

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

Property Reference	75008-07			Issued on Date	17/09/2021
Assessment Reference	001	Prop Type Ref	HT Mid		
Property	Plot 7, Green Lane, NORTHWOOD, HA6 2UZ				
SAP Rating	83 B	DER	14.44	TER	26.08
Environmental	89 B	% DER<TER	44.64		
CO ₂ Emissions (t/year)	0.88	DFEE	43.72	TFEE	48.23
General Requirements Compliance	Pass	% DFEE<TFEE	9.35		
Assessor Details	Mr. Paul Goddard, Anderson Goddard Limited, Tel: 01925 733942, paul.goddard@andersongoddard.com			Assessor ID	B342-0001
Client	Bluesky, Ivan Ball				

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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 74 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) 26.08 kgCO₂/m²
 Dwelling Carbon Dioxide Emission Rate (DER) 14.44 kgCO₂/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 48.2 kWh/m²/yr
 Dwelling Fabric Energy Efficiency (DFEE) 43.7 kWh/m²/yr OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.17 (max. 0.30)	0.23 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	(no floor)		
Roof	0.13 (max. 0.20)	0.13 (max. 0.35)	OK
Openings	1.37 (max. 2.00)	1.40 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated using user-specified ψ -value of 0.150

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: 1.20 kWh/day
 Permitted by DBSCG 2.10 OK
 Primary pipework insulated: Yes (assumed) OK

6 Controls

Space heating controls: Charging system linked to use of community heating, programmer and at least two room stats OK
 Hot water controls: Cylinderstat OK

7 Low energy lights

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

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (Thames Valley): Slight OK
 Based on:
 Overshading: Average
 Windows facing North: 9.73 m², No overhang
 Windows facing West: 1.76 m², No overhang
 Air change rate: 4.00 ach
 Blinds/curtains: None

10 Key features

Party wall U-value 0.00 W/m²K

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CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

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

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	73.6900 (1b)	x 2.6600 (2b)	= 196.0154 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	73.6900		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 196.0154 (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) =				Air changes per hour
Pressure test					40.0000 / (5) = 0.2041 (8)
Measured/design AP50					Yes
Infiltration rate					5.0000
Number of sides sheltered					0.4541 (18)
					2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =				0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =				0.3860 (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	0.4921	0.4824	0.4728	0.4246	0.4149	0.3667	0.3667	0.3570	0.3860	0.4149	0.4342	0.4535 (22b)
Effective ac	0.6211	0.6164	0.6118	0.5901	0.5861	0.5672	0.5672	0.5637	0.5745	0.5861	0.5943	0.6028 (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
Door			1.9500	1.2000	2.3400		(26)
Window (Uw = 1.40)			11.4900	1.3258	15.2330		(27)
Main Type 4	48.6200	11.4900	37.1300	0.1700	6.3121	9.0000	334.1700 (29a)
Corridor	4.0200	1.9500	2.0700	0.2257	0.4673	110.0000	227.7000 (29a)
PIJ	27.8100		27.8100	0.1300	3.6153	9.0000	250.2900 (30)
Total net area of external elements Aum(A, m ²)			80.4500				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	27.9676			(33)
Party Wall 1			44.5900	0.0000	0.0000	20.0000	891.8000 (32)
Party Floor 1			73.6900			30.0000	2210.7000 (32d)
Party Ceilings 1			45.8800			30.0000	1376.4000 (32b)
Internal Wall 1			174.8700			75.0000	13115.2500 (32c)

Heat capacity Cm = Sum(A x k)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K
Thermal bridges (User defined value 0.150 * total exposed area)
Total fabric heat loss

(28)...(30) + (32) + (32a)...(32e) =	18406.3100 (34)
	249.7803 (35)
	12.0675 (36)
(33) + (36) =	40.0351 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	
(38)m	40.1745
Heat transfer coeff	80.2096
Average = Sum(39)m / 12 =	
HLP	1.0885
HLP (average)	1.0843
Days in month	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.3323 (42)
Average daily hot water use (litres/day)												89.5916 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	98.5507	94.9671	91.3834	87.7998	84.2161	80.6324	80.6324	84.2161	87.7998	91.3834	94.9671	98.5507 (44)
Energy conte	146.1479	127.8219	131.9007	114.9943	110.3397	95.2148	88.2305	101.2458	102.4550	119.4014	130.3360	141.5364 (45)
Energy content (annual)												1409.6245 (45)
Distribution loss (46)m = 0.15 x (45)m												
	21.9222	19.1733	19.7851	17.2491	16.5510	14.2822	13.2346	15.1869	15.3682	17.9102	19.5504	21.2305 (46)

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Water storage loss:													
Store volume												180.0000 (47)	
a) If manufacturer declared loss factor is known (kWh/day):												1.2000 (48)	
Temperature factor from Table 2b												0.6000 (49)	
Enter (49) or (54) in (55)												0.7200 (55)	
Total storage loss													
	22.3200	20.1600	22.3200	21.6000	22.3200	21.6000	22.3200	22.3200	21.6000	22.3200	21.6000	22.3200	(56)
If cylinder contains dedicated solar storage													
	22.3200	20.1600	22.3200	21.6000	22.3200	21.6000	22.3200	22.3200	21.6000	22.3200	21.6000	22.3200	(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													
	191.7303	168.9931	177.4831	159.1063	155.9221	139.3268	133.8129	146.8282	146.5670	164.9838	174.4480	187.1188	(62)
Solar input												0.0000 (63)	
												0.0000	
												0.0000	
												0.0000	
												0.0000	
												0.0000	
												0.0000	
Solar input (sum of months) = Sum (63)m =												0.0000 (63)	
Output from w/h													
	191.7303	168.9931	177.4831	159.1063	155.9221	139.3268	133.8129	146.8282	146.5670	164.9838	174.4480	187.1188	(64)
												1946.3205 (64)	
Total per year (kWh/year) = Sum (64)m =													
Heat gains from water heating, kWh/month													
	85.0601	75.4377	80.3229	73.5252	73.1539	66.9485	65.8026	70.1301	69.3559	76.1669	78.6263	83.5268	(65)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9963	0.9937	0.9858	0.9554	0.8618	0.6669	0.4772	0.5416	0.8281	0.9695	0.9928	0.9970 (94)
Useful gains	437.8421	473.3225	511.6797	550.5164	537.5644	413.9368	280.9956	292.7380	403.2907	427.8603	417.9760	420.4744 (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	1165.2496	1125.2203	1017.3418	845.9092	653.1078	434.8041	283.7876	298.0511	469.2986	712.2072	951.8072	1155.4061 (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	541.1912	438.0753	376.2126	212.6828	85.9643	0.0000	0.0000	0.0000	0.0000	211.5541	384.3585	546.7892 (98)
Space heating												2796.8280 (98)
Space heating per m2											(98) / (4) =	37.9540 (99)

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8c. Space cooling requirement

Not applicable

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	2796.8280 (98)
Space heat from Heat pump = (98) x 1.00 x 1.00 x 1.05	2936.6694 (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	1946.3205 (64)
Water heat from Heat pump = (64) x 1.00 x 1.00 x 1.05	2043.6365 (310a)
Electricity used for heat distribution	49.8031 (313)
Annual totals kWh/year	
Electricity for pumps and fans:	
Total electricity for the above, kWh/year	0.0000 (331)
Electricity for lighting (calculated in Appendix L)	339.7119 (332)
Total delivered energy for all uses	5320.0178 (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	1660.1020	0.5190	861.5929 (367)
Electrical energy for heat distribution	49.8031	0.5190	25.8478 (372)
Total CO2 associated with community systems (negative value allowed since DFEE <= TFEE)			887.4407 (373)
Space and water heating			887.4407 (376)
Pumps and fans	0.0000	0.0000	0.0000 (378)
Energy for lighting	339.7119	0.5190	176.3105 (379)
Total CO2, kg/year			1063.7512 (383)
Dwelling Carbon Dioxide Emission Rate (DER)			14.4400 (384)

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

DER	14.4400 ZC1
Total Floor Area	73.6900
Assumed number of occupants	2.3323
CO2 emission factor in Table 12 for electricity displaced from grid	0.5190
CO2 emissions from appliances, equation (L14)	16.5455 ZC2
CO2 emissions from cooking, equation (L16)	2.3745 ZC3
Total CO2 emissions	33.3600 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	33.3600 ZC8

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CALCULATION OF TARGET EMISSIONS 09 Jan 2014

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	73.6900 (1b)	x 2.6600 (2b)	= 196.0154 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	73.6900		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 196.0154 (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					3 * 10 = 30.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					30.0000 / (5) = 0.1530 (8)
Pressure test					Yes
Measured/design AP50					5.0000
Infiltration rate					0.4030 (18)
Number of sides sheltered					2 (19)
Shelter factor					(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor					(21) = (18) x (20) = 0.3426 (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	0.4368	0.4282	0.4197	0.3769	0.3683	0.3255	0.3255	0.3169	0.3426	0.3683	0.3854	0.4025 (22b)
Effective ac	0.5954	0.5917	0.5881	0.5710	0.5678	0.5530	0.5530	0.5502	0.5587	0.5678	0.5743	0.5810 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
TER Opaque door			1.9500	1.0000	1.9500		(26)
TER Opening Type (Uw = 1.40)			11.4900	1.3258	15.2330		(27)
Main Type 4	48.6200	11.4900	37.1300	0.1800	6.6834		(29a)
Corridor	4.0200	1.9500	2.0700	0.1800	0.3726		(29a)
PIJ	27.8100		27.8100	0.1300	3.6153		(30)
Total net area of external elements Aum(A, m ²)			80.4500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	27.8543		(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							9.8613 (36)
Total fabric heat loss							(33) + (36) = 37.7156 (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	38.5134	38.2738	38.0389	36.9357	36.7293	35.7684	35.7684	35.5905	36.1386	36.7293	37.1469	37.5834 (38)
Heat transfer coeff	76.2290	75.9894	75.7545	74.6513	74.4449	73.4840	73.4840	73.3061	73.8541	74.4449	74.8624	75.2990 (39)
Average = Sum(39)m / 12 =												74.6503 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.0345	1.0312	1.0280	1.0130	1.0102	0.9972	0.9972	0.9948	1.0022	1.0102	1.0159	1.0218 (40)
HLP (average)												1.0130 (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												2.3323 (42)
Average daily hot water use (litres/day)												89.5916 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	98.5507	94.9671	91.3834	87.7998	84.2161	80.6324	80.6324	84.2161	87.7998	91.3834	94.9671	98.5507 (44)
Energy conte	146.1479	127.8219	131.9007	114.9943	110.3397	95.2148	88.2305	101.2458	102.4550	119.4014	130.3360	141.5364 (45)
Energy content (annual)										Total = Sum(45)m =		1409.6245 (45)
Distribution loss (46)m = 0.15 x (45)m	21.9222	19.1733	19.7851	17.2491	16.5510	14.2822	13.2346	15.1869	15.3682	17.9102	19.5504	21.2305 (46)
Water storage loss:												180.0000 (47)
Store volume												1.5520 (48)
a) If manufacturer declared loss factor is known (kWh/day):												0.5400 (49)
Temperature factor from Table 2b												0.8381 (55)
Enter (49) or (54) in (55)												

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Total storage loss	25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803 (56)
If cylinder contains dedicated solar storage	25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803 (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	195.3906	172.2991	181.1434	162.6485	159.5824	142.8690	137.4732	150.4885	150.1092	168.6441	177.9902	190.7791 (62)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63)
Output from w/h	195.3906	172.2991	181.1434	162.6485	159.5824	142.8690	137.4732	150.4885	150.1092	168.6441	177.9902	190.7791 (64)
Heat gains from water heating, kWh/month	87.9883	78.0826	83.2511	76.3590	76.0821	69.7823	68.7308	73.0584	72.1896	79.0951	81.4601	86.4550 (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	116.6139	116.6139	116.6139	116.6139	116.6139	116.6139	116.6139	116.6139	116.6139	116.6139	116.6139	116.6139	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	19.2359	17.0851	13.8946	10.5191	7.8631	6.6384	7.1730	9.3238	12.5143	15.8898	18.5458	19.7705	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	205.7517	207.8868	202.5065	191.0525	176.5939	163.0049	153.9266	151.7915	157.1718	168.6258	183.0844	196.6734	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.6614	34.6614	34.6614	34.6614	34.6614	34.6614	34.6614	34.6614	34.6614	34.6614	34.6614	34.6614	(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)	-93.2911	-93.2911	-93.2911	-93.2911	-93.2911	-93.2911	-93.2911	-93.2911	-93.2911	-93.2911	-93.2911	-93.2911	(71)
Water heating gains (Table 5)	118.2639	116.1943	111.8967	106.0541	102.2609	96.9198	92.3801	98.1967	100.2634	106.3106	113.1390	116.2030	(72)
Total internal gains	404.2356	402.1504	389.2819	368.6099	347.7021	327.5473	314.4638	320.2962	330.9337	351.8104	375.7533	393.6310	(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	
North					9.7300	10.6334	0.6300	0.7000	0.7700		31.6196 (74)	
West					1.7600	19.6403	0.6300	0.7000	0.7700		10.5641 (80)	
Solar gains	42.1837	81.0923	136.7130	214.5655	283.0059	300.1162	281.3434	227.0999	163.0364	96.4515	52.1790	35.0471 (83)
Total gains	446.4193	483.2427	525.9949	583.1753	630.7080	627.6635	595.8073	547.3961	493.9701	448.2619	427.9323	428.6781 (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	67.1314	67.3431	67.5519	68.5502	68.7403	69.6391	69.6391	69.8082	69.2901	68.7403	68.3569	67.9606	
alpha	5.4754	5.4895	5.5035	5.5700	5.5827	5.6426	5.6426	5.6539	5.6193	5.5827	5.5571	5.5307	
util living area	0.9979	0.9963	0.9909	0.9672	0.8847	0.7061	0.5347	0.6001	0.8618	0.9795	0.9958	0.9983	(86)
MIT	19.9226	20.0335	20.2476	20.5566	20.8243	20.9644	20.9937	20.9886	20.8901	20.5617	20.1973	19.9077	(87)
Th 2	20.0547	20.0574	20.0601	20.0725	20.0748	20.0857	20.0857	20.0877	20.0815	20.0748	20.0701	20.0652	(88)
util rest of house	0.9972	0.9951	0.9876	0.9547	0.8431	0.6223	0.4278	0.4892	0.7978	0.9694	0.9941	0.9978	(89)
MIT 2	18.6136	18.7773	19.0907	19.5416	19.8992	20.0616	20.0833	20.0828	19.9900	19.5561	19.0262	18.5994	(90)
Living area fraction	18.9643	19.1138	19.4006	19.8135	20.1470	20.3035	20.3272	20.3254	20.2311	19.8255	19.3399	18.9499	(91)
MIT	18.9643	19.1138	19.4006	19.8135	20.1470	20.3035	20.3272	20.3254	20.2311	19.8255	19.3399	18.9499	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.9643	19.1138	19.4006	19.8135	20.1470	20.3035	20.3272	20.3254	20.2311	19.8255	19.3399	18.9499	(93)

8. Space heating requirement

Utilisation	0.9960	0.9933	0.9845	0.9503	0.8468	0.6433	0.4566	0.5190	0.8097	0.9659	0.9922	0.9968	(94)
Useful gains	444.6541	479.9959	517.8182	554.2143	534.0981	403.8072	272.0323	284.1076	399.9538	432.9573	424.5943	427.3150	(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	1117.8416	1080.0964	977.2776	814.7075	628.8360	419.1143	273.8864	287.7564	452.8088	686.7917	916.3093	1110.6505	(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	500.8515	403.2675	341.8378	187.5551	70.4851	0.0000	0.0000	0.0000	0.0000	188.8528	354.0348	508.4016	(98)
Space heating												2555.2862	(98)
Space heating per m2												(98) / (4) =	34.6762 (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													2732.9264 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	500.8515	403.2675	341.8378	187.5551	70.4851	0.0000	0.0000	0.0000	0.0000	188.8528	354.0348	508.4016	(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)	535.6700	431.3021	365.6020	200.5937	75.3851	0.0000	0.0000	0.0000	0.0000	201.9816	378.6468	543.7451	(211)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating requirement	195.3906	172.2991	181.1434	162.6485	159.5824	142.8690	137.4732	150.4885	150.1092	168.6441	177.9902	190.7791	(64)
Efficiency of water heater (217)m	87.2181	87.0076	86.4835	85.1946	82.7992	79.8000	79.8000	79.8000	79.8000	85.1162	86.6146	79.8000	(216)
Fuel for water heating, kWh/month	224.0254	198.0277	209.4544	190.9142	192.7343	179.0338	172.2722	188.5820	188.1068	198.1340	205.4968	218.5183	(219)
Water heating fuel used												2365.2998	(219)
Annual totals kWh/year													
Space heating fuel - main system												2732.9264	(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)												339.7119	(232)
Total delivered energy for all uses												5512.9381	(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	2732.9264	0.2160	590.3121 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2365.2998	0.2160	510.9048 (264)
Space and water heating			1101.2169 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	339.7119	0.5190	176.3105 (268)
Total CO2, kg/m2/year			1316.4523 (272)
Emissions per m2 for space and water heating			14.9439 (272a)
Fuel factor (electricity)			1.5500
Emissions per m2 for lighting			2.3926 (272b)
Emissions per m2 for pumps and fans			0.5282 (272c)
Target Carbon Dioxide Emission Rate (TER) = (14.9439 * 1.55) + 2.3926 + 0.5282, rounded to 2 d.p.			26.0800 (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	73.6900 (1b)	x 2.6600 (2b)	= 196.0154 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	73.6900		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 196.0154 (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					3 * 10 = 30.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(7a)+(7b)+(7c) =				Air changes per hour
Pressure test					30.0000 / (5) = 0.1530 (8)
Measured/design AP50					Yes
Infiltration rate					5.0000
Number of sides sheltered					0.4030 (18)
					2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =				0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =				0.3426 (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	0.4368	0.4282	0.4197	0.3769	0.3683	0.3255	0.3255	0.3169	0.3426	0.3683	0.3854	0.4025 (22b)
	0.5954	0.5917	0.5881	0.5710	0.5678	0.5530	0.5530	0.5502	0.5587	0.5678	0.5743	0.5810 (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
Door			1.9500	1.2000	2.3400		(26)
Window (Uw = 1.40)			11.4900	1.3258	15.2330		(27)
Main Type 4	48.6200	11.4900	37.1300	0.1700	6.3121	9.0000	334.1700 (29a)
Corridor	4.0200	1.9500	2.0700	0.2257	0.4673	110.0000	227.7000 (29a)
PIJ	27.8100		27.8100	0.1300	3.6153	9.0000	250.2900 (30)
Total net area of external elements Aum(A, m ²)			80.4500				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	27.9676			(33)
Party Wall 1			44.5900	0.0000	0.0000	20.0000	891.8000 (32)
Party Floor 1			73.6900			30.0000	2210.7000 (32d)
Party Ceilings 1			45.8800			20.0000	917.6000 (32b)
Internal Wall 1			174.8700			75.0000	13115.2500 (32c)

Heat capacity Cm = Sum(A x k)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K
Thermal bridges (User defined value 0.150 * total exposed area)
Total fabric heat loss

(28)...(30) + (32) + (32a)...(32e) =	17947.5100 (34)
	243.5542 (35)
	12.0675 (36)
(33) + (36) =	40.0351 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	
(38)m	38.5134
Heat transfer coeff	78.5486
Average = Sum(39)m / 12 =	
HLP	1.0659
HLP (average)	1.0445
Days in month	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.3323 (42)
Average daily hot water use (litres/day)												89.5916 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	98.5507	94.9671	91.3834	87.7998	84.2161	80.6324	80.6324	84.2161	87.7998	91.3834	94.9671	98.5507 (44)
Energy conte	146.1479	127.8219	131.9007	114.9943	110.3397	95.2148	88.2305	101.2458	102.4550	119.4014	130.3360	141.5364 (45)
Energy content (annual)										Total = Sum(45)m =		1409.6245 (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)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(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	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Heat gains from water heating, kWh/month	31.0564	27.1622	28.0289	24.4363	23.4472	20.2331	18.7490	21.5147	21.7717	25.3728	27.6964	30.0765 (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	116.6139	116.6139	116.6139	116.6139	116.6139	116.6139	116.6139	116.6139	116.6139	116.6139	116.6139	116.6139	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	19.2359	17.0851	13.8946	10.5191	7.8631	6.6384	7.1730	9.3238	12.5143	15.8898	18.5458	19.7705	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	205.7517	207.8868	202.5065	191.0525	176.5939	163.0049	153.9266	151.7915	157.1718	168.6258	183.0844	196.6734	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.6614	34.6614	34.6614	34.6614	34.6614	34.6614	34.6614	34.6614	34.6614	34.6614	34.6614	34.6614	(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)	-93.2911	-93.2911	-93.2911	-93.2911	-93.2911	-93.2911	-93.2911	-93.2911	-93.2911	-93.2911	-93.2911	-93.2911	(71)
Water heating gains (Table 5)	41.7425	40.4199	37.6733	33.9393	31.5150	28.1016	25.2002	28.9177	30.2385	34.1032	38.4672	40.4254	(72)
Total internal gains	324.7143	323.3759	312.0585	293.4950	273.9563	255.7290	244.2840	248.0171	257.9087	276.6030	298.0815	314.8535	(73)

6. Solar gains

[Jan]														
	Area m2				Solar flux Table 6a W/m2		Specific data or Table 6b		Specific data or Table 6c		FF Access factor Table 6d		Gains W	
North	9.7300				10.6334		0.6300		0.7000		0.7700		31.6196	
West	1.7600				19.6403		0.6300		0.7000		0.7700		10.5641 (80)	
Solar gains	42.1837	81.0923	136.7130	214.5655	283.0059	300.1162	281.3434	227.0999	163.0364	96.4515	52.1790	35.0471	(83)	
Total gains	366.8980	404.4682	448.7715	508.0605	556.9622	555.8453	525.6274	475.1170	420.9451	373.0545	350.2605	349.9005	(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	63.4693	63.6635	63.8550	64.7702	64.9444	65.7676	65.7676	65.9224	65.4481	64.9444	64.5930	64.2298	
alpha	5.2313	5.2442	5.2570	5.3180	5.3296	5.3845	5.3845	5.3948	5.3632	5.3296	5.3062	5.2820	
util living area	0.9991	0.9983	0.9953	0.9815	0.9261	0.7809	0.6134	0.6900	0.9200	0.9907	0.9982	0.9993	(86)
MIT	19.7508	19.8666	20.0930	20.4258	20.7370	20.9320	20.9852	20.9733	20.8161	20.4307	20.0408	19.7357	(87)
Th 2	20.0288	20.0314	20.0341	20.0464	20.0487	20.0595	20.0595	20.0615	20.0553	20.0487	20.0440	20.0391	(88)
util rest of house	0.9988	0.9976	0.9936	0.9739	0.8947	0.6987	0.4929	0.5692	0.8726	0.9857	0.9975	0.9991	(89)
MIT 2	18.8802	18.9980	19.2259	19.5645	19.8594	20.0256	20.0553	20.0529	19.9405	19.5739	19.1824	18.8735	(90)
Living area fraction									fLA = Living area / (4) =			0.2679	(91)
MIT	19.1134	19.2307	19.4582	19.7952	20.0945	20.2684	20.3044	20.2994	20.1751	19.8034	19.4123	19.1045	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.1134	19.2307	19.4582	19.7952	20.0945	20.2684	20.3044	20.2994	20.1751	19.8034	19.4123	19.1045	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	366.2979	403.2399	445.2699	493.5109	499.3170	399.4585	276.2514	285.9366	370.3787	367.0942	349.1502	349.4593	(94)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1163.5724	1122.2235	1011.6957	838.6148	644.3994	429.6851	280.8070	294.8966	462.7609	706.4975	950.2916	1156.8640	(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	593.1722	483.1570	421.4208	248.4748	107.9413	0.0000	0.0000	0.0000	0.0000	252.5160	432.8218	600.7091	(98)
Space heating												3140.2131	(98)
Space heating per m2												42.6138	(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	712.5536	560.9464	574.7548	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8571	0.9202	0.8864	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	610.7293	516.1940	509.4667	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	736.7452	699.6884	642.1945	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)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	90.7314	136.5199	98.7495	0.0000	0.0000	0.0000	0.0000 (104)
Space cooling												326.0008 (104)
Cooled fraction									fC = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)												
0.0000	0.0000	0.0000	0.0000	0.0000	0.2500	0.2500	0.2500	0.0000	0.0000	0.0000	0.0000 (106)	
Space cooling kWh												
0.0000	0.0000	0.0000	0.0000	0.0000	22.6829	34.1300	24.6874	0.0000	0.0000	0.0000	0.0000 (107)	
Space cooling												81.5002 (107)
Space cooling per m2												1.1060 (108)
Energy for space heating												42.6138 (99)
Energy for space cooling												1.1060 (108)
Total												43.7198 (109)
Dwelling Fabric Energy Efficiency (DFEE)												43.7 (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	73.6900 (1b)	x 2.6600 (2b)	= 196.0154 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	73.6900		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 196.0154 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					3 * 10 = 30.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					30.0000 / (5) = 0.1530 (8)
Pressure test					Yes
Measured/design AP50					5.0000
Infiltration rate					0.4030 (18)
Number of sides sheltered					2 (19)
Shelter factor					(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor					(21) = (18) x (20) = 0.3426 (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	0.4368	0.4282	0.4197	0.3769	0.3683	0.3255	0.3255	0.3169	0.3426	0.3683	0.3854	0.4025 (22b)
Effective ac	0.5954	0.5917	0.5881	0.5710	0.5678	0.5530	0.5530	0.5502	0.5587	0.5678	0.5743	0.5810 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
TER Opaque door			1.9500	1.0000	1.9500		(26)
TER Opening Type (Uw = 1.40)			11.4900	1.3258	15.2330		(27)
Main Type 4	48.6200	11.4900	37.1300	0.1800	6.6834		(29a)
Corridor	4.0200	1.9500	2.0700	0.1800	0.3726		(29a)
PIJ	27.8100		27.8100	0.1300	3.6153		(30)
Total net area of external elements Aum(A, m ²)			80.4500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	27.8543		(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							9.8613 (36)
Total fabric heat loss							(33) + (36) = 37.7156 (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	38.5134	38.2738	38.0389	36.9357	36.7293	35.7684	35.7684	35.5905	36.1386	36.7293	37.1469	37.5834 (38)
Heat transfer coeff	76.2290	75.9894	75.7545	74.6513	74.4449	73.4840	73.4840	73.3061	73.8541	74.4449	74.8624	75.2990 (39)
Average = Sum(39)m / 12 =												74.6503 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.0345	1.0312	1.0280	1.0130	1.0102	0.9972	0.9972	0.9948	1.0022	1.0102	1.0159	1.0218 (40)
HLP (average)												1.0130 (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												2.3323 (42)
Average daily hot water use (litres/day)												89.5916 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	98.5507	94.9671	91.3834	87.7998	84.2161	80.6324	80.6324	84.2161	87.7998	91.3834	94.9671	98.5507 (44)
Energy conte	146.1479	127.8219	131.9007	114.9943	110.3397	95.2148	88.2305	101.2458	102.4550	119.4014	130.3360	141.5364 (45)
Energy content (annual)										Total = Sum(45)m =		1409.6245 (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	31.0564	27.1622	28.0289	24.4363	23.4472	20.2331	18.7490	21.5147	21.7717	25.3728	27.6964	30.0765 (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	116.6139	116.6139	116.6139	116.6139	116.6139	116.6139	116.6139	116.6139	116.6139	116.6139	116.6139	116.6139	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	19.2359	17.0851	13.8946	10.5191	7.8631	6.6384	7.1730	9.3238	12.5143	15.8898	18.5458	19.7705	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	205.7517	207.8868	202.5065	191.0525	176.5939	163.0049	153.9266	151.7915	157.1718	168.6258	183.0844	196.6734	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.6614	34.6614	34.6614	34.6614	34.6614	34.6614	34.6614	34.6614	34.6614	34.6614	34.6614	34.6614	(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)	-93.2911	-93.2911	-93.2911	-93.2911	-93.2911	-93.2911	-93.2911	-93.2911	-93.2911	-93.2911	-93.2911	-93.2911	(71)
Water heating gains (Table 5)	41.7425	40.4199	37.6733	33.9393	31.5150	28.1016	25.2002	28.9177	30.2385	34.1032	38.4672	40.4254	(72)
Total internal gains	324.7143	323.3759	312.0585	293.4950	273.9563	255.7290	244.2840	248.0171	257.9087	276.6030	298.0815	314.8535	(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		
North					9.7300	10.6334	0.6300	0.7000	0.7700		31.6196 (74)		
West					1.7600	19.6403	0.6300	0.7000	0.7700		10.5641 (80)		

Solar gains	42.1837	81.0923	136.7130	214.5655	283.0059	300.1162	281.3434	227.0999	163.0364	96.4515	52.1790	35.0471 (83)	
Total gains	366.8980	404.4682	448.7715	508.0605	556.9622	555.8453	525.6274	475.1170	420.9451	373.0545	350.2605	349.9005 (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)													21.0000 (85)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	67.1314	67.3431	67.5519	68.5502	68.7403	69.6391	69.6391	69.8082	69.2901	68.7403	68.3569	67.9606	
alpha	5.4754	5.4895	5.5035	5.5700	5.5827	5.6426	5.6426	5.6539	5.6193	5.5827	5.5571	5.5307	
util living area	0.9992	0.9985	0.9957	0.9818	0.9238	0.7705	0.5992	0.6767	0.9172	0.9911	0.9984	0.9994	(86)
MIT	19.8200	19.9324	20.1507	20.4714	20.7674	20.9449	20.9891	20.9794	20.8382	20.4710	20.0975	19.8056	(87)
Th 2	20.0547	20.0574	20.0601	20.0725	20.0748	20.0857	20.0857	20.0877	20.0815	20.0748	20.0701	20.0652	(88)
util rest of house	0.9989	0.9979	0.9941	0.9743	0.8916	0.6883	0.4829	0.5586	0.8686	0.9863	0.9978	0.9992	(89)
MIT 2	18.9684	19.0828	19.3026	19.6293	19.9089	20.0588	20.0827	20.0812	19.9818	19.6336	19.2582	18.9625	(90)
Living area fraction										fLA = Living area / (4) =		0.2679	(91)
MIT	19.1965	19.3104	19.5298	19.8549	20.1389	20.2962	20.3255	20.3218	20.2112	19.8579	19.4830	19.1883	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.1965	19.3104	19.5298	19.8549	20.1389	20.2962	20.3255	20.3218	20.2112	19.8579	19.4830	19.1883	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9986	0.9973	0.9928	0.9721	0.8942	0.7088	0.5145	0.5906	0.8769	0.9848	0.9972	0.9989	(94)
Useful gains	366.3865	403.3896	445.5553	493.8621	498.0223	393.9764	270.4120	280.6198	369.1148	367.3945	349.2832	349.5289	(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	1135.5446	1095.0354	987.0642	817.7965	628.2292	418.5762	273.7618	287.4941	451.3385	689.2043	927.0226	1128.6060	(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	572.2536	464.7860	402.8826	233.2327	96.8740	0.0000	0.0000	0.0000	0.0000	239.4264	415.9724	579.6333	(98)
Space heating												3005.0611	(98)
Alpha heating per m2										(98) / (4) =		40.7798	(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	690.7496	543.7816	557.1261	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8754	0.9339	0.9030	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	604.6984	507.8271	503.0847	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	736.7452	699.6884	642.1945	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	95.0737	142.7448	103.4977	0.0000	0.0000	0.0000	0.0000	(104)
Space cooling												341.3162	(104)
Cooled fraction												1.0000	(105)
Intermittency factor (Table 10b)													
fC = cooled area / (4) =													

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

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	23.7684	35.6862	25.8744	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling per m2												85.3291 (107)
Energy for space heating												1.1579 (108)
Energy for space cooling												40.7798 (99)
Total												1.1579 (108)
Target Fabric Energy Efficiency (TFEE)												41.9377 (109)
												48.2 (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	73.6900 (1b)	x 2.6600 (2b)	= 196.0154 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	73.6900		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 196.0154 (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) =				Air changes per hour
Pressure test					40.0000 / (5) = 0.2041 (8)
Measured/design AP50					Yes
Infiltration rate					5.0000
Number of sides sheltered					0.4541 (18)
Shelter factor	(20) = 1 - [0.075 x (19)] =				0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =				0.3860 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	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)
Wind factor	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)
Adj infilt rate	0.4342	0.4149	0.4246	0.3860	0.3860	0.3570	0.3570	0.3281	0.3570	0.3763	0.3667	0.3956 (22b)
Effective ac	0.5943	0.5861	0.5901	0.5745	0.5745	0.5637	0.5637	0.5538	0.5637	0.5708	0.5672	0.5783 (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
Door			1.9500	1.2000	2.3400		(26)
Window (Uw = 1.40)			11.4900	1.3258	15.2330		(27)
Main Type 4	48.6200	11.4900	37.1300	0.1700	6.3121	9.0000	334.1700 (29a)
Corridor	4.0200	1.9500	2.0700	0.2257	0.4673	110.0000	227.7000 (29a)
PIJ	27.8100		27.8100	0.1300	3.6153	9.0000	250.2900 (30)
Total net area of external elements Aum(A, m ²)			80.4500				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	27.9676			(33)
Party Wall 1			44.5900	0.0000	0.0000	20.0000	891.8000 (32)
Party Floor 1			73.6900			30.0000	2210.7000 (32d)
Party Ceilings 1			45.8800			30.0000	1376.4000 (32b)
Internal Wall 1			174.8700			75.0000	13115.2500 (32c)

Heat capacity Cm = Sum(A x k)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K
Thermal bridges (User defined value 0.150 * total exposed area)
Total fabric heat loss

(28)...(30) + (32) + (32a)...(32e) =	18406.3100 (34)
	249.7803 (35)
	12.0675 (36)
(33) + (36) =	40.0351 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	
(38)m	Jan 38.4401 Feb 37.9101 Mar 38.1721 Apr 37.1603 May 37.1603 Jun 36.4648 Jul 36.4648 Aug 35.8234 Sep 36.4648 Oct 36.9225 Nov 36.6906 Dec 37.4042 (38)
Heat transfer coeff	Jan 78.4752 Feb 77.9452 Mar 78.2072 Apr 77.1955 May 77.1955 Jun 76.4999 Jul 76.4999 Aug 75.8585 Sep 76.4999 Oct 76.9576 Nov 76.7257 Dec 77.4394 (39)
Average = Sum(39)m / 12 =	77.1250 (39)
HLP	Jan 1.0649 Feb 1.0577 Mar 1.0613 Apr 1.0476 May 1.0476 Jun 1.0381 Jul 1.0381 Aug 1.0294 Sep 1.0381 Oct 1.0443 Nov 1.0412 Dec 1.0509 (40)
HLP (average)	1.0466 (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												2.3323 (42)
Average daily hot water use (litres/day)												89.5916 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	98.5507	94.9671	91.3834	87.7998	84.2161	80.6324	80.6324	84.2161	87.7998	91.3834	94.9671	98.5507 (44)
Energy conte	146.1479	127.8219	131.9007	114.9943	110.3397	95.2148	88.2305	101.2458	102.4550	119.4014	130.3360	141.5364 (45)
Energy content (annual)												Total = Sum(45)m = 1409.6245 (45)
Distribution loss (46)m = 0.15 x (45)m												
	21.9222	19.1733	19.7851	17.2491	16.5510	14.2822	13.2346	15.1869	15.3682	17.9102	19.5504	21.2305 (46)

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Water storage loss:												180.0000	(47)
Store volume													
a) If manufacturer declared loss factor is known (kWh/day):												1.2000	(48)
Temperature factor from Table 2b												0.6000	(49)
Enter (49) or (54) in (55)												0.7200	(55)
Total storage loss													
	22.3200	20.1600	22.3200	21.6000	22.3200	21.6000	22.3200	21.6000	22.3200	21.6000	22.3200	21.6000	(56)
If cylinder contains dedicated solar storage													
	22.3200	20.1600	22.3200	21.6000	22.3200	21.6000	22.3200	21.6000	22.3200	21.6000	22.3200	21.6000	(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													
	191.7303	168.9931	177.4831	159.1063	155.9221	139.3268	133.8129	146.8282	146.5670	164.9838	174.4480	187.1188	(62)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63)
Solar input (sum of months) = Sum(63)m =												0.0000	(63)
Output from w/h													
	191.7303	168.9931	177.4831	159.1063	155.9221	139.3268	133.8129	146.8282	146.5670	164.9838	174.4480	187.1188	(64)
Total per year (kWh/year) = Sum(64)m =												1946.3205	(64)
RHI water heating demand												1946	(64)
Heat gains from water heating, kWh/month													
	85.0601	75.4377	80.3229	73.5252	73.1539	66.9485	65.8026	70.1301	69.3559	76.1669	78.6263	83.5268	(65)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	139.9366	139.9366	139.9366	139.9366	139.9366	139.9366	139.9366	139.9366	139.9366	139.9366	139.9366	139.9366 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	48.0897	42.7129	34.7364	26.2977	19.6579	16.5960	17.9326	23.3094	31.2858	39.7246	46.3644	49.4263 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	307.0921	310.2788	302.2485	285.1530	263.5730	243.2909	229.7412	226.5545	234.5848	251.6803	273.2602	293.5424 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	51.3259	51.3259	51.3259	51.3259	51.3259	51.3259	51.3259	51.3259	51.3259	51.3259	51.3259	51.3259 (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)	-93.2911	-93.2911	-93.2911	-93.2911	-93.2911	-93.2911	-93.2911	-93.2911	-93.2911	-93.2911	-93.2911	-93.2911 (71)
Water heating gains (Table 5)	114.3281	112.2585	107.9609	102.1183	98.3251	92.9841	88.4443	94.2610	96.3276	102.3749	109.2032	112.2672 (72)
Total internal gains	567.4814	563.2217	542.9173	511.5405	479.5275	450.8424	434.0895	442.0963	460.1697	491.7512	526.7994	553.2074 (73)

[Jan					Area	Solar flux		g		FF		Access		Gains
					m2	Table 6a		Table 6b		Table 6c		factor		W
						W/m2		or Table 6b		or Table 6c		Table 6d		
North					9.7300	11.9814		0.6300		0.7000		0.7700		35.6282
West					1.7600	22.3313		0.6300		0.7000		0.7700		12.0115 (84)

Solar gains	47.6397	82.9485	140.5634	227.1417	289.6702	328.2720	304.6180	250.4375	180.1939	105.6655	58.9355	39.1237 (83)		
Total gains	615.1211	646.1702	683.4807	738.6822	769.1977	779.1144	738.7075	692.5338	640.3636	597.4167	585.7349	592.3310 (84)		

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	65.1526	65.5956	65.3759	66.2327	66.2327	66.8349	66.8349	67.4000	66.8349	66.4374	66.6382	66.0241
alpha	5.3435	5.3730	5.3584	5.4155	5.4155	5.4557	5.4557	5.4933	5.4557	5.4292	5.4425	5.4016
util living area	0.9892	0.9840	0.9655	0.9051	0.7519	0.5041	0.3309	0.3714	0.6794	0.9189	0.9786	0.9908 (86)
MIT	20.1414	20.2475	20.4665	20.7352	20.9289	20.9934	20.9995	20.9991	20.9689	20.7531	20.4181	20.1328 (87)
Th 2	20.0296	20.0355	20.0326	20.0439	20.0439	20.0517	20.0517	20.0589	20.0517	20.0465	20.0491	20.0411 (88)
util rest of house	0.9858	0.9790	0.9541	0.8750	0.6864	0.4154	0.2331	0.2692	0.5877	0.8862	0.9708	0.9878 (89)
MIT 2	18.9125	19.0700	19.3800	19.7543	19.9845	20.0486	20.0516	20.0587	20.0324	19.7875	19.3271	18.9090 (90)
Living area fraction	19.2417	19.3854	19.6710	20.0171	20.2375	20.3017	20.3055	20.3106	fLA = Living area / (4) =	20.2832	20.0462	0.2679 (91)
MIT	19.2417	19.3854	19.6710	20.0171	20.2375	20.3017	20.3055	20.3106	20.2832	20.0462	19.6194	19.2368 (92)
Temperature adjustment												0.0000
adjusted MIT	19.2417	19.3854	19.6710	20.0171	20.2375	20.3017	20.3055	20.3106	20.2832	20.0462	19.6194	19.2368 (93)

[illegible]

FULL SAP CALCULATION PRINTOUT

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	73.6900 (1b)	x 2.6600 (2b)	= 196.0154 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	73.6900		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 196.0154 (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) =					Air changes per hour 40.0000 / (5) = 0.2041 (8)
Pressure test					Yes
Measured/design AP50					5.0000
Infiltration rate					0.4541 (18)
Number of sides sheltered					2 (19)
Shelter factor			(20) = 1 - [0.075 x (19)] =		0.8500 (20)
Infiltration rate adjusted to include shelter factor			(21) = (18) x (20) =		0.3860 (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												
	0.4921	0.4824	0.4728	0.4246	0.4149	0.3667	0.3667	0.3570	0.3860	0.4149	0.4342	0.4535 (22b)
Effective ac	0.6211	0.6164	0.6118	0.5901	0.5861	0.5672	0.5672	0.5637	0.5745	0.5861	0.5943	0.6028 (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
Door			1.9500	1.2000	2.3400		(26)
Window (Uw = 1.40)			11.4900	1.3258	15.2330		(27)
Main Type 4	48.6200	11.4900	37.1300	0.1700	6.3121	9.0000	334.1700 (29a)
Corridor	4.0200	1.9500	2.0700	0.2257	0.4673	110.0000	227.7000 (29a)
PIJ	27.8100		27.8100	0.1300	3.6153	9.0000	250.2900 (30)
Total net area of external elements Aum(A, m ²)			80.4500				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	27.9676			(33)
Party Wall 1			44.5900	0.0000	0.0000	20.0000	891.8000 (32)
Party Floor 1			73.6900			30.0000	2210.7000 (32d)
Party Ceilings 1			45.8800			30.0000	1376.4000 (32b)
Internal Wall 1			174.8700			75.0000	13115.2500 (32c)

Heat capacity Cm = Sum(A x k)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K
Thermal bridges (User defined value 0.150 * total exposed area)
Total fabric heat loss
(28)...(30) + (32) + (32a)...(32e) = 18406.3100 (34)
249.7803 (35)
12.0675 (36)
(33) + (36) = 40.0351 (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	40.1745	39.8704	39.5723	38.1721	37.9101	36.6906	36.6906	36.4648	37.1603	37.9101	38.4401	38.9941 (38)
Heat transfer coeff	80.2096	79.9055	79.6074	78.2072	77.9452	76.7257	76.7257	76.4999	77.1955	77.9452	78.4752	79.0292 (39)
Average = Sum(39)m / 12 =												78.2060 (39)
HLP	1.0885	1.0843	1.0803	1.0613	1.0577	1.0412	1.0412	1.0381	1.0476	1.0577	1.0649	1.0725 (40)
HLP (average)												1.0613 (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
Average daily hot water use (litres/day)
2.3323 (42)
89.5916 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	98.5507	94.9671	91.3834	87.7998	84.2161	80.6324	80.6324	84.2161	87.7998	91.3834	94.9671	98.5507 (44)
Energy conte	146.1479	127.8219	131.9007	114.9943	110.3397	95.2148	88.2305	101.2458	102.4550	119.4014	130.3360	141.5364 (45)
Energy content (annual)										Total = Sum(45)m =		1409.6245 (45)
Distribution loss (46)m = 0.15 x (45)m	21.9222	19.1733	19.7851	17.2491	16.5510	14.2822	13.2346	15.1869	15.3682	17.9102	19.5504	21.2305 (46)

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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9851	0.9784	0.9602	0.9048	0.7767	0.5679	0.3954	0.4430	0.7109	0.9177	0.9736	0.9873 (94)
Useful gains	600.5831	630.4013	652.6025	657.0050	592.2598	426.4981	282.8959	296.4702	443.0643	539.7830	563.7133	580.7917 (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	1188.0657	1147.2504	1037.1554	860.6232	660.2795	436.3132	284.0209	298.5025	474.3275	727.6420	971.9727	1177.5875 (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	437.0871	347.3226	286.1074	146.6051	50.6066	0.0000	0.0000	0.0000	0.0000	139.7671	293.9468	444.0161 (98)
Space heating												2145.4587 (98)
Space heating per m2												29.1147 (99)
										(98) / (4) =		

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF ENERGY RATINGS 09 Jan 2014

8c. Space cooling requirement

Not applicable

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	2145.4587 (98)
Space heat from Heat pump = (98) x 1.00 x 1.00 x 1.05	2252.7316 (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	1946.3205 (64)
Water heat from Heat pump = (64) x 1.00 x 1.00 x 1.05	2043.6365 (310a)
Electricity used for heat distribution	42.9637 (313)
Annual totals kWh/year	
Electricity for pumps and fans:	
Total electricity for the above, kWh/year	0.0000 (331)
Electricity for lighting (calculated in Appendix L)	339.7119 (332)
Total delivered energy for all uses	4636.0800 (338)

10b. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating from Heat pump	2252.7316	4.2400	95.5158 (340a)
Space heating - secondary	0.0000	0.0000	0.0000 (341)
Water heating from Heat pump	2043.6365	4.2400	86.6502 (342a)
Pumps and fans for heating	0.0000	0.0000	0.0000 (349)
Energy for lighting	339.7119	13.1900	44.8080 (350)
Additional standing charges			120.0000 (351)
Total energy cost			346.9740 (355)

11b. SAP rating - Community heating scheme

Energy cost deflator (Table 12):	0.4200 (356)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] = 1.2278 (357)
SAP value	82.8720
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	1432.1227	0.5190	743.2717 (367)
Electrical energy for heat distribution	42.9637	0.5190	22.2982 (372)
Total CO2 associated with community systems (negative value allowed since DFEE <= TFEE)			765.5698 (373)
Space and water heating			765.5698 (376)
Pumps and fans	0.0000	0.0000	0.0000 (378)
Energy for lighting	339.7119	0.5190	176.3105 (379)
Total kg/year			941.8803 (383)
CO2 emissions per m2			12.7800 (384)
EI value			89.3663 (384a)
EI rating			89 (385)
EI band			B

Calculation of stars for heating and DHW

Space heating energy efficiency	1.00 x 4.240 x 1.05
= 4.452, stars = 4	
Space heating environmental impact	1.00 x 0.519 x 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	73.6900 (1b)	x 2.6600 (2b)	= 196.0154 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	73.6900		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 196.0154 (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) =				Air changes per hour
Pressure test					40.0000 / (5) = 0.2041 (8)
Measured/design AP50					Yes
Infiltration rate					5.0000
Number of sides sheltered					0.4541 (18)
					2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =				0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =				0.3860 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	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)
Wind factor	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)
Adj infilt rate	0.4342	0.4149	0.4246	0.3860	0.3860	0.3570	0.3570	0.3281	0.3570	0.3763	0.3667	0.3956 (22b)
Effective ac	0.5943	0.5861	0.5901	0.5745	0.5745	0.5637	0.5637	0.5538	0.5637	0.5708	0.5672	0.5783 (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
Door			1.9500	1.2000	2.3400		(26)
Window (Uw = 1.40)			11.4900	1.3258	15.2330		(27)
Main Type 4	48.6200	11.4900	37.1300	0.1700	6.3121	9.0000	334.1700 (29a)
Corridor	4.0200	1.9500	2.0700	0.2257	0.4673	110.0000	227.7000 (29a)
PIJ	27.8100		27.8100	0.1300	3.6153	9.0000	250.2900 (30)
Total net area of external elements Aum(A, m ²)			80.4500				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	27.9676			(33)
Party Wall 1			44.5900	0.0000	0.0000	20.0000	891.8000 (32)
Party Floor 1			73.6900			30.0000	2210.7000 (32d)
Party Ceilings 1			45.8800			30.0000	1376.4000 (32b)
Internal Wall 1			174.8700			75.0000	13115.2500 (32c)

Heat capacity Cm = Sum(A x k)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K
Thermal bridges (User defined value 0.150 * total exposed area)
Total fabric heat loss

(28)...(30) + (32) + (32a)...(32e) =	18406.3100 (34)
	249.7803 (35)
	12.0675 (36)
(33) + (36) =	40.0351 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	
(38)m	38.4401 Jan 37.9101 Feb 38.1721 Mar 37.1603 Apr 37.1603 May 36.4648 Jun 36.4648 Jul 35.8234 Aug 36.4648 Sep 36.9225 Oct 36.6906 Nov 37.4042 Dec (38)
Heat transfer coeff	78.4752 Jan 77.9452 Feb 78.2072 Mar 77.1955 Apr 77.1955 May 76.4999 Jun 76.4999 Jul 75.8585 Aug 76.4999 Sep 76.9576 Oct 76.7257 Nov 77.4394 Dec (39)
Average = Sum(39)m / 12 =	77.1250 (39)
HLP	1.0649 Jan 1.0577 Feb 1.0613 Mar 1.0476 Apr 1.0476 May 1.0381 Jun 1.0381 Jul 1.0294 Aug 1.0381 Sep 1.0443 Oct 1.0412 Nov 1.0509 Dec (40)
HLP (average)	1.0466 (40)
Days in month	31 Jan 28 Feb 31 Mar 30 Apr 31 May 30 Jun 31 Jul 31 Aug 30 Sep 31 Oct 30 Nov 31 Dec (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.3323	(42)
Average daily hot water use (litres/day)												89.5916	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	98.5507	94.9671	91.3834	87.7998	84.2161	80.6324	80.6324	84.2161	87.7998	91.3834	94.9671	98.5507	(44)
Energy conte	146.1479	127.8219	131.9007	114.9943	110.3397	95.2148	88.2305	101.2458	102.4550	119.4014	130.3360	141.5364	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													
	21.9222	19.1733	19.7851	17.2491	16.5510	14.2822	13.2346	15.1869	15.3682	17.9102	19.5504	21.2305	(46)
										Total = Sum(45)m =		1409.6245	(45)

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Water storage loss:													
Store volume												180.0000 (47)	
a) If manufacturer declared loss factor is known (kWh/day):												1.2000 (48)	
Temperature factor from Table 2b												0.6000 (49)	
Enter (49) or (54) in (55)												0.7200 (55)	
Total storage loss													
	22.3200	20.1600	22.3200	21.6000	22.3200	21.6000	22.3200	22.3200	21.6000	22.3200	21.6000	22.3200 (56)	
If cylinder contains dedicated solar storage													
	22.3200	20.1600	22.3200	21.6000	22.3200	21.6000	22.3200	22.3200	21.6000	22.3200	21.6000	22.3200 (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													
	191.7303	168.9931	177.4831	159.1063	155.9221	139.3268	133.8129	146.8282	146.5670	164.9838	174.4480	187.1188 (62)	
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63)	
								Solar input (sum of months) = Sum (63)m =					0.0000 (63)
Output from w/h	191.7303	168.9931	177.4831	159.1063	155.9221	139.3268	133.8129	146.8282	146.5670	164.9838	174.4480	187.1188 (64)	
								Total per year (kWh/year) = Sum (64)m =					1946.3205 (64)
Heat gains from water heating, kWh/month													
	85.0601	75.4377	80.3229	73.5252	73.1539	66.9485	65.8026	70.1301	69.3559	76.1669	78.6263	83.5268 (65)	

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	139.9366	139.9366	139.9366	139.9366	139.9366	139.9366	139.9366	139.9366	139.9366	139.9366	139.9366	139.9366 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	48.0897	42.7129	34.7364	26.2977	19.6579	16.5960	17.9326	23.3094	31.2858	39.7246	46.3644	49.4263 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	307.0921	310.2788	302.2485	285.1530	263.5730	243.2909	229.7412	226.5545	234.5848	251.6803	273.2602	293.5424 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	51.3259	51.3259	51.3259	51.3259	51.3259	51.3259	51.3259	51.3259	51.3259	51.3259	51.3259	51.3259 (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)	-93.2911	-93.2911	-93.2911	-93.2911	-93.2911	-93.2911	-93.2911	-93.2911	-93.2911	-93.2911	-93.2911	-93.2911 (71)
Water heating gains (Table 5)	114.3281	112.2585	107.9609	102.1183	98.3251	92.9841	88.4443	94.2610	96.3276	102.3749	109.2032	112.2672 (72)
Total internal gains	567.4814	563.2217	542.9173	511.5405	479.5275	450.8424	434.0895	442.0963	460.1697	491.7512	526.7994	553.2074 (73)

[Jan											Area	Solar flux	g	FF	Access	Gains
											m2	Table 6a	Table 6b	Table 6c	factor	W
												W/m2	or Table 6b	or Table 6c	Table 6d	
North											9.7300	11.9814	0.6300	0.7000	0.7700	35.6282
West											1.7600	22.3313	0.6300	0.7000	0.7700	12.0115 (84)
Solar gains	47.6397	82.9485	140.5634	227.1417	289.6702	328.2720	304.6180	250.4375	180.1939	105.6655	58.9355	39.1237 (83)				
Total gains	615.1211	646.1702	683.4807	738.6822	769.1977	779.1144	738.7075	692.5338	640.3636	597.4167	585.7349	592.3310 (84)				

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	65.1526	65.5956	65.3759	66.2327	66.2327	66.8349	66.8349	67.4000	66.8349	66.4374	66.6382	66.0241
alpha	5.3435	5.3730	5.3584	5.4155	5.4155	5.4557	5.4557	5.4933	5.4557	5.4292	5.4425	5.4016
util living area	0.9892	0.9840	0.9655	0.9051	0.7519	0.5041	0.3309	0.3714	0.6794	0.9189	0.9786	0.9908 (86)
MIT	20.1414	20.2475	20.4665	20.7352	20.9289	20.9934	20.9995	20.9991	20.9689	20.7531	20.4181	20.1328 (87)
Th 2	20.0296	20.0355	20.0326	20.0439	20.0439	20.0517	20.0517	20.0589	20.0517	20.0465	20.0491	20.0411 (88)
util rest of house	0.9858	0.9790	0.9541	0.8750	0.6864	0.4154	0.2331	0.2692	0.5877	0.8862	0.9708	0.9878 (89)
MIT 2	18.9125	19.0700	19.3800	19.7543	19.9845	20.0486	20.0516	20.0587	20.0324	19.7875	19.3271	18.9090 (90)
Living area fraction	19.2417	19.3854	19.6710	20.0171	20.2375	20.3017	20.3055	20.3106	fLA = Living area / (4) =	20.2832	20.0462	0.2679 (91)
MIT	19.2417	19.3854	19.6710	20.0171	20.2375	20.3017	20.3055	20.3106	20.2832	20.0462	19.6194	19.2368 (92)
Temperature adjustment												0.0000
adjusted MIT	19.2417	19.3854	19.6710	20.0171	20.2375	20.3017	20.3055	20.3106	20.2832	20.0462	19.6194	19.2368 (93)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9822	0.9746	0.9488	0.8741	0.7006	0.4391	0.2593	0.2966	0.6112	0.8861	0.9663	0.9845 (94)
Useful gains	604.1543	629.7394	648.4713	645.6573	538.8675	342.1327	191.5810	205.4386	391.4061	529.3952	565.9805	583.1647 (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	1133.3159	1090.0984	967.5046	796.4309	574.1420	344.3793	191.6713	205.6219	404.1662	665.3884	914.5236	1117.9794 (97)
Month fracti	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000 (97a)
Space heating kWh	393.6963	309.3613	237.3608	108.5569	26.2442	0.0000	0.0000	0.0000	0.0000	101.1789	250.9510	397.9021 (98)
Space heating												1825.2516 (99)
Space heating per m2												24.7693 (99)
										(98) / (4) =		

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

Not applicable

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	1825.2516 (98)
Space heat from Heat pump = (98) x 1.00 x 1.00 x 1.05	1916.5142 (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	1946.3205 (64)
Water heat from Heat pump = (64) x 1.00 x 1.00 x 1.05	2043.6365 (310a)
Electricity used for heat distribution	39.6015 (313)
Annual totals kWh/year	
Electricity for pumps and fans:	
Total electricity for the above, kWh/year	0.0000 (331)
Electricity for lighting (calculated in Appendix L)	339.7119 (332)
Total delivered energy for all uses	4299.8626 (338)

10b. Fuel costs - using BEDF prices (482)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating from Heat pump	1916.5142	4.5600	87.3930 (340a)
Space heating - secondary	0.0000	0.0000	0.0000 (341)
Water heating from Heat pump	2043.6365	4.5600	93.1898 (342a)
Pumps and fans for heating	0.0000	0.0000	0.0000 (349)
Energy for lighting	339.7119	19.1200	64.9529 (350)
Additional standing charges			94.0000 (351)
Total energy cost			339.5358 (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	1320.0502	0.5190	685.1061 (367)
Electrical energy for heat distribution	39.6015	0.5190	20.5532 (372)
Total CO2 associated with community systems (negative value allowed since DFEE <= TFEE)			705.6593 (373)
Space and water heating			705.6593 (376)
Pumps and fans	0.0000	0.0000	0.0000 (378)
Energy for lighting	339.7119	0.5190	176.3105 (379)
Total kg/year			881.9697 (383)

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	1320.0502	3.0700	4052.5542 (367)
Electrical energy for heat distribution	39.6015	3.0700	121.5766 (372)
Total CO2 associated with community systems (negative value allowed since DFEE <= TFEE)			4174.1309 (373)
Space and water heating			4174.1309 (376)
Pumps and fans	0.0000	0.0000	0.0000 (378)
Energy for lighting	339.7119	3.0700	1042.9155 (379)
Primary energy kWh/year			5217.0463 (383)
Primary energy kWh/m2/year			70.7972 (384)

SAP 2012 EPC IMPROVEMENTS

Current energy efficiency rating: B 83
Current environmental impact rating: B 89

(For testing purposes):

A	Not considered
B	Not considered
C	Not considered
D	Not considered

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

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

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

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

Recommended measures	Typical annual savings	Energy efficiency	Environmental impact
(none)			
Total Savings	£0	0.00 kg/m²	
Potential energy efficiency rating:		B 83	
Potential environmental impact rating:			B 89

Fuel prices for cost data on this page from database revision number 482 TEST (31 Aug 2021)
 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	£65	£65	£0
Community scheme	£275	£275	£0
Space heating	£181	£181	£0
Water heating	£93	£93	£0
Lighting	£65	£65	£0
Total cost of fuels	£340	£340	£0
Total cost of uses	£339	£339	£0
Delivered energy	58 kWh/m²	58 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.9 tonnes	0.9 tonnes	0.0 tonnes
CO2 emissions per m²	12 kg/m²	12 kg/m²	0 kg/m²
Primary energy	71 kWh/m²	71 kWh/m²	0 kWh/m²

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	EndTerrace Flat
Number of storeys	1
Cross ventilation possible	No
SAP Region	Thames Valley
Front of dwelling faces	North
Overshading	Average or unknown
Thermal mass parameter	249.8 (calculated from construction elements)
Night ventilation	No
Ventilation rate during hot weather (ach)	4.00 (Calculated rate)

Overheating Calculation

Summer ventilation heat loss coefficient	258.74 (P1)
Transmission heat loss coefficient	40.04 (37)
Summer heat loss coefficient	298.78 (P2)

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

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

[Jul]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Shading	Gains W
North	9.7300	81.1852	0.6300	0.7000	0.9000	282.1715
West	1.7600	117.5071	0.6300	0.7000	0.9000	73.8755
total:						356.0470

Solar gains	Jun	Jul	Aug	
	384	356	294	(P3)
Internal gains	451	434	442	
Total summer gains	835	790	737	(P5)
Summer gain/loss ratio	2.79	2.64	2.47	(P6)
Summer external temperature	16.00	17.90	17.80	
Thermal mass temperature increment (TMP = 249.8)	0.25	0.25	0.25	
Threshold temperature	19.04	20.80	20.52	(P7)
Likelihood of high internal temperature	Not significant	Slight	Slight	
Assessment of likelihood of high internal temperature:	Slight			