

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

Property Reference	Flat 3			Issued on Date	21/06/2023
Assessment Reference	001	Prop Type Ref	3		
Property	Birchwood House, Flat 3, Northwood, HA6 2UZ				
SAP Rating	83 B	DER	11.01	TER	22.41
Environmental	90 B	% DER<TER	50.87		
CO ₂ Emissions (t/year)	1.34	DFEE	51.96	TFEE	54.67
General Requirements Compliance	Pass	% DFEE<TFEE	4.94		
Assessor Details	Mr. Zahid Ashraf, Wires & Wireless Ltd, Tel: 01793 273 981, zahid_153@yahoo.com			Assessor ID	Q076-0001
Client	Westcombe Group, Birchwood House				

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

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DWELLING AS DESIGNED

Mid-floor flat, total floor area 155 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:Electricity (c)

Fuel factor:1.55 (electricity)

Target Carbon Dioxide Emission Rate (TER) 22.41 kgCO₂/m²

Dwelling Carbon Dioxide Emission Rate (DER) 11.01 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)54.7 kWh/m²/yr

Dwelling Fabric Energy Efficiency (DFEE)52.0 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.18 (max. 0.30)	0.18 (max. 0.70)	OK
Floor	0.19 (max. 0.25)	0.19 (max. 0.70)	OK
Roof	0.11 (max. 0.20)	0.15 (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:	5.00 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main heating system: Community heating scheme -

Secondary heating system:

None

5 Cylinder insulation

Hot water storage Measured cylinder loss: 0.50 kWh/day

Permitted by DBSCG 0.50 OK

Primary pipework insulated: No primary pipework

6 Controls

Space heating controls: Charging system linked to use of community heating, programmer and at least two room statsOK

Hot water controls: No cylinderstat

7 Low energy lights

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

8 Mechanical ventilation

Continuous supply and extract system

Specific fan power:	0.79	
Maximum	1.5	OK
MVHR efficiency:	92%	
Minimum:	70%	OK

9 Summertime temperature

Overheating risk (Thames Valley): Not significant OK

Based on:

Overshading:	Average
Windows facing East:	8.80 m ² , No overhang
Windows facing South:	7.27 m ² , No overhang
Windows facing West:	8.34 m ² , No overhang
Air change rate:	0.00 ach
Blinds/curtains:	Dark-coloured curtain or roller blind, closed 100% of daylight hours

10 Key features

Roof U-value	0.10 W/m ² K
Photovoltaic array	1.41 kW

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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	154.5300 (1b)	x 2.6600 (2b)	= 411.0498 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	154.5300		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 411.0498 (5)

2. Ventilation rate

	main		secondary		other		total		m3 per hour			
	heating		heating									
Number of chimneys	0	+	0	+	0	=	0 * 40 =	0.0000	(6a)			
Number of open flues	0	+	0	+	0	=	0 * 20 =	0.0000	(6b)			
Number of intermittent fans							0 * 10 =	0.0000	(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) =						0.0000 / (5) =	0.0000	(8)			
Pressure test							Yes					
Measured/design AP50							5.0000					
Infiltration rate							0.2500	(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) =	0.2313	(21)			
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind factor	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Adj infilt rate	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
	0.2948	0.2891	0.2833	0.2544	0.2486	0.2197	0.2197	0.2139	0.2313	0.2486	0.2602	0.2717 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation:												0.5000 (23a)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												64.4000 (23c)
Effective ac	0.4728	0.4671	0.4613	0.4324	0.4266	0.3977	0.3977	0.3919	0.4093	0.4266	0.4382	0.4497 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K					
E Window (Uw = 1.40)			24.4100	1.3258	32.3617		(27)					
Exposed Floor			154.5300	0.1900	29.3607		(28b)					
External Wall	111.2600	24.4130	86.8470	0.1800	15.6325		(29a)					
Flat Roof	21.1260		21.1260	0.1000	2.1126		(30)					
Roof Joist	2.9900		2.9900	0.1478	0.4418		(30)					
Total net area of external elements Aum(A, m2)			289.9030				(31)					
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		79.9093		(33)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							27.4174 (36)					
Total fabric heat loss						(33) + (36) =	107.3267 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 64.1396	Feb 63.3554	Mar 62.5712	Apr 58.6501	May 57.8659	Jun 53.9449	Jul 53.9449	Aug 53.1607	Sep 55.5133	Oct 57.8659	Nov 59.4343	Dec 61.0027 (38)
Heat transfer coeff	171.4662	170.6820	169.8978	165.9768	165.1926	161.2716	161.2716	160.4874	162.8400	165.1926	166.7610	168.3294 (39)
Average = Sum(39)m / 12 =												165.7807 (39)
HLP	Jan 1.1096	Feb 1.1045	Mar 1.0994	Apr 1.0741	May 1.0690	Jun 1.0436	Jul 1.0436	Aug 1.0386	Sep 1.0538	Oct 1.0690	Nov 1.0791	Dec 1.0893 (40)
HLP (average)												1.0728 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.9410 (42)
Average daily hot water use (litres/day)												104.0499 (43)
Daily hot water use	Jan 114.4549	Feb 110.2929	Mar 106.1309	Apr 101.9689	May 97.8069	Jun 93.6449	Jul 93.6449	Aug 97.8069	Sep 101.9689	Oct 106.1309	Nov 110.2929	Dec 114.4549 (44)
Energy conte	169.7333	148.4498	153.1869	133.5521	128.1464	110.5806	102.4692	117.5849	118.9892	138.6705	151.3697	164.3777 (45)
Energy content (annual)												Total = Sum(45)m = 1637.1103 (45)
Distribution loss (46)m = 0.15 x (45)m												
	25.4600	22.2675	22.9780	20.0328	19.2220	16.5871	15.3704	17.6377	17.8484	20.8006	22.7054	24.6566 (46)
Water storage loss:												

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Store volume													10.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													0.5000 (48)
Temperature factor from Table 2b													1.0000 (49)
Enter (49) or (54) in (55)													0.5000 (55)
Total storage loss													
15.5000	14.0000	15.5000	15.0000	15.5000	15.0000	15.5000	15.5000	15.0000	15.5000	15.0000	15.5000	15.5000	(56)
If cylinder contains dedicated solar storage													
15.5000	14.0000	15.5000	15.0000	15.5000	15.0000	15.5000	15.5000	15.0000	15.5000	15.0000	15.5000	15.5000	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Total heat required for water heating calculated for each month													
208.4957	183.4610	191.9493	171.0641	166.9088	148.0926	141.2316	156.3473	156.5012	177.4329	188.8817	203.1401	(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 =													(63)
Output from w/h													
208.4957	183.4610	191.9493	171.0641	166.9088	148.0926	141.2316	156.3473	156.5012	177.4329	188.8817	203.1401	(64)	
Total per year (kWh/year) = Sum(64)m =													(64)
Heat gains from water heating, kWh/month													
87.4462	77.3685	81.9446	74.4157	73.6186	66.7777	65.0809	70.1069	69.5735	77.1179	80.3400	85.6655	(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	147.0525	147.0525	147.0525	147.0525	147.0525	147.0525	147.0525	147.0525	147.0525	147.0525	147.0525	147.0525 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	29.6155	26.3042	21.3920	16.1951	12.1061	10.2204	11.0436	14.3548	19.2670	24.4639	28.5530	30.4386 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	325.4079	328.7846	320.2754	302.1603	279.2932	257.8014	243.4435	240.0668	248.5760	266.6911	289.5582	311.0500 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.7052	37.7052	37.7052	37.7052	37.7052	37.7052	37.7052	37.7052	37.7052	37.7052	37.7052	37.7052 (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)	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420 (71)
Water heating gains (Table 5)	117.5353	115.1317	110.1406	103.3551	98.9497	92.7467	87.4744	94.2297	96.6299	103.6530	111.5834	115.1418 (72)
Total internal gains	539.6744	537.3363	518.9237	488.8263	457.4647	427.8843	409.0772	415.7671	431.5887	461.9238	496.8103	523.7462 (73)

6. Solar gains

[Jan]													
					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d		Gains W		
East					8.8000	19.6403	0.5400	0.8000	0.7700		51.7424 (76)		
South					7.2730	46.7521	0.5400	0.8000	0.7700		101.7962 (78)		
West					8.3400	19.6403	0.5400	0.8000	0.7700		49.0377 (80)		
Solar gains	202.5763	363.8633	537.0401	713.5374	830.4290	834.7563	800.7444	714.2039	599.4508	413.7507	246.3242	170.8380 (83)	
Total gains	742.2507	901.1996	1055.9639	1202.3637	1287.8937	1262.6406	1209.8216	1129.9710	1031.0394	875.6745	743.1345	694.5841 (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	62.5852	62.8728	63.1630	64.6551	64.9621	66.5415	66.5415	66.8666	65.9006	64.9621	64.3511	63.7515
alpha	5.1723	5.1915	5.2109	5.3103	5.3308	5.4361	5.4361	5.4578	5.3934	5.3308	5.2901	5.2501
util living area												
	0.9993	0.9979	0.9930	0.9726	0.9061	0.7488	0.5727	0.6296	0.8775	0.9863	0.9983	0.9995 (86)
MIT	19.7009	19.8671	20.1321	20.4830	20.7722	20.9463	20.9897	20.9834	20.8646	20.4730	20.0296	19.6888 (87)
Th 2	19.9930	19.9971	20.0013	20.0221	20.0262	20.0471	20.0471	20.0513	20.0388	20.0262	20.0179	20.0096 (88)
util rest of house												
	0.9991	0.9972	0.9904	0.9617	0.8684	0.6631	0.4559	0.5116	0.8154	0.9791	0.9976	0.9994 (89)
MIT 2	18.2450	18.4909	18.8801	19.3995	19.7940	20.0098	20.0431	20.0441	19.9242	19.3940	18.7438	18.2390 (90)
Living area fraction												
MIT	18.5251	18.7557	19.1210	19.6079	19.9822	20.1899	20.2252	20.2248	20.1052	19.6016	18.9912	18.5179 (92)
Temperature adjustment												0.0000
adjusted MIT	18.5251	18.7557	19.1210	19.6079	19.9822	20.1899	20.2252	20.2248	20.1052	19.6016	18.9912	18.5179 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9985	0.9959	0.9872	0.9556	0.8663	0.6770	0.4784	0.5342	0.8204	0.9747	0.9965	0.9990	(94)
Useful gains	741.1523	897.4640	1042.4287	1149.0101	1115.7623	854.8607	578.7944	603.6047	845.8899	853.4994	740.5456	693.8637	(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													
	2439.1290	2364.9129	2144.2756	1777.2699	1368.1538	901.4972	584.6470	613.8346	977.8789	1486.9979	1982.9913	2410.1303	(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													
	1263.2947	986.1257	819.7741	452.3470	187.7792	0.0000	0.0000	0.0000	0.0000	471.3229	894.5609	1276.9024	(98)
Space heating													
Space heating per m2												6352.1068	(98)
										(98) / (4) =		41.1060	(99)

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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	1515.9527	1193.4096	1219.7039	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8648	0.9284	0.9055	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	1311.0204	1107.9223	1104.4528	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1593.1735	1528.7751	1437.6176	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	203.1502	313.1145	247.8746	0.0000	0.0000	0.0000	0.0000 (104)
Space cooling	0.0000	0.0000	0.0000	0.0000	0.0000	203.1502	313.1145	247.8746	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fC = cooled area / (4) =			0.4806 (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	24.4094	37.6222	29.7833	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling	0.0000	0.0000	0.0000	0.0000	0.0000	24.4094	37.6222	29.7833	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling per m2												0.5942 (108)

9b. Energy requirements

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (301)
Fraction of space heat from community system	1.0000 (302)
Fraction of heat from community Heat pump	1.0000 (303a)
Fraction of total space heat from community Heat pump	1.0000 (304a)
Factor for control and charging method (Table 4c(3)) for community space heating	1.0000 (305)
Factor for control and charging method (Table 4c(3)) for community water heating	1.0000 (305a)
Distribution loss factor (Table 12c) for community heating system	1.0500 (306)
Space heating:	
Annual space heating requirement	6352.1068 (98)
Space heat from Heat pump = (98) x 1.00 x 1.00 x 1.05	6669.7121 (307a)
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)	0.0000 (308)
Space heating fuel for secondary/supplementary system	0.0000 (309)
Water heating	
Annual water heating requirement	2093.5063 (64)
Water heat from Heat pump = (64) x 1.00 x 1.00 x 1.05	2198.1816 (310a)
Electricity used for heat distribution	88.6789 (313)
Cooling System Energy Efficiency Ratio	6.7500 (314)
Space cooling (if there is a fixed cooling system, if not enter 0)	13.6022 (315)
Annual totals kWh/year	
Electricity for pumps and fans:	
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 1.1060)	
mechanical ventilation fans (SFP = 1.1060)	554.6377 (330a)
Total electricity for the above, kWh/year	554.6377 (331)
Electricity for lighting (calculated in Appendix L)	523.0188 (332)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV Unit 0 (0.80 * 1.41 * 951 * 0.80) =	-857.8359 (333)
Total delivered energy for all uses	9101.3167 (338)

12b. Carbon dioxide emissions - Community heating scheme

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Efficiency of heat source Heat pump			300.0000 (367a)
Space heating from Heat pump	2955.9646	0.5190	1534.1456 (367)
Electrical energy for heat distribution	88.6789	0.5190	46.0244 (372)
Total CO2 associated with community systems (negative value allowed since DFEE <= TFEE)			1580.1700 (373)
Space and water heating			1580.1700 (376)
Space cooling	13.6022	0.5190	7.0595 (377)
Pumps and fans	554.6377	0.5190	287.8570 (378)
Energy for lighting	523.0188	0.5190	271.4468 (379)
Energy saving/generation technologies			
PV Unit	-857.8359	0.5190	-445.2168 (380)
Total CO2, kg/year			1701.3165 (383)
Dwelling Carbon Dioxide Emission Rate (DER)			11.0100 (384)

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

DER	11.0100 ZC1
Total Floor Area	154.5300
Assumed number of occupants	2.9410
CO2 emission factor in Table 12 for electricity displaced from grid	0.5190
CO2 emissions from appliances, equation (L14)	12.4785 ZC2
CO2 emissions from cooking, equation (L16)	1.2269 ZC3
Total CO2 emissions	24.7153 ZC4
Residual CO2 emissions offset from biofuel CHP	0.0000 ZC5
Additional allowable electricity generation, kWh/m²/year	0.0000 ZC6
Resulting CO2 emissions offset from additional allowable electricity generation	0.0000 ZC7
Net CO2 emissions	24.7153 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	154.5300 (1b)	x 2.6600 (2b)	= 411.0498 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	154.5300		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 411.0498 (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					4 * 10 = 40.0000 (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) =				40.0000 / (5) =	0.0973 (8)
Pressure test					Yes
Measured/design AP50					5.0000
Infiltration rate					0.3473 (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) =		0.3213 (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	0.4096	0.4016	0.3935	0.3534	0.3454	0.3052	0.3052	0.2972	0.3213	0.3454	0.3614	0.3775 (22b)
Effective ac	0.5839	0.5806	0.5774	0.5624	0.5596	0.5466	0.5466	0.5442	0.5516	0.5596	0.5653	0.5712 (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 Opening Type (Uw = 1.40)			24.4100	1.3258	32.3617		(27)
Exposed Floor			154.5300	0.1300	20.0889		(28b)
External Wall	111.2600	24.4130	86.8470	0.1800	15.6325		(29a)
Flat Roof	21.1260		21.1260	0.1300	2.7464		(30)
Roof Joist	2.9900		2.9900	0.1300	0.3887		(31)
Total net area of external elements Aum(A, m ²)			289.9030				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		71.2182		(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)							24.6387 (36)
Total fabric heat loss						(33) + (36) =	95.8569 (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	79.2027	78.7608	78.3277	76.2933	75.9126	74.1408	74.1408	73.8126	74.8233	75.9126	76.6827	77.4877 (38)
Heat transfer coeff	175.0595	174.6177	174.1845	172.1501	171.7695	169.9976	169.9976	169.6695	170.6801	171.7695	172.5395	173.3445 (39)
Average = Sum(39)m / 12 =												172.1483 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.1329	1.1300	1.1272	1.1140	1.1116	1.1001	1.1001	1.0980	1.1045	1.1116	1.1165	1.1218 (40)
HLP (average)												1.1140 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.9410 (42)
Average daily hot water use (litres/day)												104.0499 (43)
Daily hot water use	114.4549	110.2929	106.1309	101.9689	97.8069	93.6449	93.6449	97.8069	101.9689	106.1309	110.2929	114.4549 (44)
Energy conte	169.7333	148.4498	153.1869	133.5521	128.1464	110.5806	102.4692	117.5849	118.9892	138.6705	151.3697	164.3777 (45)
Energy content (annual)										Total = Sum(45)m =		1637.1103 (45)
Distribution loss (46)m = 0.15 x (45)m	25.4600	22.2675	22.9780	20.0328	19.2220	16.5871	15.3704	17.6377	17.8484	20.8006	22.7054	24.6566 (46)
Water storage loss:												
Store volume												10.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												0.3712 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.2005 (55)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF TARGET EMISSIONS 09 Jan 2014

Total storage loss	6.2141	5.6127	6.2141	6.0136	6.2141	6.0136	6.2141	6.2141	6.0136	6.2141	6.0136	6.2141 (56)
If cylinder contains dedicated solar storage	6.2141	5.6127	6.2141	6.0136	6.2141	6.0136	6.2141	6.2141	6.0136	6.2141	6.0136	6.2141 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Total heat required for water heating calculated for each month	199.2098	175.0738	182.6634	162.0777	157.6229	139.1063	131.9457	147.0614	147.5149	168.1470	179.8953	193.8542 (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	199.2098	175.0738	182.6634	162.0777	157.6229	139.1063	131.9457	147.0614	147.5149	168.1470	179.8953	193.8542 (64)
Heat gains from water heating, kWh/month	80.0175	70.6587	74.5159	67.2266	66.1899	59.5886	57.6522	62.6782	62.3844	69.6891	73.1509	78.2368 (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	147.0525	147.0525	147.0525	147.0525	147.0525	147.0525	147.0525	147.0525	147.0525	147.0525	147.0525	147.0525 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	30.3423	26.9498	21.9171	16.5926	12.4032	10.4713	11.3146	14.7071	19.7399	25.0643	29.2538	31.1857 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	325.4079	328.7846	320.2754	302.1603	279.2932	257.8014	243.4435	240.0668	248.5760	266.6911	289.5582	311.0500 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.7052	37.7052	37.7052	37.7052	37.7052	37.7052	37.7052	37.7052	37.7052	37.7052	37.7052	37.7052 (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)	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420 (71)
Water heating gains (Table 5)	107.5504	105.1469	100.1557	93.3703	88.9649	82.7619	77.4895	84.2449	86.6451	93.6682	101.5985	105.1570 (72)
Total internal gains	533.4164	530.9970	512.4639	482.2389	450.7770	421.1503	402.3634	409.1345	425.0767	455.5394	490.5262	517.5084 (73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d			Gains W
East					8.8000	19.6403	0.6300	0.7000			0.7700			52.8204 (76)
South					7.2730	46.7521	0.6300	0.7000			0.7700			103.9169 (78)
West					8.3400	19.6403	0.6300	0.7000			0.7700			50.0593 (80)
Solar gains	206.7967	371.4438	548.2285	728.4028	847.7296	852.1470	817.4266	729.0832	611.9393	422.3705	251.4559	174.3971	(83)	
Total gains	740.2131	902.4408	1060.6924	1210.6417	1298.5066	1273.2973	1219.7899	1138.2177	1037.0160	877.9099	741.9822	691.9055	(84)	

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Thl (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	61.3006	61.4557	61.6085	62.3366	62.4747	63.1259	63.1259	63.2480	62.8735	62.4747	62.1959	61.9071	
alpha	5.0867	5.0970	5.1072	5.1558	5.1650	5.2084	5.2084	5.2165	5.1916	5.1650	5.1464	5.1271	
util living area	0.9993	0.9979	0.9931	0.9735	0.9110	0.7665	0.5937	0.6524	0.8868	0.9869	0.9984	0.9995 (86)	
MIT	19.6686	19.8345	20.1014	20.4467	20.7463	20.9313	20.9854	20.9767	20.8418	20.4369	19.9864	19.6434 (87)	
Th 2	19.9741	19.9764	19.9787	19.9894	19.9914	20.0008	20.0008	20.0025	19.9972	19.9914	19.9873	19.9831 (88)	
util rest of house	0.9991	0.9972	0.9904	0.9628	0.8739	0.6789	0.4688	0.5271	0.8257	0.9798	0.9976	0.9994 (89)	
MIT 2	18.1843	18.4284	18.8192	19.3233	19.7319	19.9525	19.9951	19.9924	19.8623	19.3165	18.6589	18.1538 (90)	
Living area fraction	18.4699	18.6989	19.0659	19.5394	19.9271	20.1408	20.1856	20.1817	20.0508	19.5320	18.9143	18.4404 (92)	
Temperature adjustment	18.4699	18.6989	19.0659	19.5394	19.9271	20.1408	20.1856	20.1817	20.0508	19.5320	18.9143	18.4404 (93)	
adjusted MIT	18.4699	18.6989	19.0659	19.5394	19.9271	20.1408	20.1856	20.1817	20.0508	19.5320	18.9143	18.4404 (93)	

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9985	0.9958	0.9871	0.9565	0.8711	0.6924	0.4929	0.5510	0.8296	0.9753	0.9965	0.9989 (94)	
Ext temp.	739.1059	898.6498	1047.0098	1157.9746	1131.0790	881.6550	601.2131	627.1583	860.3576	856.2036	739.3762	691.1723 (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	2480.5745	2409.5373	2188.7789	1831.5747	1413.1632	941.9310	609.5489	641.6457	1015.6753	1534.2485	2038.4303	2468.4989 (97)	
Space heating kWh	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	1.0000 (97a)	
Space heating per m2	1295.6526	1015.3164	849.4762	484.9921	209.8706	0.0000	0.0000	0.0000	0.0000	504.4654	935.3189	1322.3310 (98)	
												6617.4232 (98)	
												42.8229 (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 %)													93.5000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													7077.4579 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	1295.6526	1015.3164	849.4762	484.9921	209.8706	0.0000	0.0000	0.0000	0.0000	504.4654	935.3189	1322.3310	(98)
Space heating efficiency (main heating system 1)	93.5000	93.5000	93.5000	93.5000	93.5000	0.0000	0.0000	0.0000	0.0000	93.5000	93.5000	93.5000	(210)
Space heating fuel (main heating system)	1385.7247	1085.8998	908.5307	518.7081	224.4606	0.0000	0.0000	0.0000	0.0000	539.5352	1000.3411	1414.2578	(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	199.2098	175.0738	182.6634	162.0777	157.6229	139.1063	131.9457	147.0614	147.5149	168.1470	179.8953	193.8542	(64)
Efficiency of water heater (217)m	88.9113	88.7498	88.4022	87.5593	85.5783	79.8000	79.8000	79.8000	79.8000	87.5648	88.5840	88.9746	(216)
Fuel for water heating, kWh/month	224.0546	197.2666	206.6276	185.1063	184.1856	174.3186	165.3455	184.2875	184.8557	192.0257	203.0788	217.8757	(219)
Water heating fuel used												2319.0283	(219)
Annual totals kWh/year													
Space heating fuel - main system												7077.4579	(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)												535.8553	(232)
Total delivered energy for all uses												10007.3415	(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	7077.4579	0.2160	1528.7309 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2319.0283	0.2160	500.9101 (264)
Space and water heating			2029.6410 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	535.8553	0.5190	278.1089 (268)
Total CO2, kg/m2/year			2346.6749 (272)
Emissions per m2 for space and water heating			13.1343 (272a)
Fuel factor (electricity)			1.5500
Emissions per m2 for lighting			1.7997 (272b)
Emissions per m2 for pumps and fans			0.2519 (272c)
Target Carbon Dioxide Emission Rate (TER) = (13.1343 * 1.55) + 1.7997 + 0.2519, rounded to 2 d.p.			22.4100 (273)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	154.5300 (1b)	x 2.6600 (2b)	= 411.0498 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	154.5300		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 411.0498 (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					4 * 10 = 40.0000 (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) =				40.0000 / (5) = 0.0973 (8)
Pressure test					Yes
Measured/design AP50					5.0000
Infiltration rate					0.3473 (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) =				0.3213 (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	0.4096	0.4016	0.3935	0.3534	0.3454	0.3052	0.3052	0.2972	0.3213	0.3454	0.3614	0.3775 (22b)
Effective ac	0.5839	0.5806	0.5774	0.5624	0.5596	0.5466	0.5466	0.5442	0.5516	0.5596	0.5653	0.5712 (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
E Window (Uw = 1.40)			24.4100	1.3258	32.3617		(27)
Exposed Floor			154.5300	0.1900	29.3607		(28b)
External Wall	111.2600	24.4130	86.8470	0.1800	15.6325		(29a)
Flat Roof	21.1260		21.1260	0.1000	2.1126		(30)
Roof Joist	2.9900		2.9900	0.1478	0.4418		(31)
Total net area of external elements Aum(A, m ²)			289.9030				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		79.9093		(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)							27.4174 (36)
Total fabric heat loss						(33) + (36) =	107.3267 (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	79.2027	78.7608	78.3277	76.2933	75.9126	74.1408	74.1408	73.8126	74.8233	75.9126	76.6827	77.4877 (38)
Heat transfer coeff	186.5293	186.0875	185.6543	183.6199	183.2393	181.4674	181.4674	181.1393	182.1499	183.2393	184.0093	184.8143 (39)
Average = Sum(39)m / 12 =												183.6181 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.2071	1.2042	1.2014	1.1882	1.1858	1.1743	1.1743	1.1722	1.1787	1.1858	1.1908	1.1960 (40)
HLP (average)												1.1882 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.9410 (42)
Average daily hot water use (litres/day)												104.0499 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	114.4549	110.2929	106.1309	101.9689	97.8069	93.6449	93.6449	97.8069	101.9689	106.1309	110.2929	114.4549 (44)
Energy conte	169.7333	148.4498	153.1869	133.5521	128.1464	110.5806	102.4692	117.5849	118.9892	138.6705	151.3697	164.3777 (45)
Energy content (annual)										Total = Sum(45)m =		1637.1103 (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)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

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	36.0683	31.5456	32.5522	28.3798	27.2311	23.4984	21.7747	24.9868	25.2852	29.4675	32.1661	34.9303 (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	147.0525	147.0525	147.0525	147.0525	147.0525	147.0525	147.0525	147.0525	147.0525	147.0525	147.0525	147.0525	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	29.6155	26.3042	21.3920	16.1951	12.1061	10.2204	11.0436	14.3548	19.2670	24.4639	28.5530	30.4386	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	325.4079	328.7846	320.2754	302.1603	279.2932	257.8014	243.4435	240.0668	248.5760	266.6911	289.5582	311.0500	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.7052	37.7052	37.7052	37.7052	37.7052	37.7052	37.7052	37.7052	37.7052	37.7052	37.7052	37.7052	(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)	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	(71)
Water heating gains (Table 5)	48.4789	46.9428	43.7530	39.4164	36.6010	32.6366	29.2671	33.5844	35.1183	39.6068	44.6751	46.9493	(72)
Total internal gains	470.6181	469.1474	452.5361	424.8876	395.1160	367.7742	350.8699	355.1218	370.0771	397.8776	429.9020	455.5536	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
East	8.8000	19.6403	0.5400	0.8000	0.7700	51.7424	(76)
South	7.2730	46.7521	0.5400	0.8000	0.7700	101.7962	(78)
West	8.3400	19.6403	0.5400	0.8000	0.7700	49.0377	(80)

Solar gains	202.5763	363.8633	537.0401	713.5374	830.4290	834.7563	800.7444	714.2039	599.4508	413.7507	246.3242	170.8380	(83)
Total gains	673.1944	833.0107	989.5763	1138.4250	1225.5450	1202.5305	1151.6143	1069.3257	969.5279	811.6283	676.2262	626.3916	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)

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	57.5312	57.6678	57.8023	58.4427	58.5641	59.1360	59.1360	59.2431	58.9144	58.5641	58.3191	58.0650	
alpha	4.8354	4.8445	4.8535	4.8962	4.9043	4.9424	4.9424	4.9495	4.9276	4.9043	4.8879	4.8710	
util living area	0.9995	0.9985	0.9951	0.9812	0.9350	0.8169	0.6541	0.7145	0.9190	0.9912	0.9989	0.9997	(86)
MIT	19.5310	19.6976	19.9720	20.3332	20.6629	20.8917	20.9727	20.9581	20.7788	20.3351	19.8645	19.5061	(87)
Th 2	19.9143	19.9166	19.9189	19.9294	19.9314	19.9406	19.9406	19.9423	19.9370	19.9314	19.9274	19.9232	(88)
util rest of house	0.9994	0.9980	0.9931	0.9730	0.9041	0.7314	0.5157	0.5799	0.8672	0.9862	0.9984	0.9996	(89)
MIT 2	18.5671	18.7352	19.0106	19.3756	19.6897	19.8864	19.9331	19.9293	19.8026	19.3823	18.9108	18.5492	(90)
Living area fraction									fLA = Living area / (4) =			0.1924	(91)
MIT	18.7526	18.9204	19.1956	19.5599	19.8769	20.0798	20.1331	20.1272	19.9904	19.5656	19.0942	18.7333	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.7526	18.9204	19.1956	19.5599	19.8769	20.0798	20.1331	20.1272	19.9904	19.5656	19.0942	18.7333	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9991	0.9973	0.9914	0.9693	0.9022	0.7443	0.5427	0.6058	0.8705	0.9838	0.9979	0.9994	(94)
Useful gains	672.5779	830.7610	981.0181	1103.4593	1105.6821	894.9864	624.9273	647.8179	843.9491	798.4942	674.7788	625.9917	(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	2695.8282	2609.0169	2356.9860	1957.3639	1498.3365	994.4034	641.1498	675.1461	1072.9334	1642.8464	2207.0525	2685.9600	(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	1505.2982	1194.9880	1023.7202	614.8113	292.1349	0.0000	0.0000	0.0000	0.0000	628.1980	1103.2371	1532.6164	(98)
Space heating												7895.0040	(98)
Space heating per m2										(98) / (4) =		51.0904	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	1705.7939	1342.8590	1376.6587	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7844	0.8671	0.8320	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	1338.0947	1164.4336	1145.3999	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1533.0634	1470.5678	1376.9723	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	140.3775	227.7639	172.2898	0.0000	0.0000	0.0000	0.0000	(104)
Space cooling												540.4311	(104)
Cooled fraction									fC = cooled area / (4) =			1.0000	(105)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

Intermittency factor (Table 10b)	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	35.0944	56.9410	43.0725	0.0000	0.0000	0.0000 (107)
Space cooling											135.1078 (107)
Space cooling per m2											0.8743 (108)
Energy for space heating											51.0904 (99)
Energy for space cooling											0.8743 (108)
Total											51.9647 (109)
Dwelling Fabric Energy Efficiency (DFEE)											52.0 (109)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

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

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	154.5300 (1b)	x 2.6600 (2b)	= 411.0498 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	154.5300		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 411.0498 (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					4 * 10 = 40.0000 (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) =				40.0000 / (5) = 0.0973 (8)
Pressure test					Yes
Measured/design AP50					5.0000
Infiltration rate					0.3473 (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) =				0.3213 (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	0.4096	0.4016	0.3935	0.3534	0.3454	0.3052	0.3052	0.2972	0.3213	0.3454	0.3614	0.3775 (22b)
	0.5839	0.5806	0.5774	0.5624	0.5596	0.5466	0.5466	0.5442	0.5516	0.5596	0.5653	0.5712 (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 Opening Type (Uw = 1.40)			24.4100	1.3258	32.3617		(27)
Exposed Floor			154.5300	0.1300	20.0889		(28b)
External Wall	111.2600	24.4130	86.8470	0.1800	15.6325		(29a)
Flat Roof	21.1260		21.1260	0.1300	2.7464		(30)
Roof Joist	2.9900		2.9900	0.1300	0.3887		(30)
Total net area of external elements Aum(A, m ²)			289.9030				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		71.2182		(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)							24.6387 (36)
Total fabric heat loss						(33) + (36) =	95.8569 (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	79.2027	78.7608	78.3277	76.2933	75.9126	74.1408	74.1408	73.8126	74.8233	75.9126	76.6827	77.4877 (38)
Heat transfer coeff	175.0595	174.6177	174.1845	172.1501	171.7695	169.9976	169.9976	169.6695	170.6801	171.7695	172.5395	173.3445 (39)
Average = Sum(39)m / 12 =												172.1483 (39)
HLP	1.1329	1.1300	1.1272	1.1140	1.1116	1.1001	1.1001	1.0980	1.1045	1.1116	1.1165	1.1218 (40)
HLP (average)												1.1140 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.9410 (42)
Average daily hot water use (litres/day)												104.0499 (43)
Daily hot water use	114.4549	110.2929	106.1309	101.9689	97.8069	93.6449	93.6449	97.8069	101.9689	106.1309	110.2929	114.4549 (44)
Energy conte	169.7333	148.4498	153.1869	133.5521	128.1464	110.5806	102.4692	117.5849	118.9892	138.6705	151.3697	164.3777 (45)
Energy content (annual)												Total = Sum(45)m = 1637.1103 (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)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

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	36.0683	31.5456	32.5522	28.3798	27.2311	23.4984	21.7747	24.9868	25.2852	29.4675	32.1661	34.9303 (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	147.0525	147.0525	147.0525	147.0525	147.0525	147.0525	147.0525	147.0525	147.0525	147.0525	147.0525	147.0525 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	30.3423	26.9498	21.9171	16.5926	12.4032	10.4713	11.3146	14.7071	19.7399	25.0643	29.2538	31.1857 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	325.4079	328.7846	320.2754	302.1603	279.2932	257.8014	243.4435	240.0668	248.5760	266.6911	289.5582	311.0500 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.7052	37.7052	37.7052	37.7052	37.7052	37.7052	37.7052	37.7052	37.7052	37.7052	37.7052	37.7052 (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)	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420 (71)
Water heating gains (Table 5)	48.4789	46.9428	43.7530	39.4164	36.6010	32.6366	29.2671	33.5844	35.1183	39.6068	44.6751	46.9493 (72)
Total internal gains	471.3449	469.7930	453.0612	425.2850	395.4131	368.0250	351.1409	355.4741	370.5500	398.4780	430.6028	456.3007 (73)

6. Solar gains

[Jan]		Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
East		8.8000	19.6403	0.6300	0.7000	0.7700	52.8204 (76)
South		7.2730	46.7521	0.6300	0.7000	0.7700	103.9169 (78)
West		8.3400	19.6403	0.6300	0.7000	0.7700	50.0593 (80)

Solar gains	206.7967	371.4438	548.2285	728.4028	847.7296	852.1470	817.4266	729.0832	611.9393	422.3705	251.4559	174.3971 (83)
Total gains	678.1416	841.2367	1001.2896	1153.6878	1243.1427	1220.1721	1168.5675	1084.5572	982.4893	820.8485	682.0587	630.6978 (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	61.3006	61.4557	61.6085	62.3366	62.4747	63.1259	63.1259	63.2480	62.8735	62.4747	62.1959	61.9071
alpha	5.0867	5.0970	5.1072	5.1558	5.1650	5.2084	5.2084	5.2165	5.1916	5.1650	5.1464	5.1271
util living area	0.9995	0.9985	0.9946	0.9782	0.9228	0.7873	0.6160	0.6780	0.9041	0.9902	0.9989	0.9997 (86)
MIT	19.6309	19.7975	20.0664	20.4161	20.7244	20.9219	20.9828	20.9723	20.8226	20.4041	19.9501	19.6061 (87)
Th 2	19.9741	19.9764	19.9787	19.9894	19.9914	20.0008	20.0008	20.0025	19.9972	19.9914	19.9873	19.9831 (88)
util rest of house	0.9994	0.9980	0.9926	0.9691	0.8890	0.7014	0.4882	0.5509	0.8484	0.9848	0.9984	0.9996 (89)
MIT 2	18.7144	18.8827	19.1524	19.5055	19.7961	19.9625	19.9961	19.9940	19.8912	19.4988	19.0441	18.6969 (90)
Living area fraction									fLA = Living area / (4) =			0.1924 (91)
MIT	18.8908	19.0587	19.3282	19.6807	19.9747	20.1471	20.1859	20.1822	20.0704	19.6730	19.2184	18.8718 (92)
Temperature adjustment												0.0000
adjusted MIT	18.8908	19.0587	19.3282	19.6807	19.9747	20.1471	20.1859	20.1822	20.0704	19.6730	19.2184	18.8718 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9991	0.9973	0.9908	0.9655	0.8883	0.7154	0.5131	0.5754	0.8534	0.9824	0.9979	0.9994 (94)
Useful gains	677.5557	838.9538	992.0601	1113.9294	1104.3413	872.8604	599.5872	624.0924	838.4546	806.4037	680.6166	630.3251 (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	2554.2514	2472.3564	2234.4827	1855.8985	1421.3469	942.9936	609.5999	641.7305	1019.0239	1558.4646	2090.9007	2543.2780 (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	1396.2616	1097.6466	924.3624	534.2177	235.8522	0.0000	0.0000	0.0000	0.0000	559.5333	1015.4046	1423.2369 (98)
Space heating												7186.5154 (98)
Space heating per m2										(98) / (4) =		46.5056 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	1597.9777	1257.9825	1289.4882	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8270	0.9010	0.8703	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	1321.5303	1133.4466	1122.2418	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1554.0173	1490.7441	1395.2444	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	167.3907	265.8293	203.1139	0.0000	0.0000	0.0000	0.0000 (104)
Space cooling												636.3339 (104)
Cooled fraction									fC = cooled area / (4) =			1.0000 (105)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

Intermittency factor (Table 10b)	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	41.8477	66.4573	50.7785	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling											159.0835 (107)
Space cooling per m2											1.0295 (108)
Energy for space heating											46.5056 (99)
Energy for space cooling											1.0295 (108)
Total											47.5351 (109)
Target Fabric Energy Efficiency (TFEE)											54.7 (109)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF HEAT DEMAND 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (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	154.5300 (1b)	x 2.6600 (2b)	= 411.0498 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	154.5300		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 411.0498 (5)

2. Ventilation rate

	main		secondary		other		total		m3 per hour			
	heating		heating									
Number of chimneys	0	+	0	+	0	=	0 * 40 =	0.0000	(6a)			
Number of open flues	0	+	0	+	0	=	0 * 20 =	0.0000	(6b)			
Number of intermittent fans							0 * 10 =	0.0000	(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) =						0.0000 / (5) =	0.0000	(8)			
Pressure test							Yes					
Measured/design AP50							5.0000					
Infiltration rate							0.2500	(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) =	0.2313	(21)			
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind factor	4.5000	4.3000	4.4000	4.0000	4.0000	3.7000	3.7000	3.4000	3.7000	3.9000	3.8000	4.1000 (22)
Adj infilt rate	1.1250	1.0750	1.1000	1.0000	1.0000	0.9250	0.9250	0.8500	0.9250	0.9750	0.9500	1.0250 (22a)
	0.2602	0.2486	0.2544	0.2313	0.2313	0.2139	0.2139	0.1966	0.2139	0.2255	0.2197	0.2370 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation:												0.5000 (23a)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												64.4000 (23c)
Effective ac	0.4382	0.4266	0.4324	0.4093	0.4093	0.3919	0.3919	0.3746	0.3919	0.4035	0.3977	0.4150 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K					
E Window (Uw = 1.40)			24.4100	1.3258	32.3617			(27)				
Exposed Floor			154.5300	0.1900	29.3607			(28b)				
External Wall	111.2600	24.4130	86.8470	0.1800	15.6325			(29a)				
Flat Roof	21.1260		21.1260	0.1000	2.1126			(30)				
Roof Joist	2.9900		2.9900	0.1478	0.4418			(30)				
Total net area of external elements Aum(A, m2)			289.9030					(31)				
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		79.9093			(33)				
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K								250.0000 (35)				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)								27.4174 (36)				
Total fabric heat loss								(33) + (36) = 107.3267 (37)				
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 59.4343	Feb 57.8659	Mar 58.6501	Apr 55.5133	May 55.5133	Jun 53.1607	Jul 53.1607	Aug 50.8081	Sep 53.1607	Oct 54.7291	Nov 53.9449	Dec 56.2975 (38)
Heat transfer coeff	166.7610	165.1926	165.9768	162.8400	162.8400	160.4874	160.4874	158.1347	160.4874	162.0558	161.2716	163.6242 (39)
Average = Sum(39)m / 12 =	162.5132 (39)											
HLP	Jan 1.0791	Feb 1.0690	Mar 1.0741	Apr 1.0538	May 1.0538	Jun 1.0386	Jul 1.0386	Aug 1.0233	Sep 1.0386	Oct 1.0487	Nov 1.0436	Dec 1.0589 (40)
HLP (average)	1.0517 (40)											
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.9410 (42)
Average daily hot water use (litres/day)												104.0499 (43)
Daily hot water use	Jan 114.4549	Feb 110.2929	Mar 106.1309	Apr 101.9689	May 97.8069	Jun 93.6449	Jul 93.6449	Aug 97.8069	Sep 101.9689	Oct 106.1309	Nov 110.2929	Dec 114.4549 (44)
Energy conte	169.7333	148.4498	153.1869	133.5521	128.1464	110.5806	102.4692	117.5849	118.9892	138.6705	151.3697	164.3777 (45)
Energy content (annual)												Total = Sum(45)m = 1637.1103 (45)
Distribution loss (46)m = 0.15 x (45)m												
	25.4600	22.2675	22.9780	20.0328	19.2220	16.5871	15.3704	17.6377	17.8484	20.8006	22.7054	24.6566 (46)
Water storage loss:												

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF HEAT DEMAND 09 Jan 2014

Store volume													10.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													0.5000 (48)
Temperature factor from Table 2b													1.0000 (49)
Enter (49) or (54) in (55)													0.5000 (55)
Total storage loss	15.5000	14.0000	15.5000	15.0000	15.5000	15.0000	15.5000	15.0000	15.5000	15.0000	15.5000	15.0000	(56)
If cylinder contains dedicated solar storage	15.5000	14.0000	15.5000	15.0000	15.5000	15.0000	15.5000	15.0000	15.5000	15.0000	15.5000	15.0000	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	(59)
Total heat required for water heating calculated for each month	208.4957	183.4610	191.9493	171.0641	166.9088	148.0926	141.2316	156.3473	156.5012	177.4329	188.8817	203.1401	(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 =													(63)
Output from w/h	208.4957	183.4610	191.9493	171.0641	166.9088	148.0926	141.2316	156.3473	156.5012	177.4329	188.8817	203.1401	(64)
Total per year (kWh/year) = Sum(64)m =													(64)
RHI water heating demand													(64)
Heat gains from water heating, kWh/month	87.4462	77.3685	81.9446	74.4157	73.6186	66.7777	65.0809	70.1069	69.5735	77.1179	80.3400	85.6655	(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	176.4629	176.4629	176.4629	176.4629	176.4629	176.4629	176.4629	176.4629	176.4629	176.4629	176.4629	176.4629	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	74.0387	65.7605	53.4801	40.4879	30.2651	25.5511	27.6089	35.8871	48.1675	61.1598	71.3825	76.0965	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	485.6834	490.7233	478.0230	450.9855	416.8555	384.7782	363.3485	358.3087	371.0090	398.0465	432.1764	464.2538	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	55.5873	55.5873	55.5873	55.5873	55.5873	55.5873	55.5873	55.5873	55.5873	55.5873	55.5873	55.5873	(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)	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	(71)
Water heating gains (Table 5)	117.5353	115.1317	110.1406	103.3551	98.9497	92.7467	87.4744	94.2297	96.6299	103.6530	111.5834	115.1418	(72)
Total internal gains	791.6657	786.0239	756.0519	709.2368	660.4787	617.4844	592.8401	602.8338	630.2147	677.2676	729.5506	769.9004	(73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W			
East				8.8000	22.3313	0.5400	0.8000	0.7700	58.8320 (76)			
South				7.2730	50.9848	0.5400	0.8000	0.7700	111.0124 (78)			
West				8.3400	22.3313	0.5400	0.8000	0.7700	55.7567 (80)			
Solar gains	225.6012	364.7988	537.8272	734.9301	829.5932	893.3127	847.2776	767.0543	644.5525	443.0374	273.8610	188.3995 (83)
Total gains	1017.2669	1150.8227	1293.8791	1444.1668	1490.0720	1510.7971	1440.1177	1369.8880	1274.7672	1120.3050	1003.4116	958.2999 (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	64.3511	64.9621	64.6551	65.9006	65.9006	66.8666	66.8666	67.8614	66.8666	66.2195	66.5415	65.5847	
alpha	5.2901	5.3308	5.3103	5.3934	5.3934	5.4578	5.4578	5.5241	5.4578	5.4146	5.4361	5.3723	
util living area	0.9964	0.9924	0.9778	0.9260	0.7939	0.5425	0.3558	0.3911	0.7076	0.9461	0.9914	0.9973	(86)
MIT	19.9608	20.1149	20.3783	20.6890	20.9058	20.9907	20.9993	20.9988	20.9622	20.6930	20.2872	19.9525	(87)
Th 2	20.0179	20.0262	20.0221	20.0388	20.0388	20.0513	20.0513	20.0639	20.0513	20.0429	20.0471	20.0346	(88)
util rest of house	0.9952	0.9899	0.9699	0.9005	0.7309	0.4484	0.2508	0.2842	0.6153	0.9215	0.9879	0.9964	(89)
MIT 2	18.6424	18.8725	19.2488	19.6917	19.9576	20.0469	20.0512	20.0637	20.0274	19.7090	19.1394	18.6425	(90)
Living area fraction									fLA = Living area / (4) =			0.1924	(91)
MIT	18.8960	19.1115	19.4661	19.8836	20.1400	20.2285	20.2336	20.2436	20.2072	19.8983	19.3602	18.8945	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.8960	19.1115	19.4661	19.8836	20.1400	20.2285	20.2336	20.2436	20.2072	19.8983	19.3602	18.8945	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	1010.3621	1135.2881	1247.3463	1293.4129	1099.9613	704.5239	390.3319	417.6332	804.9563	1027.2139	987.7427	953.2777	(95)
Ext temp.	4.8000	5.4000	7.3000	9.7000	12.8000	15.8000	17.8000	17.6000	15.0000	11.4000	7.7000	4.8000	(96)
Heat loss rate W	2350.6670	2265.0426	2019.2972	1658.2899	1195.2458	710.7109	390.5618	418.0461	835.6942	1377.2027	1880.4661	2306.2046	(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	997.1868	759.1950	574.3315	262.7114	70.8917	0.0000	0.0000	0.0000	0.0000	260.3916	642.7608	1006.5776	(98)
Space heating													(98)
RHI space heating demand													(98)

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Calculation Type: New Build (As Designed)

CALCULATION OF HEAT DEMAND 09 Jan 2014

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF ENERGY RATINGS 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (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	154.5300 (1b)	x 2.6600 (2b)	= 411.0498 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	154.5300		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	411.0498 (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) =					Air changes per hour 0.0000 / (5) = 0.0000 (8)
Pressure test					Yes
Measured/design AP50					5.0000
Infiltration rate					0.2500 (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) =		0.2313 (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	0.2948	0.2891	0.2833	0.2544	0.2486	0.2197	0.2197	0.2139	0.2313	0.2486	0.2602	0.2717 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation:												0.5000 (23a)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												64.4000 (23c)
Effective ac	0.4728	0.4671	0.4613	0.4324	0.4266	0.3977	0.3977	0.3919	0.4093	0.4266	0.4382	0.4497 (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
E Window (Uw = 1.40)			24.4100	1.3258	32.3617		(27)
Exposed Floor			154.5300	0.1900	29.3607		(28b)
External Wall	111.2600	24.4130	86.8470	0.1800	15.6325		(29a)
Flat Roof	21.1260		21.1260	0.1000	2.1126		(30)
Roof Joist	2.9900		2.9900	0.1478	0.4418		(30)
Total net area of external elements Aum(A, m ²)			289.9030				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		79.9093		(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)							27.4174 (36)
Total fabric heat loss						(33) + (36) =	107.3267 (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	64.1396	63.3554	62.5712	58.6501	57.8659	53.9449	53.9449	53.1607	55.5133	57.8659	59.4343	61.0027 (38)
Average = Sum(39)m / 12 =	171.4662	170.6820	169.8978	165.9768	165.1926	161.2716	161.2716	160.4874	162.8400	165.1926	166.7610	168.3294 (39)
												165.7807 (39)
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1096	1.1045	1.0994	1.0741	1.0690	1.0436	1.0436	1.0386	1.0538	1.0690	1.0791	1.0893 (40)
Days in month												
	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.9410 (42)
Average daily hot water use (litres/day)												104.0499 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	114.4549	110.2929	106.1309	101.9689	97.8069	93.6449	93.6449	97.8069	101.9689	106.1309	110.2929	114.4549 (44)
Energy content (annual)	169.7333	148.4498	153.1869	133.5521	128.1464	110.5806	102.4692	117.5849	118.9892	138.6705	151.3697	164.3777 (45)
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		1637.1103 (45)
Water storage loss:	25.4600	22.2675	22.9780	20.0328	19.2220	16.5871	15.3704	17.6377	17.8484	20.8006	22.7054	24.6566 (46)

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Calculation Type: New Build (As Designed)

CALCULATION OF ENERGY RATINGS 09 Jan 2014

Store volume													10.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													0.5000 (48)
Temperature factor from Table 2b													1.0000 (49)
Enter (49) or (54) in (55)													0.5000 (55)
Total storage loss													
15.5000	14.0000	15.5000	15.0000	15.5000	15.0000	15.5000	15.5000	15.0000	15.5000	15.0000	15.5000	15.5000	(56)
If cylinder contains dedicated solar storage													
15.5000	14.0000	15.5000	15.0000	15.5000	15.0000	15.5000	15.5000	15.0000	15.5000	15.0000	15.5000	15.5000	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Total heat required for water heating calculated for each month													
208.4957	183.4610	191.9493	171.0641	166.9088	148.0926	141.2316	156.3473	156.5012	177.4329	188.8817	203.1401	203.1401	(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 =													(63)
Output from w/h													
208.4957	183.4610	191.9493	171.0641	166.9088	148.0926	141.2316	156.3473	156.5012	177.4329	188.8817	203.1401	203.1401	(64)
Heat gains from water heating, kWh/month													
87.4462	77.3685	81.9446	74.4157	73.6186	66.7777	65.0809	70.1069	69.5735	77.1179	80.3400	85.6655	85.6655	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	176.4629	176.4629	176.4629	176.4629	176.4629	176.4629	176.4629	176.4629	176.4629	176.4629	176.4629	176.4629	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
74.0387	65.7605	53.4801	40.4879	30.2651	25.5511	27.6089	35.8871	48.1675	61.1598	71.3825	76.0965	76.0965	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
485.6834	490.7233	478.0230	450.9855	416.8555	384.7782	363.3485	358.3087	371.0090	398.0465	432.1764	464.2538	464.2538	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
55.5873	55.5873	55.5873	55.5873	55.5873	55.5873	55.5873	55.5873	55.5873	55.5873	55.5873	55.5873	55.5873	(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)													
-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	(71)
Water heating gains (Table 5)													
117.5353	115.1317	110.1406	103.3551	98.9497	92.7467	87.4744	94.2297	96.6299	103.6530	111.5834	115.1418	115.1418	(72)
Total internal gains													
791.6657	786.0239	756.0519	709.2368	660.4787	617.4844	592.8401	602.8338	630.2147	677.2676	729.5506	769.9004	769.9004	(73)

6. Solar gains

[Jan]													
	Area	Solar flux	Specific data	g	FF	Access	Gains						
	m2	Table 6a	or Table 6b	W/m2	or Table 6c	factor	W						
						Table 6d							
East	8.8000	19.6403	0.5400	0.8000	0.7700	51.7424	(76)						
South	7.2730	46.7521	0.5400	0.8000	0.7700	101.7962	(78)						
West	8.3400	19.6403	0.5400	0.8000	0.7700	49.0377	(80)						

Solar gains	202.5763	363.8633	537.0401	713.5374	830.4290	834.7563	800.7444	714.2039	599.4508	413.7507	246.3242	170.8380	(83)
Total gains	994.2421	1149.8872	1293.0921	1422.7742	1490.9077	1452.2406	1393.5845	1317.0377	1229.6655	1091.0183	975.8748	940.7383	(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	62.5852	62.8728	63.1630	64.6551	64.9621	66.5415	66.5415	66.8666	65.9006	64.9621	64.3511	63.7515
alpha	5.1723	5.1915	5.2109	5.3103	5.3308	5.4361	5.4361	5.4578	5.3934	5.3308	5.2901	5.2501
util living area	0.9973	0.9937	0.9832	0.9473	0.8544	0.6746	0.5027	0.5498	0.8032	0.9656	0.9940	0.9979 (86)
MIT	19.8539	20.0162	20.2687	20.5929	20.8381	20.9675	20.9944	20.9912	20.9159	20.5901	20.1701	19.8390 (87)
Th 2	19.9930	19.9971	20.0013	20.0221	20.0262	20.0471	20.0471	20.0513	20.0388	20.0262	20.0179	20.0096 (88)
util rest of house	0.9963	0.9915	0.9773	0.9287	0.8062	0.5887	0.3973	0.4419	0.7279	0.9498	0.9916	0.9972 (89)
MIT 2	18.4683	18.7076	19.0759	19.5485	19.8696	20.0258	20.0451	20.0478	19.9735	19.5556	18.9480	18.4587 (90)
Living area fraction										fLA = Living area / (4) =		0.1924 (91)
MIT	18.7349	18.9594	19.3054	19.7494	20.0559	20.2070	20.2277	20.2293	20.1548	19.7546	19.1831	18.7242 (92)
Temperature adjustment												0.0000
adjusted MIT	18.7349	18.9594	19.3054	19.7494	20.0559	20.2070	20.2277	20.2293	20.1548	19.7546	19.1831	18.7242 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
0.9946	0.9884	0.9719	0.9224	0.8079	0.6039	0.4176	0.4627	0.7380	0.9441	0.9887	0.9959	0.9959	(94)
Useful gains	988.9062	1136.6057	1256.7945	1312.3327	1204.4869	876.9790	582.0056	609.3974	907.4719	1029.9786	964.8943	936.8840	(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													
2475.0985	2399.6853	2175.6044	1800.7515	1380.3319	904.2451	585.0486	614.5500	985.9643	1512.2769	2014.9865	2444.8545	2444.8545	(97)
Month fracti	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	1.0000	(97a)
Space heating kWh													
1105.7271	848.7895	683.5946	351.6615	130.8287	0.0000	0.0000	0.0000	0.0000	358.8299	756.0664	1121.9301	1121.9301	(98)
Space heating													
5357.4278													(98)
Space heating per m2													
													(98) / (4) =
													34.6692 (99)

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CALCULATION OF ENERGY RATINGS 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	1515.9527	1193.4096	1219.7039	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8648	0.9284	0.9055	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	1311.0204	1107.9223	1104.4528	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1593.1735	1528.7751	1437.6176	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	203.1502	313.1145	247.8746	0.0000	0.0000	0.0000	0.0000 (104)
Space cooling	0.0000	0.0000	0.0000	0.0000	0.0000	203.1502	313.1145	247.8746	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fC = cooled area / (4) =			0.4806 (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	24.4094	37.6222	29.7833	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling	0.0000	0.0000	0.0000	0.0000	0.0000	24.4094	37.6222	29.7833	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling per m2												0.5942 (108)

9b. Energy requirements

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (301)
Fraction of space heat from community system	1.0000 (302)
Fraction of heat from community Heat pump	1.0000 (303a)
Fraction of total space heat from community Heat pump	1.0000 (304a)
Factor for control and charging method (Table 4c(3)) for community space heating	1.0000 (305)
Factor for control and charging method (Table 4c(3)) for community water heating	1.0000 (305a)
Distribution loss factor (Table 12c) for community heating system	1.0500 (306)
Space heating:	
Annual space heating requirement	5357.4278 (98)
Space heat from Heat pump = (98) x 1.00 x 1.00 x 1.05	5625.2991 (307a)
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)	0.0000 (308)
Space heating fuel for secondary/supplementary system	0.0000 (309)
Water heating	
Annual water heating requirement	2093.5063 (64)
Water heat from Heat pump = (64) x 1.00 x 1.00 x 1.05	2198.1816 (310a)
Electricity used for heat distribution	78.2348 (313)
Cooling System Energy Efficiency Ratio	6.7500 (314)
Space cooling (if there is a fixed cooling system, if not enter 0)	13.6022 (315)
Annual totals kWh/year	
Electricity for pumps and fans:	
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 1.1060)	
mechanical ventilation fans (SFP = 1.1060)	554.6377 (330a)
Total electricity for the above, kWh/year	554.6377 (331)
Electricity for lighting (calculated in Appendix L)	523.0188 (332)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV Unit 0 (0.80 * 1.41 * 951 * 0.80) =	-857.8359 (333)
Total delivered energy for all uses	8056.9037 (338)

10b. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating from Heat pump	5625.2991	4.2400	238.5127 (340a)
Space heating - secondary	0.0000	0.0000	0.0000 (341)
Water heating from Heat pump	2198.1816	4.2400	93.2029 (342a)
Space cooling	13.6022	13.1900	1.7941 (348)
Mechanical ventilation fans	554.6377	13.1900	73.1567 (349)
Pumps and fans for heating	0.0000	0.0000	0.0000 (349)
Energy for lighting	523.0188	13.1900	68.9862 (350)
Additional standing charges			120.0000 (351)
Energy saving/generation technologies			
PV Unit	0.0000	0.0000	0.0000 (352)
Total energy cost			595.6526 (355)

11b. SAP rating - Community heating scheme

Energy cost deflator (Table 12):	0.4200 (356)
Energy cost factor (ECF)	1.2538 (357)
SAP value	82.5093
SAP rating (Section 12)	83 (358)
SAP band	B

12b. Carbon dioxide emissions - Community heating scheme

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Efficiency of heat source Heat pump			300.0000 (367a)
Space heating from Heat pump	2607.8269	0.5190	1353.4622 (367)
Electrical energy for heat distribution	78.2348	0.5190	40.6039 (372)
Total CO2 associated with community systems			1394.0660 (373)
(negative value allowed since DFEE <= TFEE)			
Space and water heating			1394.0660 (376)

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Space cooling	13.6022	0.5190	7.0595 (377)
Pumps and fans	554.6377	0.5190	287.8570 (378)
Energy for lighting	523.0188	0.5190	271.4468 (379)
Energy saving/generation technologies			
PV Unit	-857.8359	0.5190	-445.2168 (380)
Total kg/year			1515.2125 (383)
CO2 emissions per m2			9.8100 (384)
EI value			89.8242 (384a)
EI rating			90 (385)
EI band			B

----- Calculation of stars for heating and DHW

Space heating energy efficiency	$1.00 \times 4.240 \times 1.05$	
= 4.452, stars = 4		
Space heating environmental impact	$1.00 \times 0.519 \times 1.05 / 3.0000$	
= 0.1817, stars = 5		
Water heating energy efficiency		4.452, stars = 4
Water heating environmental impact		0.1817, stars = 5

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

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

SAP 2012 WORKSHEET FOR New Build (As Designed) (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	154.5300 (1b)	x 2.6600 (2b)	= 411.0498 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	154.5300		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 411.0498 (5)

2. Ventilation rate

	main		secondary		other		total		m3 per hour			
	heating		heating									
Number of chimneys	0	+	0	+	0	=	0 * 40 =	0.0000	(6a)			
Number of open flues	0	+	0	+	0	=	0 * 20 =	0.0000	(6b)			
Number of intermittent fans							0 * 10 =	0.0000	(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) =						0.0000 / (5) =	0.0000	(8)			
Pressure test							Yes					
Measured/design AP50							5.0000					
Infiltration rate							0.2500	(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) =	0.2313	(21)			
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind factor	4.5000	4.3000	4.4000	4.0000	4.0000	3.7000	3.7000	3.4000	3.7000	3.9000	3.8000	4.1000 (22)
Adj infilt rate	1.1250	1.0750	1.1000	1.0000	1.0000	0.9250	0.9250	0.8500	0.9250	0.9750	0.9500	1.0250 (22a)
	0.2602	0.2486	0.2544	0.2313	0.2313	0.2139	0.2139	0.1966	0.2139	0.2255	0.2197	0.2370 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation:												
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =	0.5000 (23a)											
	64.4000 (23c)											
Effective ac	0.4382	0.4266	0.4324	0.4093	0.4093	0.3919	0.3919	0.3746	0.3919	0.4035	0.3977	0.4150 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K					
E Window (Uw = 1.40)			24.4100	1.3258	32.3617		(27)					
Exposed Floor			154.5300	0.1900	29.3607		(28b)					
External Wall	111.2600	24.4130	86.8470	0.1800	15.6325		(29a)					
Flat Roof	21.1260		21.1260	0.1000	2.1126		(30)					
Roof Joist	2.9900		2.9900	0.1478	0.4418		(30)					
Total net area of external elements Aum(A, m2)			289.9030				(31)					
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		79.9093		(33)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							27.4174 (36)					
Total fabric heat loss						(33) + (36) =	107.3267 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 59.4343	Feb 57.8659	Mar 58.6501	Apr 55.5133	May 55.5133	Jun 53.1607	Jul 53.1607	Aug 50.8081	Sep 53.1607	Oct 54.7291	Nov 53.9449	Dec 56.2975 (38)
Heat transfer coeff	166.7610	165.1926	165.9768	162.8400	162.8400	160.4874	160.4874	158.1347	160.4874	162.0558	161.2716	163.6242 (39)
Average = Sum(39)m / 12 =												162.5132 (39)
HLP	Jan 1.0791	Feb 1.0690	Mar 1.0741	Apr 1.0538	May 1.0538	Jun 1.0386	Jul 1.0386	Aug 1.0233	Sep 1.0386	Oct 1.0487	Nov 1.0436	Dec 1.0589 (40)
HLP (average)												1.0517 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.9410 (42)
Average daily hot water use (litres/day)												104.0499 (43)
Daily hot water use	Jan 114.4549	Feb 110.2929	Mar 106.1309	Apr 101.9689	May 97.8069	Jun 93.6449	Jul 93.6449	Aug 97.8069	Sep 101.9689	Oct 106.1309	Nov 110.2929	Dec 114.4549 (44)
Energy conte	169.7333	148.4498	153.1869	133.5521	128.1464	110.5806	102.4692	117.5849	118.9892	138.6705	151.3697	164.3777 (45)
Energy content (annual)										Total = Sum(45)m =		1637.1103 (45)
Distribution loss (46)m = 0.15 x (45)m												
25.4600	22.2675	22.9780	20.0328	19.2220	16.5871	15.3704	17.6377	17.8484	20.8006	22.7054	24.6566 (46)	
Water storage loss:												

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

Store volume													10.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													0.5000 (48)
Temperature factor from Table 2b													1.0000 (49)
Enter (49) or (54) in (55)													0.5000 (55)
Total storage loss													
15.5000	14.0000	15.5000	15.0000	15.5000	15.0000	15.5000	15.5000	15.0000	15.5000	15.0000	15.5000	15.5000	(56)
If cylinder contains dedicated solar storage													
15.5000	14.0000	15.5000	15.0000	15.5000	15.0000	15.5000	15.5000	15.0000	15.5000	15.0000	15.5000	15.5000	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Total heat required for water heating calculated for each month													
208.4957	183.4610	191.9493	171.0641	166.9088	148.0926	141.2316	156.3473	156.5012	177.4329	188.8817	203.1401	203.1401	(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 =													(63)
Output from w/h													
208.4957	183.4610	191.9493	171.0641	166.9088	148.0926	141.2316	156.3473	156.5012	177.4329	188.8817	203.1401	203.1401	(64)
Heat gains from water heating, kWh/month													
87.4462	77.3685	81.9446	74.4157	73.6186	66.7777	65.0809	70.1069	69.5735	77.1179	80.3400	85.6655	85.6655	(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	176.4629	176.4629	176.4629	176.4629	176.4629	176.4629	176.4629	176.4629	176.4629	176.4629	176.4629	176.4629	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
74.0387	65.7605	53.4801	40.4879	30.2651	25.5511	27.6089	35.8871	48.1675	61.1598	71.3825	76.0965	76.0965	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
485.6834	490.7233	478.0230	450.9855	416.8555	384.7782	363.3485	358.3087	371.0090	398.0465	432.1764	464.2538	464.2538	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
55.5873	55.5873	55.5873	55.5873	55.5873	55.5873	55.5873	55.5873	55.5873	55.5873	55.5873	55.5873	55.5873	(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)													
-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	-117.6420	(71)
Water heating gains (Table 5)													
117.5353	115.1317	110.1406	103.3551	98.9497	92.7467	87.4744	94.2297	96.6299	103.6530	111.5834	115.1418	115.1418	(72)
Total internal gains													
791.6657	786.0239	756.0519	709.2368	660.4787	617.4844	592.8401	602.8338	630.2147	677.2676	729.5506	769.9004	769.9004	(73)

6. Solar gains

[Jan]		Area	Solar flux	Specific data	FF	Access	Gains	
		m2	Table 6a	g		factor	W	
			W/m2	or Table 6b	or Table 6c	Table 6d		
East		8.8000	22.3313	0.5400	0.8000	0.7700	58.8320	(76)
South		7.2730	50.9848	0.5400	0.8000	0.7700	111.0124	(78)
West		8.3400	22.3313	0.5400	0.8000	0.7700	55.7567	(80)

Solar gains	225.6012	364.7988	537.8272	734.9301	829.5932	893.3127	847.2776	767.0543	644.5525	443.0374	273.8610	188.3995	(83)
Total gains	1017.2669	1150.8227	1293.8791	1444.1668	1490.0720	1510.7971	1440.1177	1369.8880	1274.7672	1120.3050	1003.4116	958.2999	(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	64.3511	64.9621	64.6551	65.9006	65.9006	66.8666	66.8666	67.8614	66.8666	66.2195	66.5415	65.5847	
alpha	5.2901	5.3308	5.3103	5.3934	5.3934	5.4578	5.4578	5.5241	5.4578	5.4146	5.4361	5.3723	
util living area													
0.9964	0.9924	0.9778	0.9260	0.7939	0.5425	0.3558	0.3911	0.7076	0.9461	0.9914	0.9973	0.9973	(86)
MIT	19.9608	20.1149	20.3783	20.6890	20.9058	20.9907	20.9993	20.9988	20.9622	20.6930	20.2872	19.9525	(87)
Th 2	20.0179	20.0262	20.0221	20.0388	20.0388	20.0513	20.0513	20.0639	20.0513	20.0429	20.0471	20.0346	(88)
util rest of house													
0.9952	0.9899	0.9699	0.9005	0.7309	0.4484	0.2508	0.2842	0.6153	0.9215	0.9879	0.9964	0.9964	(89)
MIT 2	18.6424	18.8725	19.2488	19.6917	19.9576	20.0469	20.0512	20.0637	20.0274	19.7090	19.1394	18.6425	(90)
Living area fraction													
MIT	18.8960	19.1115	19.4661	19.8836	20.1400	20.2285	20.2336	20.2436	20.2072	19.8983	19.3602	18.8945	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.8960	19.1115	19.4661	19.8836	20.1400	20.2285	20.2336	20.2436	20.2072	19.8983	19.3602	18.8945	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
0.9932	0.9865	0.9640	0.8956	0.7382	0.4663	0.2710	0.3049	0.6315	0.9169	0.9844	0.9948	0.9948	(94)
Useful gains	1010.3621	1135.2881	1247.3463	1293.4129	1099.9613	704.5239	390.3319	417.6332	804.9563	1027.2139	987.7427	953.2777	(95)
Ext temp.	4.8000	5.4000	7.3000	9.7000	12.8000	15.8000	17.8000	17.6000	15.0000	11.4000	7.7000	4.8000	(96)
Heat loss rate W													
2350.6670	2265.0426	2019.2972	1658.2899	1195.2458	710.7109	390.5618	418.0461	835.6942	1377.2027	1880.4661	2306.2046	2306.2046	(97)
Month fracti	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	(97a)
Space heating kWh													
997.1868	759.1950	574.3315	262.7114	70.8917	0.0000	0.0000	0.0000	0.0000	260.3916	642.7608	1006.5776	1006.5776	(98)
Space heating												4574.0465	(98)
Space heating per m2												29.5997	(99)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY 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.	4.8000	5.4000	7.3000	9.7000	12.8000	15.8000	17.8000	17.6000	15.0000	11.4000	7.7000	4.8000	
Heat loss rate W													
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	1315.9963	995.0216	1012.0623	0.0000	0.0000	0.0000	0.0000	(100)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.9251	0.9690	0.9599	0.0000	0.0000	0.0000	0.0000	(101)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1217.4829	964.1762	971.4282	0.0000	0.0000	0.0000	0.0000	(102)
Month fracti	0.0000	0.0000	0.0000	0.0000	0.0000	1661.6161	1583.1646	1499.3907	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh						1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	(103a)
Space cooling	0.0000	0.0000	0.0000	0.0000	0.0000	319.7759	460.5274	392.8041	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction													1173.1073 (104)
Intermittency factor (Table 10b)													fC = cooled area / (4) = 0.4806 (105)
Space cooling kWh	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	0.0000	0.0000	0.0000	0.0000	0.0000	38.4226	55.3345	47.1972	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling per m2													140.9543 (107)
													0.9121 (108)

9b. Energy requirements

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(301)
Fraction of space heat from community system	1.0000	(302)
Fraction of heat from community Heat pump	1.0000	(303a)
Fraction of total space heat from community Heat pump	1.0000	(304a)
Factor for control and charging method (Table 4c(3)) for community space heating	1.0000	(305)
Factor for control and charging method (Table 4c(3)) for community water heating	1.0000	(305a)
Distribution loss factor (Table 12c) for community heating system	1.0500	(306)
Space heating:		
Annual space heating requirement	4574.0465	(98)
Space heat from Heat pump = (98) x 1.00 x 1.00 x 1.05	4802.7488	(307a)
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)	0.0000	(308)
Space heating fuel for secondary/supplementary system	0.0000	(309)
Water heating		
Annual water heating requirement	2093.5063	(64)
Water heat from Heat pump = (64) x 1.00 x 1.00 x 1.05	2198.1816	(310a)
Electricity used for heat distribution	70.0093	(313)
Cooling System Energy Efficiency Ratio	6.7500	(314)
Space cooling (if there is a fixed cooling system, if not enter 0)	20.8821	(315)
Annual totals kWh/year		
Electricity for pumps and fans:		
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 1.1060)		
mechanical ventilation fans (SFP = 1.1060)	554.6377	(330a)
Total electricity for the above, kWh/year	554.6377	(331)
Electricity for lighting (calculated in Appendix L)	523.0188	(332)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV Unit 0 (0.80 * 1.41 * 1019 * 0.80) =	-919.2352	(333)
Total delivered energy for all uses	7180.2340	(338)

10b. Fuel costs - using BEDF prices (520)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating from Heat pump	4802.7488	11.8800	570.5666	(340a)
Space heating - secondary	0.0000	0.0000	0.0000	(341)
Water heating from Heat pump	2198.1816	11.8800	261.1440	(342a)
Space cooling	20.8821	36.8500	7.6951	(348)
Mechanical ventilation fans	554.6377	36.8500	204.3840	(349)
Pumps and fans for heating	0.0000	0.0000	0.0000	(349)
Energy for lighting	523.0188	36.8500	192.7324	(350)
Additional standing charges			104.0000	(351)
Energy saving/generation technologies				
PV Unit	0.0000	0.0000	0.0000	(352)
Total energy cost			1340.5220	(355)

12b. Carbon dioxide emissions - Community heating scheme

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Efficiency of heat source Heat pump			300.0000	(367a)
Space heating from Heat pump	2333.6435	0.5190	1211.1610	(367)
Electrical energy for heat distribution	70.0093	0.5190	36.3348	(372)
Total CO2 associated with community systems (negative value allowed since DFEE <= TFEE)			1247.4958	(373)
Space and water heating			1247.4958	(376)
Space cooling	20.8821	0.5190	10.8378	(377)
Pumps and fans	554.6377	0.5190	287.8570	(378)
Energy for lighting	523.0188	0.5190	271.4468	(379)
Energy saving/generation technologies				
PV Unit	-919.2352	0.5190	-477.0831	(380)
Total kg/year			1340.5543	(383)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

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13b. Primary energy - Community heating scheme

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Efficiency of heat source Heat pump			300.0000 (367a)
Space heating from Heat pump	2333.6435	3.0700	7164.2855 (367)
Electrical energy for heat distribution	70.0093	3.0700	214.9286 (372)
Total CO2 associated with community systems (negative value allowed since DFEE <= TFEE)			7379.2141 (373)
Space and water heating			7379.2141 (376)
Space cooling	20.8821	3.0700	64.1081 (377)
Pumps and fans	554.6377	3.0700	1702.7378 (378)
Energy for lighting	523.0188	3.0700	1605.6678 (379)
Energy saving/generation technologies			
PV Unit	-919.2352	3.0700	-2822.0520 (380)
Primary energy kWh/year			7929.6758 (383)
Primary energy kWh/m2/year			51.3148 (384)

SAP 2012 EPC IMPROVEMENTS

Current energy efficiency rating: B 83
Current environmental impact rating: B 90

(For testing purposes):

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

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

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

Potential energy efficiency rating: B 83
Potential environmental impact rating: B 90

Fuel prices for cost data on this page from database revision number 520 TEST (05 Jun 2023)
Recommendation texts revision number 4.9c (22 Feb 2014)

Typical heating and lighting costs of this home (per year, Thames Valley):			
	Current	Potential	Saving
Electricity	£405	£405	£0
Community scheme	£936	£936	£0
Space heating	£879	£879	£0
Space cooling	£8	£8	£0
Water heating	£261	£261	£0
Lighting	£193	£193	£0
Total cost of fuels	£1341	£1341	£0
Total cost of uses	£1341	£1341	£0
Delivered energy	46 kWh/m²	46 kWh/m²	0 kWh/m²
Carbon dioxide emissions	1.3 tonnes	1.3 tonnes	0.0 tonnes
CO2 emissions per m²	9 kg/m²	9 kg/m²	0 kg/m²
Primary energy	51 kWh/m²	51 kWh/m²	0 kWh/m²

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

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

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF ENERGY RATINGS FOR IMPROVED DWELLING 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (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 Designed)

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

SAP 2012 WORKSHEET FOR New Build (As Designed) (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 Designed) 9.92

Overheating Calculation Input Data

Dwelling type SemiDetached Flat
Number of storeys 1
Cross ventilation possible Yes
SAP Region Thames Valley
Front of dwelling faces North
Overshading Average or unknown
Thermal mass parameter 250.0
Night ventilation No
Ventilation rate during hot weather (ach) 6.00 (Windows fully open)

Overheating Calculation

Summer ventilation heat loss coefficient 813.88 (P1)
Transmission heat loss coefficient 107.33 (37)
Summer heat loss coefficient 921.21 (P2)

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

Solar shading Orientation	Z blinds	Solar access	Z overhangs	Z summer
East	0.850	0.90	1.000	0.765 (P8)
South	0.850	0.90	1.000	0.765 (P8)
West	0.850	0.90	1.000	0.765 (P8)

[Jul]	Area m2	Solar flux Table 6a W/m2	Specific data g or Table 6b	FF Specific data or Table 6c	Shading	Gains W
East	8.8000	117.5071	0.5400	0.8000	0.7650	307.5632
South	7.2730	112.2060	0.5400	0.8000	0.7650	242.7266
West	8.3400	117.5071	0.5400	0.8000	0.7650	291.4860
total:						841.7758

	Jun	Jul	Aug	
Solar gains	888	842	767	(P3)
Internal gains	617	593	603	
Total summer gains	1505	1435	1369	(P5)
Summer gain/loss ratio	1.63	1.56	1.49	(P6)
Summer external temperature	16.00	17.90	17.80	
Thermal mass temperature increment (TMP = 250.0)	0.25	0.25	0.25	
Threshold temperature	17.88	19.71	19.54	(P7)
Likelihood of high internal temperature	Not significant	Not significant	Not significant	
Assessment of likelihood of high internal temperature:	Not significant			