.7200		0.7000		0.7700		32.3119 (78)
West				2.7300	25.1925		0.7200		0.7000		0.7700		24.0214 (80)
West				2.1200	25.1925		0.7200		0.7000		0.7700		18.6540 (80)
East				3.1500	33.4886		0.6300		0.7000		1.0000		41.8686 (82)
West				0.7900	33.4886		0.6300		0.7000		1.0000		10.5004 (82)
Solar gains	127.3563	205.0728	327.8768	468.8626	537.9039	602.3464	553.7164	499.4421	394.9021	255.2540	156.6807	100.1840	(83)
Total gains	531.5268	606.0652	713.7445	831.3160	876.6371	919.5183	858.0390	810.1002	718.8025	602.7410	530.4482	493.5945	(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	11.2753	11.2753	11.2753	11.2753	11.2753	11.2753	11.2753	11.2753	11.2753	11.2753	11.2753	11.2753
alpha	1.7517	1.7517	1.7517	1.7517	1.7517	1.7517	1.7517	1.7517	1.7517	1.7517	1.7517	1.7517
util living area	0.8797	0.8508	0.7891	0.6935	0.5717	0.4151	0.3112	0.3263	0.5296	0.7287	0.8414	0.8903 (86)
MIT	17.8838	18.1905	18.8535	19.6127	20.2895	20.7324	20.8926	20.8838	20.5500	19.7583	18.7084	17.8213 (87)
Th 2	19.4964	19.4964	19.4964	19.4964	19.4964	19.4964	19.4964	19.4964	19.4964	19.4964	19.4964	19.4964 (88)
util rest of house	0.8624	0.8296	0.7588	0.6483	0.5023	0.3156	0.1817	0.1916	0.4310	0.6747	0.8144	0.8740 (89)
MIT 2	16.7983	17.0931	17.7272	18.4341	19.0347	19.3767	19.4725	19.4703	19.2621	18.5963	17.6061	16.7396 (90)
Living area fraction	fLA = Living area / (4) =											0.3981 (91)
MIT	17.2305	17.5300	18.1756	18.9034	19.5343	19.9164	20.0379	20.0331	19.7749	19.0589	18.0449	17.1703 (92)
Temperature adjustment												-0.1500
adjusted MIT	17.0805	17.3800	18.0256	18.7534	19.3843	19.7664	19.8879	19.8831	19.6249	18.9089	17.8949	17.0203 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.8252	0.7912	0.7224	0.6223	0.4965	0.3349	0.2176	0.2287	0.4404	0.6494	0.7772	0.8378 (94)
Useful gains	438.6240	479.5337	515.6251	517.3580	435.2721	307.9279	186.7424	185.3007	316.5517	391.4001	412.2752	413.5495 (95)
Ext temp.	5.4000	5.9000	7.6000	10.0000	13.1000	15.9000	17.7000	17.7000	15.3000	12.0000	8.4000	5.5000 (96)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

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

Heat loss rate W	1060.9860	1042.7797	947.0025	795.1043	570.8277	351.2046	198.7363	198.2980	392.8448	627.5689	862.4651	1046.4335 (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	463.0373	378.5013	320.9448	199.9773	100.8534	0.0000	0.0000	0.0000	0.0000	175.7096	324.1367	470.8657 (98)
Space heating												2434.0262 (98)
Space heating per m2										(98) / (4) =		47.2260 (99)

8c. Space cooling requirement

Not applicable

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												90.5000 (206)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement												2689.5317 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	463.0373	378.5013	320.9448	199.9773	100.8534	0.0000	0.0000	0.0000	0.0000	175.7096	324.1367	470.8657 (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)	511.6435	418.2335	354.6351	220.9694	111.4402	0.0000	0.0000	0.0000	0.0000	194.1542	358.1621	520.2936 (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	137.5503	120.6995	125.5071	110.7750	107.2983	94.0732	88.6405	99.6268	100.1961	114.9609	123.7382	133.6587 (64)
Efficiency of water heater	89.7466	89.7050	89.5769	89.3327	88.8217	87.3000	87.3000	87.3000	87.3000	89.2067	89.5927	87.3000 (216)
Fuel for water heating, kWh/month	153.2652	134.5516	140.1109	124.0027	120.8019	107.7586	101.5355	114.1200	114.7721	128.8702	138.1119	148.8861 (219)
Water heating fuel used												1526.7868 (219)
Annual totals kWh/year												
Space heating fuel - main system												2689.5317 (211)
Space heating fuel - secondary												0.0000 (215)
Electricity for pumps and fans:												
(MEV)Decentralised, Database: total watage = 4.7450, total flow = 21.0000, SFP = 0.2260)												
mechanical ventilation fans (SFP = 0.2260)												33.3879 (230a)
central heating pump												30.0000 (230c)
main heating flue fan												45.0000 (230e)
Total electricity for the above, kWh/year												108.3879 (231)
Electricity for lighting (calculated in Appendix L)												238.2723 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
Total delivered energy for all uses												4562.9788 (238)

10a. Fuel costs - using BEDF prices (524)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2689.5317	10.2300	275.1391 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1526.7868	10.2300	156.1903 (247)
Mechanical ventilation fans	33.3879	36.7200	12.2600 (249)
Pumps and fans for heating	75.0000	36.7200	27.5400 (249)
Energy for lighting	238.2723	36.7200	87.4936 (250)
Additional standing charges			103.0000 (251)
Energy saving/generation technologies			
PV Unit	0.0000	36.7200	0.0000 (252)
Total energy cost			661.6230 (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	2689.5317	0.2160	580.9388 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1526.7868	0.2160	329.7860 (264)
Space and water heating			910.7248 (265)
Pumps and fans	108.3879	0.5190	56.2533 (267)
Energy for lighting	238.2723	0.5190	123.6633 (268)
Energy saving/generation technologies			
PV Unit	-439.4100	0.5190	-228.0538 (269)
Total kg/year			862.5877 (272)

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

Energy Primary energy factor Primary energy

FULL SAP CALCULATION PRINTOUT

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	kWh/year	kg CO2/kWh	kWh/year
Space heating - main system 1	2689.5317	1.2200	3281.2287 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1526.7868	1.2200	1862.6800 (264)
Space and water heating			5143.9086 (265)
Pumps and fans	108.3879	3.0700	332.7508 (267)
Energy for lighting	238.2723	3.0700	731.4960 (268)
Energy saving/generation technologies			
PV Unit	-439.4100	3.0700	-1348.9887 (269)
Primary energy kWh/year			4859.1668 (272)
Primary energy kWh/m2/year			94.2795 (273)

SAP 2012 EPC IMPROVEMENTS

Current energy efficiency rating: C 80
Current environmental impact rating: B 87

(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: SAP change Cost change CO2 change
(none)

Recommended measures	Typical annual savings	Energy efficiency	Environmental impact
(none)	Total Savings £0	0.00 kg/m²	

Potential energy efficiency rating: C 80
Potential environmental impact rating: B 87

Fuel prices for cost data on this page from database revision number 524 TEST (01 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	£127	£127	£0
Mains gas	£534	£534	£0
Space heating	£418	£418	£0
Water heating	£156	£156	£0
Lighting	£87	£87	£0
Total cost of fuels	£661	£661	£0
Total cost of uses	£661	£661	£0
Delivered energy	89 kWh/m²	89 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.9 tonnes	0.9 tonnes	0.0 tonnes
CO2 emissions per m²	17 kg/m²	17 kg/m²	0 kg/m²
Primary energy	94 kWh/m²	94 kWh/m²	0 kWh/m²

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)



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

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	SemiDetached Flat
Number of storeys	1
Cross ventilation possible	No
SAP Region	Southern England
Front of dwelling faces	North
Overshading	Average or unknown
Thermal mass parameter	71.5 (calculated from construction elements)
Night ventilation	No
Ventilation rate during hot weather (ach)	4.00 (Windows fully open)

Overheating Calculation

Summer ventilation heat loss coefficient	159.88 (P1)
Transmission heat loss coefficient	70.85 (37)
Summer heat loss coefficient	230.73 (P2)

Overhangs	Ratio	Z_overhangs	Overhang type
Orientation			
South	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	1.00	1.000	1.000 (P8)
South	1.000	0.90	1.000	0.900 (P8)
West	1.000	0.90	1.000	0.900 (P8)
West	1.000	1.00	1.000	1.000 (P8)

[Jul]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Shading	Gains W
South	1.6300	118.5567	0.7200	0.7000	0.9000	78.8913
West	2.7300	125.2818	0.7200	0.7000	0.9000	139.6259
West	2.1200	125.2818	0.7200	0.7000	0.9000	108.4275
East	3.1500	188.6220	0.6300	0.7000	1.0000	235.8219
West	0.7900	188.6220	0.6300	0.7000	1.0000	59.1426
total:						621.9092

	Jun	Jul	Aug	
Solar gains	668	622	550	(P3)
Internal gains	314	301	308	
Total summer gains	983	923	858	(P5)
Summer gain/loss ratio	4.26	4.00	3.72	(P6)
Summer external temperature	15.40	17.30	17.30	
Thermal mass temperature increment (TMP = 71.5)	1.50	1.50	1.50	
Threshold temperature	21.16	22.80	22.52	(P7)
Likelihood of high internal temperature	Slight	Medium	Medium	
Assessment of likelihood of high internal temperature:	Medium			