

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

Property Reference	74278-01			Issued on Date	30/03/2023
Assessment Reference	001	Prop Type Ref	HT 2B3P (GF)		
Property	Flat 1, 32 Brookstone Close, MANCHESTER, M21 7AE				
SAP Rating	86 B	DER	27.78	TER	27.12
Environmental	82 B	% DER<TER	-2.44		
CO ₂ Emissions (t/year)	1.33	DFEE	37.19	TFEE	47.21
General Requirements Compliance	Fail	% DFEE<TFEE	21.24		
Assessor Details	Mr. Paul Goddard, Anderson Goddard Limited, Tel: 01925 733 942, paul.goddard@andersongoddard.com			Assessor ID	B342-0001
Client					

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

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DWELLING AS BUILT

Ground-floor flat, total floor area 61 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
 Fuel factor: 1.55 (electricity)
 Target Carbon Dioxide Emission Rate (TER) 27.12 kgCO₂/m²
 Dwelling Carbon Dioxide Emission Rate (DER) 27.78 kgCO₂/m² Fail
 Excess emissions = 0.66 kgCO₂/m² (2.4%)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 47.2 kWh/m²/yr
 Dwelling Fabric Energy Efficiency (DFEE) 37.2 kWh/m²/yr OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.18 (max. 0.30)	0.18 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.13 (max. 0.25)	0.13 (max. 0.70)	OK
Roof	(no roof)		
Openings	1.35 (max. 2.00)	1.35 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated using user-specified ψ -value of 0.058

3 Air permeability

Air permeability at 50 pascals: 3.00 (measured in this dwelling)
 Maximum 10.0 OK

4 Heating efficiency

Main heating system: Electric storage heaters with radiators or underfloor - Electric
 High heat retention storage heaters

Secondary heating system: None

5 Cylinder insulation

Hot water storage Measured store loss: 1.13 kWh/day
 Permitted by DBSCG 2.10 OK
 Primary pipework insulated: No primary pipework

6 Controls

Space heating controls: Controls for high heat retention storage heaters 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

Continuous extract system
 Specific fan power: 0.32
 Maximum 0.7 OK

9 Summertime temperature

Overheating risk (West Pennines (England)): Not significant OK

Based on:

Overshading: Average
 Windows facing North East: 7.69 m², No overhang
 Windows facing South East: 0.90 m², No overhang
 Air change rate: 4.00 ach
 Blinds/curtains: None

10 Key features

Party wall U-value 0.00 W/m²K
 Air permeability 3.0 m³/m²h
 Photovoltaic array 488.00 kWh/Year

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CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

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

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	61.0200 (1b)	x 2.4000 (2b)	= 146.4480 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	61.0200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 146.4480 (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					3.0000
Infiltration rate					0.1500 (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) =	0.1275 (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	0.1626	0.1594	0.1562	0.1403	0.1371	0.1211	0.1211	0.1179	0.1275	0.1371	0.1434	0.1498 (22b)
Mechanical extract ventilation - centralised												0.5000 (23a)
If mechanical ventilation:												0.5000 (23a)
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Window (Uw = 1.35)			8.5900	1.2808	11.0024		(27)
GF			61.0200	0.1300	7.9326	75.0000	4576.5000 (28a)
Main	48.8200	8.5900	40.2300	0.1800	7.2414	92.0000	3701.1600 (29a)
Total net area of external elements Aum(A, m ²)			109.8400				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	26.1764		(33)
Party Wall 1			30.0000	0.0000	0.0000	70.0000	2100.0000 (32)
Party Ceilings 1			60.0200			30.0000	1800.6000 (32b)
Internal Wall 1			121.4300			9.0000	1092.8700 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	13271.1300 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							217.4882 (35)
Thermal bridges (User defined value 0.058 * total exposed area)							6.3707 (36)
Total fabric heat loss						(33) + (36) =	32.5471 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	24.1639	24.1639	24.1639	24.1639	24.1639	24.1639	24.1639	24.1639	24.1639	24.1639	24.1639	24.1639 (38)
Heat transfer coeff	56.7110	56.7110	56.7110	56.7110	56.7110	56.7110	56.7110	56.7110	56.7110	56.7110	56.7110	56.7110 (39)
Average = Sum(39)m / 12 =												56.7110 (39)
HLP	0.9294	0.9294	0.9294	0.9294	0.9294	0.9294	0.9294	0.9294	0.9294	0.9294	0.9294	0.9294 (40)
HLP (average)												0.9294 (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												2.0103 (42)
Average daily hot water use (litres/day)												81.9452 (43)
Daily hot water use	90.1397	86.8619	83.5841	80.3063	77.0284	73.7506	73.7506	77.0284	80.3063	83.5841	86.8619	90.1397 (44)
Energy conte	133.6745	116.9126	120.6433	105.1798	100.9225	87.0884	80.7002	92.6047	93.7107	109.2108	119.2121	129.4566 (45)
Energy content (annual)										Total = Sum(45)m =		1289.3164 (45)
Distribution loss (46)m = 0.15 x (45)m	20.0512	17.5369	18.0965	15.7770	15.1384	13.0633	12.1050	13.8907	14.0566	16.3816	17.8818	19.4185 (46)

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Independent Energy Specialists, SAP, SBEM, EPC's, U-Value & Condensation Risk, 2D & 3D Thermal Modelling

Water storage loss:													
Store volume												150.0000 (47)	
a) If manufacturer declared loss factor is known (kWh/day):												1.1300 (48)	
Temperature factor from Table 2b												0.6000 (49)	
Enter (49) or (54) in (55)												0.6780 (55)	
Total storage loss													
	21.0180	18.9840	21.0180	20.3400	21.0180	20.3400	21.0180	21.0180	20.3400	21.0180	20.3400	21.0180 (56)	
If cylinder contains dedicated solar storage													
	21.0180	18.9840	21.0180	20.3400	21.0180	20.3400	21.0180	21.0180	20.3400	21.0180	20.3400	21.0180 (57)	
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)	
Total heat required for water heating calculated for each month													
	154.6925	135.8966	141.6613	125.5198	121.9405	107.4284	101.7182	113.6227	114.0507	130.2288	139.5521	150.4746 (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	154.6925	135.8966	141.6613	125.5198	121.9405	107.4284	101.7182	113.6227	114.0507	130.2288	139.5521	150.4746 (64)	
								Total per year (kWh/year) = Sum (64)m =					1536.7864 (64)
Heat gains from water heating, kWh/month													
	61.2612	54.0606	56.9283	51.2443	50.3711	45.2289	43.6472	47.6055	47.4308	53.1270	55.9100	59.8587 (65)	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9938	0.9892	0.9748	0.9249	0.7963	0.5940	0.4232	0.4839	0.7677	0.9516	0.9883	0.9951 (94)
Useful gains	364.4681	397.2254	431.8860	460.0535	431.1586	320.0472	215.9860	225.8912	320.2910	354.6227	347.3979	349.1167 (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	857.8597	830.8296	753.2487	634.3962	489.0107	329.8208	217.3049	228.5027	355.3947	536.9238	713.8618	861.3293 (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	367.0834	291.3820	239.0938	125.5268	43.0419	0.0000	0.0000	0.0000	0.0000	135.6321	263.8540	381.0862 (98)
Space heating												1846.7001 (99)
Space heating per m2												30.2638 (99)
										(98) / (4) =		

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8c. Space cooling requirement

Not applicable

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement												1846.7001 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	367.0834	291.3820	239.0938	125.5268	43.0419	0.0000	0.0000	0.0000	0.0000	135.6321	263.8540	381.0862 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	367.0834	291.3820	239.0938	125.5268	43.0419	0.0000	0.0000	0.0000	0.0000	135.6321	263.8540	381.0862 (211)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	154.6925	135.8966	141.6613	125.5198	121.9405	107.4284	101.7182	113.6227	114.0507	130.2288	139.5521	150.4746 (64)
Efficiency of water heater												100.0000 (216)
(217)m	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000 (217)
Fuel for water heating, kWh/month	154.6925	135.8966	141.6613	125.5198	121.9405	107.4284	101.7182	113.6227	114.0507	130.2288	139.5521	150.4746 (219)
Water heating fuel used												1536.7864 (219)
Annual totals kWh/year												
Space heating fuel - main system												1846.7001 (211)
Space heating fuel - secondary												0.0000 (215)
Electricity for pumps and fans:												
(MEV)Centralised, Database: in-use factor = 1.3000, SFP = 0.4160)												
mechanical ventilation fans (SFP = 0.4160)												74.3253 (230a)
Total electricity for the above, kWh/year												74.3253 (231)
Electricity for lighting (calculated in Appendix L)												296.0977 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
Total delivered energy for all uses												3753.9094 (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	1846.7001	0.5190	958.4373	(261)
Space heating - secondary	0.0000	0.0000	0.0000	(263)
Water heating	1536.7864	0.5190	797.5921	(264)
Space and water heating			1756.0295	(265)
Pumps and fans	74.3253	0.5190	38.5748	(267)
Energy for lighting	296.0977	0.5190	153.6747	(268)
Energy saving/generation technologies				
PV Unit (0.90*43.39 + 0.10*12.14)	-488.0000	0.5190	-253.2720	(269)
Total CO2, kg/year			1695.0070	(272)
Dwelling Carbon Dioxide Emission Rate (DER)			27.7800	(273)

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

DER		27.7800	ZC1
Total Floor Area	TFA	61.0200	
Assumed number of occupants	N	2.0103	
CO2 emission factor in Table 12 for electricity displaced from grid	EF	0.5190	
CO2 emissions from appliances, equation (L14)		17.0444	ZC2
CO2 emissions from cooking, equation (L16)		2.7409	ZC3
Total CO2 emissions		47.5652	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		47.5652	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	61.0200 (1b)	x 2.4000 (2b)	= 146.4480 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	61.0200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 146.4480 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					2 * 10 = 20.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(7a)+(7b)+(7c) =				20.0000 / (5) = 0.1366 (8)
Pressure test					Yes
Measured/design AP50					5.0000
Infiltration rate					0.3866 (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) =				0.3286 (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	0.4189	0.4107	0.4025	0.3614	0.3532	0.3122	0.3122	0.3039	0.3286	0.3532	0.3697	0.3861 (22b)
Effective ac	0.5878	0.5843	0.5810	0.5653	0.5624	0.5487	0.5487	0.5462	0.5540	0.5624	0.5683	0.5745 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K					
TER Opening Type (Uw = 1.40)			8.5900	1.3258	11.3883		(27)					
GF			61.0200	0.1300	7.9326		(28a)					
Main	48.8200	8.5900	40.2300	0.1800	7.2414		(29a)					
Total net area of external elements Aum(A, m2)			109.8400				(31)					
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		26.5623		(33)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							7.7927 (36)					
Total fabric heat loss						(33) + (36) =	34.3550 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 28.4050	Feb 28.2403	Mar 28.0789	Apr 27.3207	May 27.1788	Jun 26.5184	Jul 26.5184	Aug 26.3961	Sep 26.7728	Oct 27.1788	Nov 27.4658	Dec 27.7658 (38)
Heat transfer coeff	62.7600	62.5953	62.4338	61.6756	61.5338	60.8734	60.8734	60.7511	61.1278	61.5338	61.8208	62.1208 (39)
Average = Sum(39)m / 12 =												61.6750 (39)
HLP	Jan 1.0285	Feb 1.0258	Mar 1.0232	Apr 1.0107	May 1.0084	Jun 0.9976	Jul 0.9976	Aug 0.9956	Sep 1.0018	Oct 1.0084	Nov 1.0131	Dec 1.0180 (40)
HLP (average)												1.0107 (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												2.0103 (42)
Average daily hot water use (litres/day)												81.9452 (43)
Daily hot water use	Jan 90.1397	Feb 86.8619	Mar 83.5841	Apr 80.3063	May 77.0284	Jun 73.7506	Jul 73.7506	Aug 77.0284	Sep 80.3063	Oct 83.5841	Nov 86.8619	Dec 90.1397 (44)
Energy conte	133.6745	116.9126	120.6433	105.1798	100.9225	87.0884	80.7002	92.6047	93.7107	109.2108	119.2121	129.4566 (45)
Energy content (annual)										Total = Sum(45)m =		1289.3164 (45)
Distribution loss (46)m = 0.15 x (45)m	20.0512	17.5369	18.0965	15.7770	15.1384	13.0633	12.1050	13.8907	14.0566	16.3816	17.8818	19.4185 (46)
Water storage loss:												
Store volume												150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.7527 (55)
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (56)

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If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(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	180.2694	158.9983	167.2382	150.2716	147.5174	132.1803	127.2951	139.1996	138.8025	155.8057	164.3040	176.0515	(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	180.2694	158.9983	167.2382	150.2716	147.5174	132.1803	127.2951	139.1996	138.8025	155.8057	164.3040	176.0515	(64)
Heat gains from water heating, kWh/month	81.7227	72.5420	77.3898	71.0457	70.8327	65.0304	64.1088	68.0670	67.2323	73.5885	75.7115	80.3203	(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	100.5161	100.5161	100.5161	100.5161	100.5161	100.5161	100.5161	100.5161	100.5161	100.5161	100.5161	100.5161	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	16.7663	14.8917	12.1107	9.1686	6.8536	5.7861	6.2521	8.1267	10.9077	13.8498	16.1648	17.2323	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	175.5119	177.3331	172.7436	162.9731	150.6395	139.0477	131.3036	129.4823	134.0719	143.8424	156.1760	167.7678	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.0516	33.0516	33.0516	33.0516	33.0516	33.0516	33.0516	33.0516	33.0516	33.0516	33.0516	33.0516	(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)	-80.4129	-80.4129	-80.4129	-80.4129	-80.4129	-80.4129	-80.4129	-80.4129	-80.4129	-80.4129	-80.4129	-80.4129	(71)
Water heating gains (Table 5)	109.8423	107.9494	104.0186	98.6746	95.2052	90.3200	86.1677	91.4879	93.3782	98.9093	105.1549	107.9573	(72)
Total internal gains	358.2753	356.3291	345.0277	326.9711	308.8531	291.3086	279.8782	285.2518	294.5125	312.7563	333.6505	349.1123	(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	
Northeast				7.6900	11.2829	0.6300		0.7000	0.7700		26.5168 (75)	
Southeast				0.9000	36.7938	0.6300		0.7000	0.7700		10.1202 (77)	
Solar gains	36.6370	71.2141	120.8333	188.9321	247.4122	261.3669	245.4337	199.3980	144.0360	85.0147	45.4866	30.3157 (83)
Total gains	394.9123	427.5431	465.8611	515.9032	556.2653	552.6755	525.3119	484.6498	438.5485	397.7710	379.1371	379.4280 (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	67.5192	67.6968	67.8718	68.7062	68.8646	69.6117	69.6117	69.7518	69.3220	68.8646	68.5449	68.2139		
alpha	5.5013	5.5131	5.5248	5.5804	5.5910	5.6408	5.6408	5.6501	5.6215	5.5910	5.5697	5.5476		
util living area	0.9971	0.9949	0.9875	0.9569	0.8600	0.6728	0.5042	0.5654	0.8319	0.9723	0.9941	0.9977	(86)	
MIT	19.9701	20.0828	20.2985	20.6011	20.8517	20.9719	20.9953	20.9914	20.9099	20.6000	20.2385	19.9512	(87)	
Th 2	20.0596	20.0619	20.0641	20.0744	20.0763	20.0853	20.0853	20.0870	20.0819	20.0763	20.0724	20.0683	(88)	
util rest of house	0.9961	0.9932	0.9831	0.9413	0.8141	0.5897	0.4024	0.4590	0.7625	0.9593	0.9918	0.9969	(89)	
MIT 2	18.6864	18.8523	19.1667	19.6036	19.9316	20.0668	20.0836	20.0834	20.0094	19.6100	19.0877	18.6652	(90)	
Living area fraction	19.2014	19.3460	19.6208	20.0037	20.3007	20.4299	20.4493	20.4477	20.3707	20.0071	19.5494	19.1811	(91)	
MIT	19.2014	19.3460	19.6208	20.0037	20.3007	20.4299	20.4493	20.4477	20.3707	20.0071	19.5494	19.1811	(92)	
Temperature adjustment												0.0000		
adjusted MIT	19.2014	19.3460	19.6208	20.0037	20.3007	20.4299	20.4493	20.4477	20.3707	20.0071	19.5494	19.1811	(93)	

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	392.9166	423.8889	456.7440	484.9014	459.6818	343.8673	232.9492	243.2524	344.9151	381.0896	375.3727	377.8746	(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	935.2131	904.2501	819.1800	684.8307	529.2357	354.8878	234.3221	245.9019	383.3144	578.8570	769.6315	930.6361	(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	403.4686	322.8027	269.6524	143.9491	51.7481	0.0000	0.0000	0.0000	0.0000	147.1390	283.8664	411.2545	(98)
Space heating												2033.8807	(98)
Space heating per m2												33.3314	(99)

8c. Space cooling requirement

Not applicable

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF TARGET EMISSIONS 09 Jan 2014

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												93.5000 (206)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement												2175.2735 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	403.4686	322.8027	269.6524	143.9491	51.7481	0.0000	0.0000	0.0000	0.0000	147.1390	283.8664	411.2545 (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)	431.5172	345.2436	288.3983	153.9562	55.3456	0.0000	0.0000	0.0000	0.0000	157.3679	303.6004	439.8444 (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	180.2694	158.9983	167.2382	150.2716	147.5174	132.1803	127.2951	139.1996	138.8025	155.8057	164.3040	176.0515 (64)
Efficiency of water heater (217)m	86.9016	86.6651	86.0817	84.6995	82.3278	79.8000	79.8000	79.8000	79.8000	84.6617	86.2597	79.8000 (216)
Fuel for water heating, kWh/month	207.4409	183.4628	194.2785	177.4174	179.1830	165.6395	159.5177	174.4356	173.9380	184.0333	190.4759	202.3510 (219)
Water heating fuel used												2192.1735 (219)
Annual totals kWh/year												
Space heating fuel - main system												2175.2735 (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)												296.0977 (232)
Total delivered energy for all uses												4738.5447 (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	2175.2735	0.2160	469.8591 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2192.1735	0.2160	473.5095 (264)
Space and water heating			943.3686 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	296.0977	0.5190	153.6747 (268)
Total CO2, kg/m2/year			1135.9682 (272)
Emissions per m2 for space and water heating			15.4600 (272a)
Fuel factor (electricity)			1.5500
Emissions per m2 for lighting			2.5184 (272b)
Emissions per m2 for pumps and fans			0.6379 (272c)
Target Carbon Dioxide Emission Rate (TER) = (15.4600 * 1.55) + 2.5184 + 0.6379, rounded to 2 d.p.			27.1200 (273)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

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

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	61.0200 (1b)	x 2.4000 (2b)	= 146.4480 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	61.0200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 146.4480 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					2 * 10 = 20.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					20.0000 / (5) = 0.1366 (8)
Pressure test					Yes
Measured/design AP50					3.0000
Infiltration rate					0.2866 (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) = 0.2436 (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	0.3106	0.3045	0.2984	0.2679	0.2619	0.2314	0.2314	0.2253	0.2436	0.2619	0.2740	0.2862 (22b)
Effective ac	0.5482	0.5464	0.5445	0.5359	0.5343	0.5268	0.5268	0.5254	0.5297	0.5343	0.5375	0.5410 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Window (Uw = 1.35)			8.5900	1.2808	11.0024		(27)
GF			61.0200	0.1300	7.9326	75.0000	4576.5000 (28a)
Main	48.8200	8.5900	40.2300	0.1800	7.2414	92.0000	3701.1600 (29a)
Total net area of external elements Aum(A, m ²)			109.8400				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	26.1764			(33)
Party Wall 1			30.0000	0.0000	0.0000	70.0000	2100.0000 (32)
Party Ceilings 1			60.0200			20.0000	1200.4000 (32b)
Internal Wall 1			121.4300			9.0000	1092.8700 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 12670.9300 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							207.6521 (35)
Thermal bridges (User defined value 0.058 * total exposed area)							6.3707 (36)
Total fabric heat loss							(33) + (36) = 32.5471 (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	26.4946	26.4041	26.3154	25.8987	25.8207	25.4578	25.4578	25.3906	25.5976	25.8207	25.9784	26.1433 (38)
Heat transfer coeff	59.0417	58.9512	58.8625	58.4458	58.3678	58.0049	58.0049	57.9377	58.1447	58.3678	58.5255	58.6904 (39)
Average = Sum(39)m / 12 =												58.4454 (39)
HLP	0.9676	0.9661	0.9646	0.9578	0.9565	0.9506	0.9506	0.9495	0.9529	0.9565	0.9591	0.9618 (40)
HLP (average)												0.9578 (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												2.0103 (42)
Average daily hot water use (litres/day)												81.9452 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	90.1397	86.8619	83.5841	80.3063	77.0284	73.7506	73.7506	77.0284	80.3063	83.5841	86.8619	90.1397 (44)
Energy content (annual)	133.6745	116.9126	120.6433	105.1798	100.9225	87.0884	80.7002	92.6047	93.7107	109.2108	119.2121	129.4566 (45)
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		1289.3164 (45)
Water storage loss:	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)

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If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Heat gains from water heating, kWh/month	28.4058	24.8439	25.6367	22.3507	21.4460	18.5063	17.1488	19.6785	19.9135	23.2073	25.3326	27.5095 (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	100.5161	100.5161	100.5161	100.5161	100.5161	100.5161	100.5161	100.5161	100.5161	100.5161	100.5161	100.5161	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	16.7663	14.8917	12.1107	9.1686	6.8536	5.7861	6.2521	8.1267	10.9077	13.8498	16.1648	17.2323	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	175.5119	177.3331	172.7436	162.9731	150.6395	139.0477	131.3036	129.4823	134.0719	143.8424	156.1760	167.7678	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.0516	33.0516	33.0516	33.0516	33.0516	33.0516	33.0516	33.0516	33.0516	33.0516	33.0516	33.0516	(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)	-80.4129	-80.4129	-80.4129	-80.4129	-80.4129	-80.4129	-80.4129	-80.4129	-80.4129	-80.4129	-80.4129	-80.4129	(71)
Water heating gains (Table 5)	38.1799	36.9701	34.4579	31.0426	28.8253	25.7032	23.0495	26.4496	27.6577	31.1926	35.1841	36.9752	(72)
Total internal gains	283.6129	282.3498	272.4671	256.3391	239.4732	223.6918	213.7600	217.2135	225.7920	242.0397	260.6797	275.1301	(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				
Northeast				7.6900	11.2829	0.6700		0.7000		0.7700	28.2004 (75)				
Southeast				0.9000	36.7938	0.6700		0.7000		0.7700	10.7628 (77)				
Solar gains				38.9631	75.7356	128.5053	200.9278	263.1209	277.9617	261.0168	212.0582	153.1811	90.4124	48.3747	32.2405 (83)
Total gains				322.5760	358.0854	400.9724	457.2669	502.5941	501.6535	474.7768	429.2717	378.9732	332.4521	309.0544	307.3706 (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	59.6139	59.7054	59.7954	60.2217	60.3021	60.6794	60.6794	60.7498	60.5335	60.3021	60.1396	59.9707	
alpha	4.9743	4.9804	4.9864	5.0148	5.0201	5.0453	5.0453	5.0500	5.0356	5.0201	5.0093	4.9980	
util living area	0.9974	0.9951	0.9876	0.9572	0.8643	0.6898	0.5265	0.5984	0.8571	0.9774	0.9951	0.9980	(86)
MIT	19.7725	19.9042	20.1540	20.5009	20.7991	20.9532	20.9902	20.9821	20.8584	20.4774	20.0633	19.7432	(87)
Th 2	20.1104	20.1117	20.1129	20.1186	20.1197	20.1247	20.1247	20.1256	20.1228	20.1197	20.1175	20.1153	(88)
util rest of house	0.9967	0.9938	0.9839	0.9439	0.8244	0.6130	0.4271	0.4950	0.7997	0.9681	0.9935	0.9974	(89)
MIT 2	18.9795	19.1118	19.3607	19.7037	19.9769	20.1007	20.1216	20.1194	20.0354	19.6866	19.2755	18.9542	(90)
Living area fraction									fLA = Living area / (4) =			0.4012	(91)
MIT	19.2976	19.4297	19.6790	20.0235	20.3067	20.4427	20.4701	20.4655	20.3656	20.0039	19.5915	19.2707	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.2976	19.4297	19.6790	20.0235	20.3067	20.4427	20.4701	20.4655	20.3656	20.0039	19.5915	19.2707	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9958	0.9924	0.9817	0.9422	0.8337	0.6422	0.4671	0.5364	0.8174	0.9665	0.9922	0.9967	(94)
Ext temp.	321.2225	355.3636	393.6191	430.8577	419.0097	322.1411	221.7510	230.2739	309.7842	321.3298	306.6514	306.3504	(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	885.4863	856.5433	775.7471	650.1236	502.3569	338.9077	224.4838	235.5445	364.3113	548.8832	731.0741	884.5072	(97)
Month fracti	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	(97a)
Space heating kWh	419.8123	336.7927	284.3033	157.8715	62.0103	0.0000	0.0000	0.0000	0.0000	169.2997	305.5844	430.1487	(98)
Space heating												2165.8228	(98)
Space heating per m2												35.4937	(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	545.2463	429.2365	440.3267	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9040	0.9487	0.9249	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	492.8949	407.2260	407.2793	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	661.8713	629.0185	577.1625	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	121.6630	165.0137	126.3932	0.0000	0.0000	0.0000	0.0000	(104)
Space cooling												413.0698	(104)

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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 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	30.4157	41.2534	31.5983	0.0000	0.0000	0.0000 (107)
Space cooling											103.2675 (107)
Space cooling per m2											1.6924 (108)
Energy for space heating											35.4937 (99)
Energy for space cooling											1.6924 (108)
Total											37.1860 (109)
Dwelling Fabric Energy Efficiency (DFEE)											37.2 (109)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

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

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	61.0200 (1b)	x 2.4000 (2b)	= 146.4480 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	61.0200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 146.4480 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					2 * 10 = 20.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					Air changes per hour 20.0000 / (5) = 0.1366 (8)
Pressure test					Yes
Measured/design AP50					5.0000
Infiltration rate					0.3866 (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) =	0.3286 (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	0.4189	0.4107	0.4025	0.3614	0.3532	0.3122	0.3122	0.3039	0.3286	0.3532	0.3697	0.3861 (22b)
Effective ac	0.5878	0.5843	0.5810	0.5653	0.5624	0.5487	0.5487	0.5462	0.5540	0.5624	0.5683	0.5745 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K					
TER Opening Type (Uw = 1.40)			8.5900	1.3258	11.3883		(27)					
GF			61.0200	0.1300	7.9326		(28a)					
Main	48.8200	8.5900	40.2300	0.1800	7.2414		(29a)					
Total net area of external elements Aum(A, m2)			109.8400				(31)					
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		26.5623		(33)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							7.7927 (36)					
Total fabric heat loss						(33) + (36) =	34.3550 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 28.4050	Feb 28.2403	Mar 28.0789	Apr 27.3207	May 27.1788	Jun 26.5184	Jul 26.5184	Aug 26.3961	Sep 26.7728	Oct 27.1788	Nov 27.4658	Dec 27.7658 (38)
Heat transfer coeff	62.7600	62.5953	62.4338	61.6756	61.5338	60.8734	60.8734	60.7511	61.1278	61.5338	61.8208	62.1208 (39)
Average = Sum(39)m / 12 =												61.6750 (39)
HLP	Jan 1.0285	Feb 1.0258	Mar 1.0232	Apr 1.0107	May 1.0084	Jun 0.9976	Jul 0.9976	Aug 0.9956	Sep 1.0018	Oct 1.0084	Nov 1.0131	Dec 1.0180 (40)
HLP (average)												1.0107 (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												2.0103 (42)
Average daily hot water use (litres/day)												81.9452 (43)
Daily hot water use	Jan 90.1397	Feb 86.8619	Mar 83.5841	Apr 80.3063	May 77.0284	Jun 73.7506	Jul 73.7506	Aug 77.0284	Sep 80.3063	Oct 83.5841	Nov 86.8619	Dec 90.1397 (44)
Energy conte	133.6745	116.9126	120.6433	105.1798	100.9225	87.0884	80.7002	92.6047	93.7107	109.2108	119.2121	129.4566 (45)
Energy content (annual)										Total = Sum(45)m =		1289.3164 (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	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	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Heat gains from water heating, kWh/month												

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

28.4058 24.8439 25.6367 22.3507 21.4460 18.5063 17.1488 19.6785 19.9135 23.2073 25.3326 27.5095 (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	100.5161	100.5161	100.5161	100.5161	100.5161	100.5161	100.5161	100.5161	100.5161	100.5161	100.5161	100.5161	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	16.7663	14.8917	12.1107	9.1686	6.8536	5.7861	6.2521	8.1267	10.9077	13.8498	16.1648	17.2323	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	175.5119	177.3331	172.7436	162.9731	150.6395	139.0477	131.3036	129.4823	134.0719	143.8424	156.1760	167.7678	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.0516	33.0516	33.0516	33.0516	33.0516	33.0516	33.0516	33.0516	33.0516	33.0516	33.0516	33.0516	(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)	-80.4129	-80.4129	-80.4129	-80.4129	-80.4129	-80.4129	-80.4129	-80.4129	-80.4129	-80.4129	-80.4129	-80.4129	(71)
Water heating gains (Table 5)	38.1799	36.9701	34.4579	31.0426	28.8253	25.7032	23.0495	26.4496	27.6577	31.1926	35.1841	36.9752	(72)
Total internal gains	283.6129	282.3498	272.4671	256.3391	239.4732	223.6918	213.7600	217.2135	225.7920	242.0397	260.6797	275.1301	(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		
Northeast				7.6900	11.2829	0.6300		0.7000		0.7700	26.5168 (75)		
Southeast				0.9000	36.7938	0.6300		0.7000		0.7700	10.1202 (77)		

Solar gains	36.6370	71.2141	120.8333	188.9321	247.4122	261.3669	245.4337	199.3980	144.0360	85.0147	45.4866	30.3157	(83)
Total gains	320.2498	353.5639	393.3004	445.2712	486.8854	485.0587	459.1937	416.6115	369.8280	327.0543	306.1664	305.4458	(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	67.5192	67.6968	67.8718	68.7062	68.8646	69.6117	69.6117	69.7518	69.3220	68.8646	68.5449	68.2139	21.0000 (85)
alpha	5.5013	5.5131	5.5248	5.5804	5.5910	5.6408	5.6408	5.6501	5.6215	5.5910	5.5697	5.5476	
util living area	0.9990	0.9980	0.9943	0.9766	0.9077	0.7433	0.5713	0.6459	0.8988	0.9884	0.9979	0.9992	(86)
MIT	19.8539	19.9687	20.1898	20.5082	20.7941	20.9540	20.9913	20.9836	20.8586	20.4997	20.1259	19.8355	(87)
Th 2	20.0596	20.0619	20.0641	20.0744	20.0763	20.0853	20.0853	20.0870	20.0819	20.0763	20.0724	20.0683	(88)
util rest of house	0.9986	0.9973	0.9922	0.9672	0.8714	0.6599	0.4588	0.5301	0.8441	0.9823	0.9971	0.9990	(89)
MIT 2	19.0063	19.1226	19.3447	19.6662	19.9323	20.0635	20.0830	20.0820	19.9973	19.6626	19.2884	18.9950	(90)
Living area fraction	fLA = Living area / (4) =												
MIT	19.3463	19.4620	19.6837	20.0040	20.2780	20.4207	20.4474	20.4437	20.3428	19.9984	19.6244	19.3322	(92)
Temperature adjustment	0.0000												
adjusted MIT	19.3463	19.4620	19.6837	20.0040	20.2780	20.4207	20.4474	20.4437	20.3428	19.9984	19.6244	19.3322	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9983	0.9967	0.9911	0.9664	0.8803	0.6922	0.5044	0.5770	0.8620	0.9816	0.9965	0.9987	(94)
Useful gains	319.6972	352.3925	389.8004	430.2933	428.6177	335.7811	231.6017	240.4052	318.7772	321.0453	305.1091	305.0420	(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	944.3067	911.5145	823.1111	684.8452	527.8392	354.3278	234.2042	245.6593	381.6096	578.3216	774.2676	940.0229	(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	464.7095	375.7300	322.3832	183.2774	73.8208	0.0000	0.0000	0.0000	0.0000	191.4136	337.7941	472.4258	(98)
Space heating	2421.5543 (98)												(98)
Space heating per m2	(98) / (4) =												39.6846 (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	572.2099	450.4631	461.7084	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8940	0.9457	0.9196	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	511.5281	425.9998	424.5906	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	642.4748	610.8045	562.3649	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	94.2816	137.4948	102.5041	0.0000	0.0000	0.0000	0.0000	(104)
Space cooling	334.2805 (104)												(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													

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

	0.0000	0.0000	0.0000	0.0000	0.0000	23.5704	34.3737	25.6260	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling												83.5701 (107)
Space cooling per m2												1.3696 (108)
Energy for space heating												39.6846 (99)
Energy for space cooling												1.3696 (108)
Total												41.0542 (109)
Target Fabric Energy Efficiency (TFEE)												47.2 (109)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF HEAT DEMAND 09 Jan 2014

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

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	61.0200 (1b)	x 2.4000 (2b)	= 146.4480 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	61.0200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 146.4480 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					0 * 10 = 0.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(7a)+(7b)+(7c) =				0.0000 / (5) = 0.0000 (8)
Pressure test					Yes
Measured/design AP50					3.0000
Infiltration rate					0.1500 (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) =				0.1275 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.3000	4.2000	4.2000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000 (22)
Wind factor	1.0750	1.0500	1.0500	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750 (22a)
Adj infilt rate	0.1371	0.1339	0.1339	0.1243	0.1275	0.1084	0.1052	0.1052	0.1084	0.1211	0.1211	0.1243 (22b)
Mechanical extract ventilation - centralised												0.5000 (23a)
If mechanical ventilation:												0.5000 (23a)
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Window (Uw = 1.35)			8.5900	1.2808	11.0024		(27)
GF			61.0200	0.1300	7.9326	75.0000	4576.5000 (28a)
Main	48.8200	8.5900	40.2300	0.1800	7.2414	92.0000	3701.1600 (29a)
Total net area of external elements Aum(A, m ²)			109.8400				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =			26.1764	(33)
Party Wall 1			30.0000	0.0000	0.0000	70.0000	2100.0000 (32)
Party Ceilings 1			60.0200			30.0000	1800.6000 (32b)
Internal Wall 1			121.4300			9.0000	1092.8700 (32c)

Heat capacity Cm = Sum(A x k)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K
Thermal bridges (User defined value 0.058 * total exposed area)
Total fabric heat loss
(28)...(30) + (32) + (32a)...(32e) = 13271.1300 (34)
217.4882 (35)
6.3707 (36)
(33) + (36) = 32.5471 (37)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	24.1639	24.1639	24.1639	24.1639	24.1639	24.1639	24.1639	24.1639	24.1639	24.1639	24.1639	24.1639 (38)
Heat transfer coeff	56.7110	56.7110	56.7110	56.7110	56.7110	56.7110	56.7110	56.7110	56.7110	56.7110	56.7110	56.7110 (39)
Average = Sum(39)m / 12 =												56.7110 (39)
HLP	0.9294	0.9294	0.9294	0.9294	0.9294	0.9294	0.9294	0.9294	0.9294	0.9294	0.9294	0.9294 (40)
HLP (average)												0.9294 (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												2.0103 (42)
Average daily hot water use (litres/day)												81.9452 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	90.1397	86.8619	83.5841	80.3063	77.0284	73.7506	73.7506	77.0284	80.3063	83.5841	86.8619	90.1397 (44)
Energy conte	133.6745	116.9126	120.6433	105.1798	100.9225	87.0884	80.7002	92.6047	93.7107	109.2108	119.2121	129.4566 (45)
Energy content (annual)												Total = Sum(45)m = 1289.3164 (45)
Distribution loss (46)m = 0.15 x (45)m	20.0512	17.5369	18.0965	15.7770	15.1384	13.0633	12.1050	13.8907	14.0566	16.3816	17.8818	19.4185 (46)

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Water storage loss:													
Store volume												150.0000 (47)	
a) If manufacturer declared loss factor is known (kWh/day):												1.1300 (48)	
Temperature factor from Table 2b												0.6000 (49)	
Enter (49) or (54) in (55)												0.6780 (55)	
Total storage loss													
	21.0180	18.9840	21.0180	20.3400	21.0180	20.3400	21.0180	20.3400	21.0180	20.3400	21.0180	21.0180 (56)	
If cylinder contains dedicated solar storage													
	21.0180	18.9840	21.0180	20.3400	21.0180	20.3400	21.0180	20.3400	21.0180	20.3400	21.0180 (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)		
Total heat required for water heating calculated for each month													
	154.6925	135.8966	141.6613	125.5198	121.9405	107.4284	101.7182	113.6227	114.0507	130.2288	139.5521	150.4746 (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 (63)		
								Solar input (sum of months) = Sum(63)m =					0.0000 (63)
Output from w/h													
	154.6925	135.8966	141.6613	125.5198	121.9405	107.4284	101.7182	113.6227	114.0507	130.2288	139.5521	150.4746 (64)	
								Total per year (kWh/year) = Sum(64)m =					1536.7864 (64)
												1537 (64)	
RHI water heating demand													
Heat gains from water heating, kWh/month													
	61.2612	54.0606	56.9283	51.2443	50.3711	45.2289	43.6472	47.6055	47.4308	53.1270	55.9100	59.8587 (65)	

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	120.6193	120.6193	120.6193	120.6193	120.6193	120.6193	120.6193	120.6193	120.6193	120.6193	120.6193	120.6193 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	41.9157	37.2291	30.2768	22.9215	17.1341	14.4653	15.6303	20.3168	27.2692	34.6245	40.4119	43.0807 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	261.9580	264.6763	257.8263	243.2434	224.8350	207.5338	195.9755	193.2572	200.1073	214.6902	233.0985	250.3997 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	49.0723	49.0723	49.0723	49.0723	49.0723	49.0723	49.0723	49.0723	49.0723	49.0723	49.0723	49.0723 (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)	-80.4129	-80.4129	-80.4129	-80.4129	-80.4129	-80.4129	-80.4129	-80.4129	-80.4129	-80.4129	-80.4129	-80.4129 (71)
Water heating gains (Table 5)	82.3403	80.4474	76.5165	71.1726	67.7031	62.8179	58.6656	63.9858	65.8761	71.4072	77.6528	80.4553 (72)
Total internal gains	475.4927	471.6316	453.8983	426.6161	398.9509	374.0957	359.5501	366.8386	382.5313	410.0006	440.4419	463.2144 (73)

[Jan					Area	Solar flux	g		FF	Access		Gains
					m2	Table 6a	Table 6b		Table 6c	factor		W
						W/m2	or		or	Table 6d		
Northeast					7.6900	9.9768	0.6700		0.7000	0.7700		24.9358 (75)
Southeast					0.9000	32.4665	0.6700		0.7000	0.7700		9.4970 (77)
Solar gains	34.4328	68.6775	121.7891	194.2639	248.1240	268.3232	245.9063	197.2499	149.1821	86.2613	43.9370	29.1381 (83)
Total gains	509.9255	540.3090	575.6874	620.8801	647.0749	642.4190	605.4565	564.0885	531.7134	496.2619	484.3789	492.3525 (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	65.0037	65.0037	65.0037	65.0037	65.0037	65.0037	65.0037	65.0037	65.0037	65.0037	65.0037	65.0037
alpha	5.3336	5.3336	5.3336	5.3336	5.3336	5.3336	5.3336	5.3336	5.3336	5.3336	5.3336	5.3336
util living area	0.9781	0.9674	0.9368	0.8479	0.6725	0.4635	0.3458	0.3905	0.6432	0.8821	0.9619	0.9821 (86)
MIT	20.3885	20.4718	20.6260	20.8112	20.9245	20.9552	20.9586	20.9579	20.9373	20.7978	20.5613	20.3503 (87)
Th 2	20.1426	20.1426	20.1426	20.1426	20.1426	20.1426	20.1426	20.1426	20.1426	20.1426	20.1426	20.1426 (88)
util rest of house	0.9724	0.9590	0.9207	0.8128	0.6130	0.3906	0.2661	0.3055	0.5667	0.8465	0.9506	0.9774 (89)
MIT 2	19.3431	19.4617	19.6777	19.9225	20.0533	20.0807	20.0827	20.0825	20.0675	19.9116	19.5909	19.2885 (90)
Living area fraction									fLA = Living area / (4) =			0.4012 (91)
MIT	19.7625	19.8669	20.0581	20.2790	20.4028	20.4316	20.4341	20.4337	20.4164	20.2672	19.9802	19.7145 (92)
Temperature adjustment												0.0000
adjusted MIT	19.7625	19.8669	20.0581	20.2790	20.4028	20.4316	20.4341	20.4337	20.4164	20.2672	19.9802	19.7145 (93)

[illegible]

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF HEAT DEMAND 09 Jan 2014

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF ENERGY RATINGS 09 Jan 2014

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

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	61.0200 (1b)	x 2.4000 (2b)	= 146.4480 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	61.0200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 146.4480 (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
Pressure test					0.0000 / (5) = 0.0000 (8)
Measured/design AP50					Yes
Infiltration rate					3.0000
Number of sides sheltered					0.1500 (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) = 0.1275 (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	0.1626	0.1594	0.1562	0.1403	0.1371	0.1211	0.1211	0.1179	0.1275	0.1371	0.1434	0.1498 (22b)
Mechanical extract ventilation - centralised												0.5000 (23a)
If mechanical ventilation:												0.5000 (23a)
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Window (Uw = 1.35)			8.5900	1.2808	11.0024		(27)
GF			61.0200	0.1300	7.9326	75.0000	4576.5000 (28a)
Main	48.8200	8.5900	40.2300	0.1800	7.2414	92.0000	3701.1600 (29a)
Total net area of external elements Aum(A, m ²)			109.8400				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 26.1764		(33)
Party Wall 1			30.0000	0.0000	0.0000	70.0000	2100.0000 (32)
Party Ceilings 1			60.0200			30.0000	1800.6000 (32b)
Internal Wall 1			121.4300			9.0000	1092.8700 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) = 13271.1300 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K	217.4882 (35)
Thermal bridges (User defined value 0.058 * total exposed area)	6.3707 (36)
Total fabric heat loss	(33) + (36) = 32.5471 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	
(38)m	Jan 24.1639 Feb 24.1639 Mar 24.1639 Apr 24.1639 May 24.1639 Jun 24.1639 Jul 24.1639 Aug 24.1639 Sep 24.1639 Oct 24.1639 Nov 24.1639 Dec 24.1639 (38)
Heat transfer coeff	Jan 56.7110 Feb 56.7110 Mar 56.7110 Apr 56.7110 May 56.7110 Jun 56.7110 Jul 56.7110 Aug 56.7110 Sep 56.7110 Oct 56.7110 Nov 56.7110 Dec 56.7110 (39)
Average = Sum(39)m / 12 =	56.7110 (39)
HLP	Jan 0.9294 Feb 0.9294 Mar 0.9294 Apr 0.9294 May 0.9294 Jun 0.9294 Jul 0.9294 Aug 0.9294 Sep 0.9294 Oct 0.9294 Nov 0.9294 Dec 0.9294 (40)
HLP (average)	0.9294 (40)
Days in month	Jan 31 Feb 28 Mar 31 Apr 30 May 31 Jun 30 Jul 31 Aug 31 Sep 30 Oct 31 Nov 30 Dec 31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.0103 (42)
Average daily hot water use (litres/day)												81.9452 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	90.1397	86.8619	83.5841	80.3063	77.0284	73.7506	73.7506	77.0284	80.3063	83.5841	86.8619	90.1397 (44)
Energy conte	133.6745	116.9126	120.6433	105.1798	100.9225	87.0884	80.7002	92.6047	93.7107	109.2108	119.2121	129.4566 (45)
Energy content (annual)	Total = Sum(45)m =											1289.3164 (45)
Distribution loss (46)m = 0.15 x (45)m												
	20.0512	17.5369	18.0965	15.7770	15.1384	13.0633	12.1050	13.8907	14.0566	16.3816	17.8818	19.4185 (46)

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FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF ENERGY RATINGS 09 Jan 2014

8c. Space cooling requirement

Not applicable

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												100.0000	(206)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
Space heating requirement												1311.8400	(211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	275.9683	213.3941	165.2384	77.5714	22.7833	0.0000	0.0000	0.0000	0.0000	79.8132	186.3374	290.7339	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	275.9683	213.3941	165.2384	77.5714	22.7833	0.0000	0.0000	0.0000	0.0000	79.8132	186.3374	290.7339	(211)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	154.6925	135.8966	141.6613	125.5198	121.9405	107.4284	101.7182	113.6227	114.0507	130.2288	139.5521	150.4746	(64)
Efficiency of water heater	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	(216)
(217)m	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	(217)
Fuel for water heating, kWh/month	154.6925	135.8966	141.6613	125.5198	121.9405	107.4284	101.7182	113.6227	114.0507	130.2288	139.5521	150.4746	(219)
Water heating fuel used												1536.7864	(219)
Annual totals kWh/year													
Space heating fuel - main system												1311.8400	(211)
Space heating fuel - secondary												0.0000	(215)
Electricity for pumps and fans:													
(MEVCentralised, Database: in-use factor = 1.3000, SFP = 0.4160)													
mechanical ventilation fans (SFP = 0.4160)												74.3253	(230a)
Total electricity for the above, kWh/year												74.3253	(231)
Electricity for lighting (calculated in Appendix L)												296.0977	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
Total delivered energy for all uses												3219.0493	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1 (0.00*15.29 + 1.00*5.50)	1311.8400	5.5000	72.1512 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (electric off-peak tariff)			
High-rate fraction			0.0993 (243)
Low-rate fraction			0.9007 (244)
High-rate cost	152.6495	15.2900	23.3401 (245)
Low-rate cost	1384.1369	5.5000	76.1275 (246)
Mechanical ventilation fans (0.71*15.29 + 0.29*5.50)	74.3253	12.4509	9.2542 (249)
Pumps and fans for heating (0.90*15.29 + 0.10*5.50)	0.0000	0.0000	0.0000 (249)
Energy for lighting (0.90*15.29 + 0.10*5.50)	296.0977	14.3110	42.3745 (250)
Additional standing charges			24.0000 (251)
Energy saving/generation technologies			
PV Unit (0.90*43.39 + 0.10*12.14)	0.0000	13.7505	0.0000 (252)
Total energy cost			247.2475 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):	0.4200 (256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] = 0.9795 (257)
SAP value	86.3363
SAP rating (Section 12)	86 (258)
SAP band	B

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1311.8400	0.5190	680.8450 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating	1536.7864	0.5190	797.5921 (264)
Space and water heating			1478.4371 (265)
Pumps and fans	74.3253	0.5190	38.5748 (267)
Energy for lighting	296.0977	0.5190	153.6747 (268)
Energy saving/generation technologies			
PV Unit (0.90*43.39 + 0.10*12.14)	-488.0000	0.5190	-253.2720 (269)
Total kg/year			1417.4146 (272)
CO2 emissions per m2			23.2300 (273)
EI value			82.0851
EI rating			82 (274)
EI band			B

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF ENERGY RATINGS 09 Jan 2014

Calculation of stars for heating and DHW

Main heating energy efficiency	$5.50 \times (1 + 0.29 \times 0.20) / 1.0000 = 5.819$, stars = 3
Main heating environmental impact	$0.519 \times (1 + 0.29 \times 0.20) / 1.0000 = 0.5491$, stars = 2
Water heating energy efficiency	$6.47 / 1.0000 = 6.472$, stars = 3
Water heating environmental impact	$0.519 / 1.0000 = 0.5190$, stars = 2

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

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

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

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	61.0200 (1b)	x 2.4000 (2b)	= 146.4480 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	61.0200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 146.4480 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					0 * 10 = 0.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(7a)+(7b)+(7c) =				0.0000 / (5) = 0.0000 (8)
Pressure test					Yes
Measured/design AP50					3.0000
Infiltration rate					0.1500 (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) =				0.1275 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.3000	4.2000	4.2000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000 (22)
Wind factor	1.0750	1.0500	1.0500	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750 (22a)
Adj infilt rate	0.1371	0.1339	0.1339	0.1243	0.1275	0.1084	0.1052	0.1052	0.1084	0.1211	0.1211	0.1243 (22b)
Mechanical extract ventilation - centralised												0.5000 (23a)
If mechanical ventilation:												0.5000 (23a)
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Window (Uw = 1.35)			8.5900	1.2808	11.0024		(27)
GF			61.0200	0.1300	7.9326	75.0000	4576.5000 (28a)
Main	48.8200	8.5900	40.2300	0.1800	7.2414	92.0000	3701.1600 (29a)
Total net area of external elements Aum(A, m ²)			109.8400				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =			26.1764	(33)
Party Wall 1			30.0000	0.0000	0.0000	70.0000	2100.0000 (32)
Party Ceilings 1			60.0200			30.0000	1800.6000 (32b)
Internal Wall 1			121.4300			9.0000	1092.8700 (32c)
Heat capacity Cm = Sum(A x k)			(28)...(30) + (32) + (32a)...(32e) =			13271.1300	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K						217.4882	(35)
Thermal bridges (User defined value 0.058 * total exposed area)						6.3707	(36)
Total fabric heat loss			(33) + (36) =			32.5471	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	24.1639	24.1639	24.1639	24.1639	24.1639	24.1639	24.1639	24.1639	24.1639	24.1639	24.1639	24.1639 (38)
Heat transfer coeff	56.7110	56.7110	56.7110	56.7110	56.7110	56.7110	56.7110	56.7110	56.7110	56.7110	56.7110	56.7110 (39)
Average = Sum(39)m / 12 =												56.7110 (39)
HLP	0.9294	0.9294	0.9294	0.9294	0.9294	0.9294	0.9294	0.9294	0.9294	0.9294	0.9294	0.9294 (40)
HLP (average)												0.9294 (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												2.0103 (42)
Average daily hot water use (litres/day)												81.9452 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
90.1397	86.8619	83.5841	80.3063	77.0284	73.7506	73.7506	77.0284	80.3063	83.5841	86.8619	90.1397	(44)
Energy conte	133.6745	116.9126	120.6433	105.1798	100.9225	87.0884	80.7002	92.6047	93.7107	109.2108	119.2121	129.4566 (45)
Energy content (annual)												Total = Sum(45)m = 1289.3164 (45)
Distribution loss (46)m = 0.15 x (45)m	20.0512	17.5369	18.0965	15.7770	15.1384	13.0633	12.1050	13.8907	14.0566	16.3816	17.8818	19.4185 (46)

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Water storage loss:													
Store volume												150.0000 (47)	
a) If manufacturer declared loss factor is known (kWh/day):												1.1300 (48)	
Temperature factor from Table 2b												0.6000 (49)	
Enter (49) or (54) in (55)												0.6780 (55)	
Total storage loss													
	21.0180	18.9840	21.0180	20.3400	21.0180	20.3400	21.0180	21.0180	20.3400	21.0180	20.3400	21.0180	(56)
If cylinder contains dedicated solar storage													
	21.0180	18.9840	21.0180	20.3400	21.0180	20.3400	21.0180	21.0180	20.3400	21.0180	20.3400	21.0180	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Total heat required for water heating calculated for each month													
	154.6925	135.8966	141.6613	125.5198	121.9405	107.4284	101.7182	113.6227	114.0507	130.2288	139.5521	150.4746	(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													
	154.6925	135.8966	141.6613	125.5198	121.9405	107.4284	101.7182	113.6227	114.0507	130.2288	139.5521	150.4746	(64)
Total per year (kWh/year) = Sum (64)m =												1536.7864 (64)	
Heat gains from water heating, kWh/month													
	61.2612	54.0606	56.9283	51.2443	50.3711	45.2289	43.6472	47.6055	47.4308	53.1270	55.9100	59.8587	(65)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9693	0.9559	0.9189	0.8188	0.6317	0.4154	0.2933	0.3345	0.5919	0.8522	0.9481	0.9745 (94)
Useful gains	494.2814	516.4669	529.0205	508.3756	408.7397	266.8412	177.5554	188.6878	314.7339	422.9220	459.2470	479.8046 (95)
Ext temp.	5.2000	5.8000	7.4000	9.9000	12.9000	15.7000	17.3000	17.1000	14.7000	11.3000	7.9000	5.0000 (96)
Heat loss rate W												
	825.8535	797.7506	717.8544	588.6049	425.4922	268.3318	177.7374	189.0573	324.1836	508.5371	685.0809	834.4723 (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												
	246.6896	189.0227	140.4924	57.7651	12.4638	0.0000	0.0000	0.0000	0.0000	63.6976	162.6005	263.8728 (98)
Space heating												1136.6044 (98)
Space heating per m2												18.6268 (99)
										(98) / (4) =		

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

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

8c. Space cooling requirement

Not applicable

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												100.0000	(206)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
Space heating requirement												1136.6044	(211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	246.6896	189.0227	140.4924	57.7651	12.4638	0.0000	0.0000	0.0000	0.0000	63.6976	162.6005	263.8728	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	246.6896	189.0227	140.4924	57.7651	12.4638	0.0000	0.0000	0.0000	0.0000	63.6976	162.6005	263.8728	(211)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	154.6925	135.8966	141.6613	125.5198	121.9405	107.4284	101.7182	113.6227	114.0507	130.2288	139.5521	150.4746	(64)
Efficiency of water heater												100.0000	(216)
(217)m	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	(217)
Fuel for water heating, kWh/month	154.6925	135.8966	141.6613	125.5198	121.9405	107.4284	101.7182	113.6227	114.0507	130.2288	139.5521	150.4746	(219)
Water heating fuel used												1536.7864	(219)
Annual totals kWh/year													
Space heating fuel - main system												1136.6044	(211)
Space heating fuel - secondary												0.0000	(215)
Electricity for pumps and fans:													
(MEV)Centralised, Database: in-use factor = 1.3000, SFP = 0.4160)													
mechanical ventilation fans (SFP = 0.4160)												74.3253	(230a)
Total electricity for the above, kWh/year												74.3253	(231)
Electricity for lighting (calculated in Appendix L)												296.0977	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
Total delivered energy for all uses												3043.8137	(238)

10a. Fuel costs - using BEDF prices (513)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1 (0.00*43.39 + 1.00*12.14)	1136.6044	12.1400	137.9838	(240)
Space heating - secondary	0.0000	0.0000	0.0000	(242)
Water heating (electric off-peak tariff)				
High-rate fraction			0.0993	(243)
Low-rate fraction			0.9007	(244)
High-rate cost	152.6495	43.3900	66.2346	(245)
Low-rate cost	1384.1369	12.1400	168.0342	(246)
Mechanical ventilation fans (0.71*43.39 + 0.29*12.14)	74.3253	34.3275	25.5140	(249)
Pumps and fans for heating (0.90*43.39 + 0.10*12.14)	0.0000	0.0000	0.0000	(249)
Energy for lighting (0.90*43.39 + 0.10*12.14)	296.0977	40.2650	119.2237	(250)
Additional standing charges			0.0000	(251)
Energy saving/generation technologies				
PV Unit (0.90*43.39 + 0.10*12.14)	0.0000	38.5575	0.0000	(252)
Total energy cost			516.9903	(255)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1136.6044	0.5190	589.8977	(261)
Space heating - secondary	0.0000	0.0000	0.0000	(263)
Water heating	1536.7864	0.5190	797.5921	(264)
Space and water heating			1387.4898	(265)
Pumps and fans	74.3253	0.5190	38.5748	(267)
Energy for lighting	296.0977	0.5190	153.6747	(268)
Energy saving/generation technologies				
PV Unit (0.90*43.39 + 0.10*12.14)	-488.0000	0.5190	-253.2720	(269)
Total kg/year			1326.4673	(272)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1136.6044	3.0700	3489.3756	(261)
Space heating - secondary	0.0000	0.0000	0.0000	(263)
Water heating	1536.7864	3.0700	4717.9341	(264)
Space and water heating			8207.3097	(265)
Pumps and fans	74.3253	3.0700	228.1786	(267)
Energy for lighting	296.0977	3.0700	909.0198	(268)
Energy saving/generation technologies				

FULL SAP CALCULATION PRINTOUT

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

PV Unit $(0.90 \times 43.39 + 0.10 \times 12.14)$ -488.0000 3.0700 -1498.1600 (269)
Primary energy kWh/year 7846.3482 (272)
Primary energy kWh/m²/year 128.5865 (273)

SAP 2012 EPC IMPROVEMENTS

Current energy efficiency rating: B 86
Current environmental impact rating: B 82

(For testing purposes):

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

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

Recommended measures	Typical annual savings	Energy efficiency	Environmental impact
(none)			
	Total Savings £0		0.00 kg/m ²

Potential energy efficiency rating: B 86
Potential environmental impact rating: B 82

Fuel prices for cost data on this page from database revision number 513 TEST (28 Feb 2023)
Recommendation texts revision number 4.9c (22 Feb 2014)

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

	Current	Potential	Saving
Electricity	£517	£517	£0
Space heating	£163	£163	£0
Water heating	£234	£234	£0
Lighting	£119	£119	£0
Total cost of fuels	£517	£517	£0
Total cost of uses	£516	£516	£0
Delivered energy	50 kWh/m ²	50 kWh/m ²	0 kWh/m ²
Carbon dioxide emissions	1.3 tonnes	1.3 tonnes	0.0 tonnes
CO2 emissions per m ²	22 kg/m ²	22 kg/m ²	0 kg/m ²
Primary energy	129 kWh/m ²	129 kWh/m ²	0 kWh/m ²

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF ENERGY RATINGS FOR IMPROVED DWELLING 09 Jan 2014

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

No improvements selected / applicable

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

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

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

No improvements selected / applicable

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

Overheating Calculation Input Data

Dwelling type	EndTerrace Flat
Number of storeys	1
Cross ventilation possible	No
SAP Region	West Pennines
Front of dwelling faces	North East
Overshading	Average or unknown
Thermal mass parameter	217.5 (calculated from construction elements)
Night ventilation	No
Ventilation rate during hot weather (ach)	4.00 (Windows fully open)

Overheating Calculation

Summer ventilation heat loss coefficient	193.31 (P1)
Transmission heat loss coefficient	32.55 (37)
Summer heat loss coefficient	225.86 (P2)

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

Solar shading	Z blinds	Solar access	Z overhangs	Z summer
Orientation				
North East	1.000	0.90	1.000	0.900 (P8)
South East	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 East	7.6900	89.6552	0.6700	0.7000	0.9000	261.9145
South East	0.9000	112.1012	0.6700	0.7000	0.9000	38.3275
total:						300.2420

Solar gains	Jun	Jul	Aug	
	330	300	240	(P3)
Internal gains	374	360	367	
Total summer gains	704	660	607	(P5)
Summer gain/loss ratio	3.12	2.92	2.69	(P6)
Summer external temperature	14.70	16.40	16.30	
Thermal mass temperature increment (TMP = 217.5)	0.48	0.48	0.48	
Threshold temperature	18.29	19.80	19.46	(P7)
Likelihood of high internal temperature	Not significant	Not significant	Not significant	
Assessment of likelihood of high internal temperature:	Not significant			