

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

Property Reference	3388- Plot 39			Issued on Date	18/03/2021
Assessment Reference	Plot 39	Prop Type Ref	Type 897		
Property	Plot 39, Bonscale, Langley				
SAP Rating	84 B	DER	17.24	TER	17.84
Environmental	87 B	% DER<TER	3.37		
CO₂ Emissions (t/year)	1.18	DFEE	45.20	TFEE	50.62
General Requirements Compliance	Pass	% DFEE<TFEE	10.71		
Assessor Details	Mr. Adam Lindley, Complete Sustainability Solutions, Tel: 01617060298, adam@completesustainability.co.uk			Assessor ID	m004-0001
Client					

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

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DWELLING AS DESIGNED

Semi-Detached House, total floor area 83 m²

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating:Mains gas
Fuel factor:1.00 (mains gas)
Target Carbon Dioxide Emission Rate (TER) 17.84 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 17.24 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 50.6 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE) 45.2 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.23 (max. 0.30)	0.23 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.16 (max. 0.25)	0.16 (max. 0.70)	OK
Roof	0.09 (max. 0.20)	0.09 (max. 0.35)	OK
Openings	1.40 (max. 2.00)	1.40 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals: 5.10 (design value)
Maximum 10.0 OK

4 Heating efficiency

Main heating system: Boiler system with radiators or underfloor - Mains gas
Data from database
Potterton Promax Ultra Combi 28 ErP
Combi boiler
Efficiency: 89.1% SEDBUK2009
Minimum: 88.0% OK

Secondary heating system:

None

5 Cylinder insulation

Hot water storage No cylinder

6 Controls

Space heating controls: Programmer, room thermostat and TRVs OK

Hot water controls:

No cylinder

Boiler interlock

Yes

OK

7 Low energy lights

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

8 Mechanical ventilation

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

9 Summertime temperature

Overheating risk (Thames Valley): Medium OK

Based on:

Overshading: Average
Windows facing South East: 5.80 m², No overhang
Windows facing South West: 1.45 m², No overhang
Windows facing North West: 8.18 m², No overhang
Air change rate: 2.50 ach
Blinds/curtains: None

10 Key features

Party wall U-value 0.00 W/m²K
Roof U-value 0.09 W/m²K

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CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
 CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	41.7100 (1b)	x 2.3100 (2b)	= 96.3501 (1b) - (3b)
First floor	41.7100 (1c)	x 2.7000 (2c)	= 112.6170 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	83.4200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 208.9671 (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					5.1000
Infiltration rate					0.2550 (18)
Number of sides sheltered					4 (19)
Shelter factor			(20) = 1 - [0.075 x (19)]	=	0.7000 (20)
Infiltration rate adjusted to include shelter factor			(21) = (18) x (20)	=	0.1785 (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	0.2276	0.2231	0.2187	0.1964	0.1919	0.1696	0.1696	0.1651	0.1785	0.1919	0.2008	0.2097 (22b)
Mechanical extract ventilation - decentralised												
If mechanical ventilation:												0.5000 (23a)
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Front Door			2.1400	1.4000	2.9960		(26)
Windows (Uw = 1.40)			15.4300	1.3258	20.4564		(27)
Heat Loss Floor 1			41.7100	0.1600	6.6736		(28a)
External Wall 1	92.3900	17.5700	74.8200	0.2300	17.2086		(29a)
External Roof 1	41.7100		41.7100	0.0900	3.7539		(30)
Total net area of external elements Aum(A, m ²)			175.8100				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 51.0885		(33)
Party Wall 1			39.8300	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							9.4098 (36)
Total fabric heat loss						(33) + (36) =	60.4983 (37)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	34.4796	34.4796	34.4796	34.4796	34.4796	34.4796	34.4796	34.4796	34.4796	34.4796	34.4796	34.4796 (38)
Heat transfer coeff	94.9779	94.9779	94.9779	94.9779	94.9779	94.9779	94.9779	94.9779	94.9779	94.9779	94.9779	94.9779 (39)
Average = Sum(39)m / 12 =												94.9779 (39)
HLP	1.1386	1.1386	1.1386	1.1386	1.1386	1.1386	1.1386	1.1386	1.1386	1.1386	1.1386	1.1386 (40)
HLP (average)												1.1386 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												2.5246 (42)
Average daily hot water use (litres/day)												94.1582 (43)
Daily hot water use	103.5741	99.8077	96.0414	92.2751	88.5087	84.7424	84.7424	88.5087	92.2751	96.0414	99.8077	103.5741 (44)
Energy conte	153.5973	134.3372	138.6240	120.8557	115.9640	100.0681	92.7278	106.4065	107.6773	125.4875	136.9795	148.7508 (45)
Energy content (annual)												Total = Sum(45)m = 1481.4756 (45)
Distribution loss (46)m = 0.15 x (45)m	23.0396	20.1506	20.7936	18.1284	17.3946	15.0102	13.9092	15.9610	16.1516	18.8231	20.5469	22.3126 (46)

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CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

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	21.8256	19.6929	21.7356	20.9582	21.6014	20.8406	21.4955	21.5641	20.9047	21.6800	21.0691	21.8043	(61)
Total heat required for water heating calculated for each month	175.4229	154.0302	160.3595	141.8139	137.5653	120.9087	114.2233	127.9706	128.5820	147.1676	158.0485	170.5551	(62)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63)
Output from w/h	175.4229	154.0302	160.3595	141.8139	137.5653	120.9087	114.2233	127.9706	128.5820	147.1676	158.0485	170.5551	(64)
Heat gains from water heating, kWh/month	56.5275	49.5904	51.5264	45.4241	43.9584	38.4828	36.2059	40.7712	41.0289	47.1446	50.8129	54.9107	(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	126.2279	126.2279	126.2279	126.2279	126.2279	126.2279	126.2279	126.2279	126.2279	126.2279	126.2279	126.2279	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	20.5323	18.2366	14.8310	11.2280	8.3931	7.0858	7.6564	9.9521	13.3577	16.9607	19.7956	21.1029	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	226.4396	228.7893	222.8681	210.2624	194.3500	179.3947	169.4035	167.0538	172.9751	185.5807	201.4931	216.4485	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.6228	35.6228	35.6228	35.6228	35.6228	35.6228	35.6228	35.6228	35.6228	35.6228	35.6228	35.6228	(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)	-100.9823	-100.9823	-100.9823	-100.9823	-100.9823	-100.9823	-100.9823	-100.9823	-100.9823	-100.9823	-100.9823	-100.9823	(71)
Water heating gains (Table 5)	75.9778	73.7952	69.2559	63.0890	59.0838	53.4483	48.6638	54.8000	56.9846	63.3664	70.5735	73.8047	(72)
Total internal gains	386.8180	384.6894	370.8233	348.4478	325.6953	303.7971	289.5921	295.6743	307.1857	329.7762	355.7306	375.2245	(73)

6. Solar gains

[Jan]		Area	Solar flux	g	FF	Access	Gains						
		m ²	Table 6a	Specific data	Specific data	factor	W						
			W/m ²	or Table 6b	or Table 6c	Table 6d							
Southeast		5.8000	36.7938	0.7200	0.7000	0.7700	74.5361 (77)						
Southwest		1.4500	36.7938	0.7200	0.7000	0.7700	18.6340 (79)						
Northwest		8.1800	11.2829	0.7200	0.7000	0.7700	32.2359 (81)						
Solar gains	125.4060	224.3203	335.3657	463.2057	562.3412	577.4142	548.7239	471.8383	379.1760	255.5901	152.1574	106.0597	(83)
Total gains	512.2241	609.0097	706.1890	811.6535	888.0365	881.2113	838.3160	767.5126	686.3617	585.3663	507.8880	481.2841	(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	60.9937	60.9937	60.9937	60.9937	60.9937	60.9937	60.9937	60.9937	60.9937	60.9937	60.9937	60.9937	
alpha	5.0662	5.0662	5.0662	5.0662	5.0662	5.0662	5.0662	5.0662	5.0662	5.0662	5.0662	5.0662	
util living area	0.9978	0.9943	0.9832	0.9426	0.8329	0.6534	0.4910	0.5546	0.8153	0.9700	0.9951	0.9984	(86)
MIT	19.7872	19.9580	20.2296	20.5666	20.8379	20.9638	20.9929	20.9874	20.8919	20.5262	20.0808	19.7420	(87)
Th 2	19.9695	19.9695	19.9695	19.9695	19.9695	19.9695	19.9695	19.9695	19.9695	19.9695	19.9695	19.9695	(88)
util rest of house	0.9970	0.9924	0.9773	0.9224	0.7800	0.5629	0.3799	0.4378	0.7380	0.9555	0.9931	0.9978	(89)
MIT 2	18.8666	19.0366	19.3048	19.6280	19.8648	19.9537	19.9678	19.9660	19.9120	19.5965	19.1595	18.8215	(90)
Living area fraction									fLA = Living area / (4) =			0.1795	(91)
MIT	19.0318	19.2019	19.4708	19.7964	20.0395	20.1350	20.1517	20.1493	20.0879	19.7634	19.3249	18.9867	(92)
Temperature adjustment												-0.1500	
adjusted MIT	18.8818	19.0519	19.3208	19.6464	19.8895	19.9850	20.0017	19.9993	19.9379	19.6134	19.1749	18.8367	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	0.9959	0.9900	0.9724	0.9146	0.7753	0.5643	0.3835	0.4413	0.7353	0.9488	0.9909	0.9970	(94)
Useful gains	510.1278	602.9246	686.7035	742.3275	688.5168	497.2986	321.5004	338.6828	504.6831	555.3976	503.2883	479.8230	(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	1384.9516	1344.1223	1217.6909	1020.6725	777.8173	511.4547	323.0904	341.8565	554.4699	856.0703	1146.8453	1390.1651	(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	650.8690	498.0849	395.0546	200.4084	66.4395	0.0000	0.0000	0.0000	0.0000	223.7004	463.3610	677.2945	(98)
Space heating												3175.2124	(98)
Space heating per m2												(98) / (4) =	38.0630 (99)

8c. Space cooling requirement

Not applicable

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CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													90.0000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													3528.0138 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	650.8690	498.0849	395.0546	200.4084	66.4395	0.0000	0.0000	0.0000	0.0000	223.7004	463.3610	677.2945	(98)
Space heating efficiency (main heating system 1)	90.0000	90.0000	90.0000	90.0000	90.0000	0.0000	0.0000	0.0000	0.0000	90.0000	90.0000	90.0000	(210)
Space heating fuel (main heating system)	723.1878	553.4276	438.9496	222.6760	73.8217	0.0000	0.0000	0.0000	0.0000	248.5561	514.8456	752.5495	(211)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	175.4229	154.0302	160.3595	141.8139	137.5653	120.9087	114.2233	127.9706	128.5820	147.1676	158.0485	170.5551	(64)
Efficiency of water heater (217)m	89.2786	89.1981	89.0217	88.6025	87.7478	86.7000	86.7000	86.7000	86.7000	88.6609	89.1371	86.7000	(216)
Fuel for water heating, kWh/month	196.4894	172.6833	180.1353	160.0563	156.7734	139.4564	131.7454	147.6016	148.3068	165.9893	177.3095	190.9566	(219)
Water heating fuel used													1967.5034 (219)
Annual totals kWh/year													
Space heating fuel - main system													3528.0138 (211)
Space heating fuel - secondary													0.0000 (215)
Electricity for pumps and fans:													
(MEV)Decentralised, Database: total watage = 6.8080, total flow = 37.0000, SFP = 0.1840													
mechanical ventilation fans (SFP = 0.1840)													46.9089 (230a)
central heating pump													30.0000 (230c)
main heating flue fan													45.0000 (230e)
Total electricity for the above, kWh/year													121.9089 (231)
Electricity for lighting (calculated in Appendix L)													362.6062 (232)
Total delivered energy for all uses													5980.0323 (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	3528.0138	0.2160	762.0510	(261)
Space heating - secondary	0.0000	0.0000	0.0000	(263)
Water heating (other fuel)	1967.5034	0.2160	424.9807	(264)
Space and water heating			1187.0317	(265)
Pumps and fans	121.9089	0.5190	63.2707	(267)
Energy for lighting	362.6062	0.5190	188.1926	(268)
Total CO2, kg/year			1438.4951	(272)
Dwelling Carbon Dioxide Emission Rate (DER)			17.2400	(273)

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

DER			17.2400	ZC1
Total Floor Area		TFA	83.4200	
Assumed number of occupants		N	2.5246	
CO2 emission factor in Table 12 for electricity displaced from grid		EF	0.5190	
CO2 emissions from appliances, equation (L14)			16.0853	ZC2
CO2 emissions from cooking, equation (L16)			2.1528	ZC3
Total CO2 emissions			35.4781	ZC4
Residual CO2 emissions offset from biofuel CHP			0.0000	ZC5
Additional allowable electricity generation, kWh/m ² /year			0.0000	ZC6
Resulting CO2 emissions offset from additional allowable electricity generation			0.0000	ZC7
Net CO2 emissions			35.4781	ZC8

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CALCULATION OF TARGET EMISSIONS 09 Jan 2014

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

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	41.7100 (1b)	2.3100 (2b)	96.3501 (1b) - (3b)
First floor	41.7100 (1c)	2.7000 (2c)	112.6170 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	83.4200		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 208.9671 (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				3 * 10 =	30.0000 (7a)
Number of passive vents				0 * 10 =	0.0000 (7b)
Number of flueless gas fires				0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =				30.0000 / (5) =	0.1436 (8)
Pressure test					Yes
Measured/design AP50					5.0000
Infiltration rate					0.3936 (18)
Number of sides sheltered					4 (19)
Shelter factor			(20) = 1 - [0.075 x (19)] =		0.7000 (20)
Infiltration rate adjusted to include shelter factor			(21) = (18) x (20) =		0.2755 (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	0.3513	0.3444	0.3375	0.3030	0.2962	0.2617	0.2617	0.2548	0.2755	0.2962	0.3099	0.3237 (22b)
Effective ac	0.5617	0.5593	0.5569	0.5459	0.5439	0.5342	0.5342	0.5325	0.5379	0.5439	0.5480	0.5524 (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			2.1400	1.0000	2.1400		(26)
TER Opening Type (Uw = 1.40)			15.4300	1.3258	20.4564		(27)
Heat Loss Floor 1			41.7100	0.1300	5.4223		(28a)
External Wall 1	92.3900	17.5700	74.8200	0.1800	13.4676		(29a)
External Roof 1	41.7100		41.7100	0.1300	5.4223		(30)
Total net area of external elements Aum(A, m ²)			175.8100				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 46.9086		(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K 250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K) 10.0198 (36)
Total fabric heat loss (33) + (36) = 56.9284 (37)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	38.7337	38.5685	38.4066	37.6460	37.5037	36.8413	36.8413	36.7187	37.0965	37.5037	37.7916	38.0925 (38)
Heat transfer coeff	95.6621	95.4969	95.3350	94.5745	94.4322	93.7698	93.7698	93.6471	94.0249	94.4322	94.7200	95.0210 (39)
Average = Sum(39)m / 12 =												94.5738 (39)
HLP	1.1468	1.1448	1.1428	1.1337	1.1320	1.1241	1.1241	1.1226	1.1271	1.1320	1.1355	1.1391 (40)
HLP (average)												1.1337 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												2.5246 (42)
Average daily hot water use (litres/day)												94.1582 (43)
Daily hot water use	103.5741	99.8077	96.0414	92.2751	88.5087	84.7424	84.7424	88.5087	92.2751	96.0414	99.8077	103.5741 (44)
Energy conte	153.5973	134.3372	138.6240	120.8557	115.9640	100.0681	92.7278	106.4065	107.6773	125.4875	136.9795	148.7508 (45)
Energy content (annual)												Total = Sum(45)m = 1481.4756 (45)
Distribution loss (46)m = 0.15 x (45)m												
Water storage loss:	23.0396	20.1506	20.7936	18.1284	17.3946	15.0102	13.9092	15.9610	16.1516	18.8231	20.5469	22.3126 (46)
Total storage loss:	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF TARGET EMISSIONS 09 Jan 2014

Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)	
Total heat required for water heating calculated for each month	50.9589	45.9389	48.9416	45.5055	45.1031	41.7908	43.1838	45.1031	45.5055	48.9416	49.2202	50.9589	50.9589	50.9589	50.9589	50.9589	50.9589	50.9589	50.9589	50.9589	50.9589	50.9589	50.9589	(61)
Solar input	204.5562	180.2761	187.5656	166.3612	161.0670	141.8589	135.9116	151.5096	153.1828	174.4292	186.1997	199.7097	199.7097	199.7097	199.7097	199.7097	199.7097	199.7097	199.7097	199.7097	199.7097	199.7097	199.7097	(62)
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63)
Heat gains from water heating, kWh/month	204.5562	180.2761	187.5656	166.3612	161.0670	141.8589	135.9116	151.5096	153.1828	174.4292	186.1997	199.7097	199.7097	199.7097	199.7097	199.7097	199.7097	199.7097	199.7097	199.7097	199.7097	199.7097	199.7097	(64)
	63.8108	56.1518	58.3279	51.5609	49.8338	43.7203	41.6279	46.6559	47.1791	53.9600	57.8507	62.1994	62.1994	62.1994	62.1994	62.1994	62.1994	62.1994	62.1994	62.1994	62.1994	62.1994	62.1994	(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
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	126.2279	126.2279	126.2279	126.2279	126.2279	126.2279	126.2279	126.2279	126.2279	126.2279	126.2279	126.2279	(66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	20.5323	18.2366	14.8310	11.2280	8.3931	7.0858	7.6564	9.9521	13.3577	16.9607	19.7956	21.1029	(67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	226.4396	228.7893	222.8681	210.2624	194.3500	179.3947	169.4035	167.0538	172.9751	185.5807	201.4931	216.4485	(68)
Pumps, fans	35.6228	35.6228	35.6228	35.6228	35.6228	35.6228	35.6228	35.6228	35.6228	35.6228	35.6228	35.6228	(69)
Losses e.g. evaporation (negative values) (Table 5)	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)
Water heating gains (Table 5)	-100.9823	-100.9823	-100.9823	-100.9823	-100.9823	-100.9823	-100.9823	-100.9823	-100.9823	-100.9823	-100.9823	-100.9823	(71)
Total internal gains	85.7673	83.5593	78.3977	71.6124	66.9809	60.7227	55.9515	62.7096	65.5265	72.5269	80.3482	83.6013	(72)
	396.6075	394.4535	379.9651	356.9712	333.5924	311.0715	296.8799	303.5839	315.7277	338.9367	365.5053	385.0211	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data g or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W							
Southeast	5.8000	36.7938	0.6300	0.7000	0.7700	65.2191 (77)							
Southwest	1.4500	36.7938	0.6300	0.7000	0.7700	16.3048 (79)							
Northwest	8.1800	11.2829	0.6300	0.7000	0.7700	28.2064 (81)							
Solar gains	109.7303	196.2803	293.4450	405.3050	492.0485	505.2374	480.1334	412.8585	331.7790	223.6414	133.1378	92.8022	(83)
Total gains	506.3377	590.7338	673.4101	762.2762	825.6409	816.3089	777.0133	716.4424	647.5066	562.5780	498.6431	477.8233	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Thl (C)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	60.5575	60.6622	60.7653	61.2539	61.3462	61.7796	61.7796	61.8605	61.6119	61.3462	61.1598	60.9661	
tau	5.0372	5.0441	5.0510	5.0836	5.0897	5.1186	5.1186	5.1240	5.1075	5.0897	5.0773	5.0644	
util living area	0.9979	0.9950	0.9863	0.9538	0.8605	0.6876	0.5210	0.5828	0.8371	0.9741	0.9955	0.9984	(86)
MIT	19.7696	19.9298	20.1904	20.5288	20.8105	20.9561	20.9912	20.9850	20.8793	20.5097	20.0741	19.7374	(87)
Th 2	19.9628	19.9644	19.9660	19.9734	19.9748	19.9812	19.9812	19.9824	19.9787	19.9748	19.9720	19.9691	(88)
util rest of house	0.9972	0.9934	0.9814	0.9367	0.8119	0.5969	0.4056	0.4631	0.7638	0.9613	0.9937	0.9979	(89)
MIT 2	18.3238	18.5585	18.9375	19.4223	19.7911	19.9525	19.9781	19.9763	19.8824	19.4049	18.7754	18.2812	(90)
Living area fraction	18.5832	18.8046	19.1623	19.6208	19.9740	20.1326	20.1599	20.1573	20.0613	19.6031	19.0085	18.5425	(92)
Temperature adjustment	18.5832	18.8046	19.1623	19.6208	19.9740	20.1326	20.1599	20.1573	20.0613	19.6031	19.0085	18.5425	(93)
adjusted MIT	18.5832	18.8046	19.1623	19.6208	19.9740	20.1326	20.1599	20.1573	20.0613	19.6031	19.0085	18.5425	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(94)
Useful gains	504.1859	585.1782	657.3265	708.4088	670.3422	498.9758	331.2734	347.1167	498.9751	537.2644	494.2021	476.2840	(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	1366.3639	1327.8479	1207.1634	1013.9170	781.3345	518.7904	333.8083	351.8619	560.5094	850.1857	1127.9694	1362.8402	(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	641.4604	499.0740	409.0787	219.9660	82.5782	0.0000	0.0000	0.0000	0.0000	232.8134	456.3125	659.5978	(98)
Space heating												3200.8810	(98)
Space heating per m2												38.3707	(99)

8c. Space cooling requirement

Not applicable

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF TARGET EMISSIONS 09 Jan 2014

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													93.4000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													3427.0675 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	641.4604	499.0740	409.0787	219.9660	82.5782	0.0000	0.0000	0.0000	0.0000	232.8134	456.3125	659.5978	(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)	686.7885	534.3405	437.9857	235.5096	88.4135	0.0000	0.0000	0.0000	0.0000	249.2649	488.5572	706.2075	(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	204.5562	180.2761	187.5656	166.3612	161.0670	141.8589	135.9116	151.5096	153.1828	174.4292	186.1997	199.7097	(64)
Efficiency of water heater (217)m	87.7319	87.4802	86.9615	85.7552	83.4604	80.3000	80.3000	80.3000	80.3000	85.7788	87.2208	80.3000	(216)
Fuel for water heating, kWh/month	233.1605	206.0766	215.6881	193.9954	192.9862	176.6611	169.2548	188.6794	190.7632	203.3476	213.4809	227.3757	(219)
Water heating fuel used													2411.4695 (219)
Annual totals kWh/year													
Space heating fuel - main system													3427.0675 (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)													362.6062 (232)
Total delivered energy for all uses													6276.1432 (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	3427.0675	0.2160	740.2466 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2411.4695	0.2160	520.8774 (264)
Space and water heating			1261.1240 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	362.6062	0.5190	188.1926 (268)
Total CO2, kg/m2/year			1488.2416 (272)
Emissions per m2 for space and water heating			15.1178 (272a)
Fuel factor (mains gas)			1.0000
Emissions per m2 for lighting			2.2560 (272b)
Emissions per m2 for pumps and fans			0.4666 (272c)
Target Carbon Dioxide Emission Rate (TER) = (15.1178 * 1.00) + 2.2560 + 0.4666, rounded to 2 d.p.			17.8400 (273)