



SAP Report Submission for Building Regulations Compliance

Client: Foreman Homes

Project: 14 Shaw Crescent, West End
SOUTHAMPTON, SO30 3LH

Contact: Tobias Whiting
Abacus Energy (UK) Ltd
toby@abacusenergyuk.com

Report Issue Date: 07/01/2025

EXCELLENCE
IN ENERGY
ASSESSMENT

BUILDING REGULATION COMPLIANCE

Calculation Type: New Build (As Built)

Property Reference	SAP 0943 Plot 20			Issued on Date	07/01/2025
Assessment Reference	As Built	Prop Type Ref	Type F		
Property	14 Shaw Crescent, West End, SOUTHAMPTON, SO30 3LH				
SAP Rating	88 B	DER	12.67	TER	17.90
Environmental	90 B	% DER<TER	29.20		
CO ₂ Emissions (t/year)	0.74	DFEE	44.10	TFEE	50.95
General Requirements Compliance	Pass	% DFEE<TFEE	13.43		
Assessor Details	Mr. Tobias Whiting, Abacus Energy (UK) Ltd, Tel: 07798936079, toby@abacusenergyuk.com			Assessor ID	E477-0001
Client	Foreman Homes, FORE				

SUMMARY FOR INPUT DATA FOR New Build (As Built)

Criterion 1 – Achieving the TER and TFEE rate

1a TER and DER

Fuel for main heating	Mains gas		
Fuel factor	1.00 (mains gas)		
Target Carbon Dioxide Emission Rate (TER)	17.90	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	12.67	kgCO ₂ /m ²	Pass
	-5.23 (-29.2%)	kgCO ₂ /m ²	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	50.95	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	44.10	kWh/m ² /yr	
	-6.8 (-13.4%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.24 (max. 0.30)	0.24 (max. 0.70)	Pass
Party wall	0.00 (max. 0.20)	-	Pass
Floor	0.12 (max. 0.25)	0.12 (max. 0.70)	Pass
Roof	0.10 (max. 0.20)	0.10 (max. 0.35)	Pass
Openings	1.19 (max. 2.00)	1.20 (max. 3.30)	Pass

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	3.71 (measured in this dwelling)	m ³ /(h.m ²) @ 50 Pa	
Maximum	10.0	m ³ /(h.m ²) @ 50 Pa	Pass

Limiting System Efficiencies

4 Heating efficiency

This report has been produced by an accredited Elmhurst member whose work is subject to quality assurance audits. The data used to produce the report has been verified by the Elmhurst members' portal.

BUILDING REGULATION COMPLIANCE

Calculation Type: New Build (As Built)

Main heating system

Boiler system with radiators or underfloor - Mains gas
Data from database
Vaillant ecoFIT sustain 835 VUW 356/6-3 (H-GB)
Combi boiler
Efficiency: 89.3% SEDBUK2009
Minimum: 88.0%

Pass

Secondary heating system

None

5 Cylinder insulation

Hot water storage

No cylinder

6 Controls

Space heating controls

Programmer, room thermostat and TRVs

Pass

Hot water controls

No cylinder

Boiler interlock

Yes

Pass

7 Low energy lights

Percentage of fixed lights with low-energy fittings

100 %

Minimum

75 %

Pass

8 Mechanical ventilation

Continuous extract system

Specific fan power

0.17

Maximum

0.7

Pass

Criterion 3 – Limiting the effects of heat gains in summer

9 Summertime temperature

Overheating risk (Southern England)

Slight

Pass

Based on:

Overshading

Average

Windows facing North

5.80 m², No overhang

Windows facing South

7.82 m², No overhang

Windows facing West

1.91 m², No overhang

Air change rate

4.00 ach

Blinds/curtains

None

Criterion 4 – Building performance consistent with DER and DFEE rate

Party Walls

Type

U-value

Filled Cavity with Edge Sealing

0.00

W/m²K

Pass

Air permeability and pressure testing

3 Air permeability

Air permeability at 50 pascals

3.71 (measured in this dwelling) m³/(h.m²) @ 50 Pa

Maximum

10.0 m³/(h.m²) @ 50 Pa

Pass

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BUILDING REGULATION COMPLIANCE

Calculation Type: New Build (As Built)

10 Key features

Party wall U-value	0.00	W/m ² K
Roof U-value	0.10	W/m ² K
Floor U-value	0.12	W/m ² K
Door U-value	1.10	W/m ² K
Air permeability	3.7	m ³ /m ² h
Photovoltaic array	0.82	kW

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THERMAL BRIDGING

Calculation Type: New Build (As Built)

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Environmental	90 B	% DER<TER	29.20		
CO ₂ Emissions (t/year)	0.74	DFEE	44.10	TFEE	50.95
General Requirements Compliance	Pass	% DFEE<TFEE	13.43		
Assessor Details	Mr. Tobias Whiting, Abacus Energy (UK) Ltd, Tel: 07798936079, toby@abacusenergyuk.com			Assessor ID	E477-0001
Client	Foreman Homes, FORE				

	Junction detail	Source Type	Psi (W/mK)	Length (m)	Result	Reference
External wall	E2 Other lintels (including other steel lintels)	Independently assessed	0.071	2.84	0.20	Birtley Supatherm
External wall	E2 Other lintels (including other steel lintels)	Independently assessed	0.064	8.74	0.56	Birtley Supatherm
External wall	E2 Other lintels (including other steel lintels)	Independently assessed	0.067	1.59	0.11	Birtley Supatherm
External wall	E3 Sill	Independently assessed	0.021	10.55	0.22	Knauf P5
External wall	E4 Jamb	Independently assessed	0.016	29.10	0.47	Knauf P6
External wall	E5 Ground floor (normal)	Table K1 - Default	0.320	20.08	6.43	
External wall	E6 Intermediate floor within a dwelling	Independently assessed	0.000	20.08	0.00	CD0029
External wall	E10 Eaves (insulation at ceiling level)	Table K1 - Approved	0.060	14.16	0.85	
External wall	E12 Gable (insulation at ceiling level)	Independently assessed	0.044	6.02	0.26	Knauf P21
External wall	E16 Corner (normal)	Independently assessed	0.039	10.00	0.39	Knauf P23
External wall	E18 Party wall between dwellings	Independently assessed	0.036	10.00	0.36	Knauf P25 Halved
Party wall	P1 Party wall - Ground floor	Table K1 - Default	0.160	6.02	0.96	
Party wall	P2 Party wall - Intermediate floor within a dwelling	Table K1 - Default	0.000	6.02	0.00	
Party wall	P4 Party wall - Roof (insulation at ceiling level)	Independently assessed	0.035	6.02	0.21	Knauf P29 Halved

Total: **11.02** W/mK:
Y-Value: **0.060** W/m²K:

FULL SAP CALCULATION PRINTOUT

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

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DWELLING AS BUILT

Semi-Detached House, total floor area 85 m²

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

1a TER and DER

Fuel for main heating:Mains gas

Fuel factor:1.00 (mains gas)

Target Carbon Dioxide Emission Rate (TER) 17.90 kgCO₂/m²

Dwelling Carbon Dioxide Emission Rate (DER) 12.67 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 50.9 kWh/m²/yr

Dwelling Fabric Energy Efficiency (DFEE) 44.1 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.24 (max. 0.30)	0.24 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.12 (max. 0.25)	0.12 (max. 0.70)	OK
Roof	0.10 (max. 0.20)	0.10 (max. 0.35)	OK
Openings	1.19 (max. 2.00)	1.20 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals:	3.71 (measured in this dwelling)	
Maximum	10.0	OK

4 Heating efficiency

Main heating system: Boiler system with radiators or underfloor - Mains gas

Data from database

Vaillant ecoFIT sustain 835 VUW 356/6-3 (H-GB)

Combi boiler

Efficiency: 89.3% SEDBUK2009

Minimum: 88.0% OK

Secondary heating system:

None

5 Cylinder insulation

Hot water storage No cylinder

6 Controls

Space heating controls: Programmer, room thermostat and TRVs OK

Hot water controls:

No cylinder

Boiler interlock

Yes

OK

7 Low energy lights

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

Minimum 75% OK

8 Mechanical ventilation

Continuous extract system

Specific fan power: 0.17

Maximum 0.7 OK

9 Summertime temperature

Overheating risk (Southern England): Slight OK

Based on:

Overshading: Average

Windows facing North: 5.80 m², No overhang

Windows facing South: 7.82 m², No overhang

Windows facing West: 1.91 m², No overhang

Air change rate: 4.00 ach

Blinds/curtains: None

10 Key features

Party wall U-value 0.00 W/m²K

Roof U-value 0.10 W/m²K

Floor U-value 0.12 W/m²K

Door U-value 1.10 W/m²K

Air permeability 3.7 m³/m²h

Photovoltaic array 0.82 kW

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

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	42.3500 (1b)	x 2.3900 (2b)	= 101.2165 (1b) - (3b)
First floor	42.3500 (1c)	x 2.6100 (2c)	= 110.5335 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	84.7000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 211.7500 (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					3.7100
Infiltration rate					0.1855 (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) =	0.1577 (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	0.2010	0.1971	0.1932	0.1734	0.1695	0.1498	0.1498	0.1458	0.1577	0.1695	0.1774	0.1853 (22b)
Mechanical extract ventilation - centralised												
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 m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K					
Front Door			2.1500	1.1000	2.3650		(26)					
Windows (Uw = 1.20)			15.5300	1.1450	17.7824		(27)					
Ground Floor			42.3500	0.1200	5.0820	84.0000	3557.4000 (28a)					
Brick and Block	100.4000	17.6800	82.7200	0.2400	19.8528	42.2200	3492.4384 (29a)					
Pitched Roof	42.3500		42.3500	0.1000	4.2350	9.1000	385.3850 (30)					
Total net area of external elements Aum(A, m2)			185.1000				(31)					
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =	49.3172			(33)					
Party Wall 1			29.9500	0.0000	0.0000	110.0000	3294.5000 (32)					
Ground Floor Block			28.7600			75.0000	2157.0000 (32c)					
Ground Floor Stud			47.0300			9.0000	423.2700 (32c)					
First Floor Stud			103.6500			9.0000	932.8500 (32c)					
Internal Floor 1			42.3500			18.0000	762.3000 (32d)					
Internal Ceiling 1			42.3500			18.0000	762.3000 (32e)					
Heat capacity Cm = Sum(A x k)				(28) ... (30) + (32) + (32a) ... (32e) =	15767.4434		(34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							186.1564 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							11.0187 (36)					
Total fabric heat loss				(33) + (36) =	60.3359		(37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	34.9388	34.9388	34.9388	34.9388	34.9388	34.9388	34.9388	34.9388	34.9388	34.9388	34.9388	34.9388 (38)
Average = Sum(39)m / 12 =	95.2747	95.2747	95.2747	95.2747	95.2747	95.2747	95.2747	95.2747	95.2747	95.2747	95.2747	95.2747 (39)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.1248	1.1248	1.1248	1.1248	1.1248	1.1248	1.1248	1.1248	1.1248	1.1248	1.1248	1.1248 (40)
HLP (average)												1.1248 (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												2.5460 (42)
Average daily hot water use (litres/day)												94.6679 (43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	

FULL SAP CALCULATION PRINTOUT

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CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Daily hot water use	104.1347	100.3480	96.5613	92.7746	88.9878	85.2011	85.2011	88.9878	92.7746	96.5613	100.3480	104.1347 (44)
Energy conte	154.4288	135.0644	139.3744	121.5099	116.5917	100.6098	93.2297	106.9825	108.2602	126.1668	137.7209	149.5560 (45)
Energy content (annual)										Total = Sum (45)m =		1489.4950 (45)
Distribution loss (46)m = 0.15 x (45)m	23.1643	20.2597	20.9062	18.2265	17.4888	15.0915	13.9845	16.0474	16.2390	18.9250	20.6581	22.4334 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	0.6706	0.6070	0.6056	0.5073	0.4669	0.3857	0.3574	0.4284	0.4520	0.5482	0.6189	0.6495 (61)
Total heat required for water heating calculated for each month	155.0994	135.6714	139.9800	122.0172	117.0586	100.9955	93.5872	107.4109	108.7122	126.7150	138.3399	150.2055 (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	155.0994	135.6714	139.9800	122.0172	117.0586	100.9955	93.5872	107.4109	108.7122	126.7150	138.3399	150.2055 (64)
Heat gains from water heating, kWh/month	51.5152	45.0607	46.4934	40.5289	38.8835	33.5492	31.0882	35.6788	36.1095	42.0875	45.9469	49.8897 (65)
										Total per year (kWh/year) = Sum (64)m =		1495.7926 (64)

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	127.3009	127.3009	127.3009	127.3009	127.3009	127.3009	127.3009	127.3009	127.3009	127.3009	127.3009	127.3009 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	20.7901	18.4656	15.0172	11.3690	8.4985	7.1748	7.7526	10.0771	13.5255	17.1737	20.0442	21.3679 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	228.9828	231.3589	225.3711	212.6239	196.5328	181.4095	171.3061	168.9300	174.9178	187.6650	203.7561	218.8794 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.7301	35.7301	35.7301	35.7301	35.7301	35.7301	35.7301	35.7301	35.7301	35.7301	35.7301	35.7301 (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)	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407 (71)
Water heating gains (Table 5)	69.2409	67.0545	62.4911	56.2901	52.2627	46.5961	41.7853	47.9553	50.1521	56.5692	63.8152	67.0561 (72)
Total internal gains	383.2040	381.0693	367.0697	344.4733	321.4843	299.3706	285.0343	291.1527	302.7856	325.5982	351.8058	371.4937 (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				5.8000	10.6334	0.6300	0.7000			0.7700	18.8483 (74)	
South				7.8200	46.7521	0.6300	0.7000			0.7700	111.7325 (78)	
West				1.9100	19.6403	0.6300	0.7000			0.7700	11.4644 (80)	
Solar gains	142.0452	241.4359	331.2362	415.6282	472.9820	473.5536	454.8421	410.9685	360.0418	266.8593	169.9876	121.6878 (83)
Total gains	525.2492	622.5052	698.3059	760.1015	794.4662	772.9242	739.8763	702.1212	662.8274	592.4575	521.7934	493.1815 (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	45.9707	45.9707	45.9707	45.9707	45.9707	45.9707	45.9707	45.9707	45.9707	45.9707	45.9707	45.9707
alpha	4.0647	4.0647	4.0647	4.0647	4.0647	4.0647	4.0647	4.0647	4.0647	4.0647	4.0647	4.0647
util living area	0.9926	0.9846	0.9681	0.9287	0.8437	0.6980	0.5407	0.5862	0.7992	0.9463	0.9861	0.9942 (86)
MIT	19.5052	19.7131	20.0143	20.3755	20.6986	20.9019	20.9733	20.9627	20.8217	20.3989	19.8685	19.4486 (87)
Th 2	19.9806	19.9806	19.9806	19.9806	19.9806	19.9806	19.9806	19.9806	19.9806	19.9806	19.9806	19.9806 (88)
util rest of house	0.9907	0.9808	0.9598	0.9091	0.7997	0.6151	0.4268	0.4722	0.7300	0.9276	0.9820	0.9927 (89)
MIT 2	18.6202	18.8261	19.1225	19.4710	19.7660	19.9286	19.9718	19.9672	19.8739	19.4997	18.9818	18.5639 (90)
Living area fraction									fLA = Living area / (4) =			0.2288 (91)
MIT	18.8227	19.0290	19.3266	19.6780	19.9794	20.1513	20.2010	20.1950	20.0907	19.7054	19.1847	18.7663 (92)
Temperature adjustment												0.0000
adjusted MIT	18.8227	19.0290	19.3266	19.6780	19.9794	20.1513	20.2010	20.1950	20.0907	19.7054	19.1847	18.7663 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9878	0.9761	0.9532	0.9022	0.7997	0.6301	0.4525	0.4975	0.7385	0.9213	0.9777	0.9903 (94)
Ext temp.	518.8460	607.6481	665.6112	685.7621	635.3196	487.0505	334.8176	349.3267	489.4840	545.8336	510.1471	488.4143 (95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Month fracti	1383.6441	1346.1396	1222.0451	1026.8685	788.8159	528.9008	343.0798	361.5657	570.7649	867.5156	1151.3646	1387.8000 (97)
Space heating kWh	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000 (97a)
Space heating	643.4098	496.2663	413.9869	245.5966	114.2013	0.0000	0.0000	0.0000	0.0000	239.3314	461.6766	669.1430 (98)
Space heating per m2												3283.6118 (98)
										(98) / (4) =		38.7676 (99)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 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 %)													90.2000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													3640.3678 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	643.4098	496.2663	413.9869	245.5966	114.2013	0.0000	0.0000	0.0000	0.0000	239.3314	461.6766	669.1430	(98)
Space heating efficiency (main heating system 1)	90.2000	90.2000	90.2000	90.2000	90.2000	0.0000	0.0000	0.0000	0.0000	90.2000	90.2000	90.2000	(210)
Space heating fuel (main heating system)	713.3146	550.1844	458.9655	272.2800	126.6090	0.0000	0.0000	0.0000	0.0000	265.3341	511.8366	741.8437	(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	155.0994	135.6714	139.9800	122.0172	117.0586	100.9955	93.5872	107.4109	108.7122	126.7150	138.3399	150.2055	(64)
Efficiency of water heater	87.1426	86.8327	86.2628	85.0981	82.6439	76.4000	76.4000	76.4000	76.4000	84.8918	86.5937	76.4000	(216)
Fuel for water heating, kWh/month	177.9834	156.2446	162.2716	143.3842	141.6422	132.1931	122.4963	140.5902	142.2934	149.2664	159.7573	172.0391	(219)
Water heating fuel used												1800.1618	(219)
Annual totals kWh/year													
Space heating fuel - main system												3640.3678	(211)
Space heating fuel - secondary												0.0000	(215)
Electricity for pumps and fans:													
(MEV)Centralised, Database: in-use factor = 1.4000, SFP = 0.2380)													
mechanical ventilation fans (SFP = 0.2380)													61.4837 (230a)
central heating pump													30.0000 (230c)
main heating flue fan													45.0000 (230e)
Total electricity for the above, kWh/year													136.4837 (231)
Electricity for lighting (calculated in Appendix L)													367.1600 (232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV Unit 0 (0.80 * 0.82 * 1068 * 1.00) =													-700.6542 (233)
Total delivered energy for all uses													5243.5191 (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	3640.3678	0.2160	786.3195 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1800.1618	0.2160	388.8349 (264)
Space and water heating			1175.1544 (265)
Pumps and fans	136.4837	0.5190	70.8351 (267)
Energy for lighting	367.1600	0.5190	190.5560 (268)
Energy saving/generation technologies			
PV Unit	-700.6542	0.5190	-363.6395 (269)
Total CO2, kg/year			1072.9059 (272)
Dwelling Carbon Dioxide Emission Rate (DER)			12.6700 (273)

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

DER			12.6700 ZC1
Total Floor Area		TFA	84.7000
Assumed number of occupants		N	2.5460
CO2 emission factor in Table 12 for electricity displaced from grid		EF	0.5190
CO2 emissions from appliances, equation (L14)			16.0201 ZC2
CO2 emissions from cooking, equation (L16)			2.1264 ZC3
Total CO2 emissions			30.8165 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			30.8165 ZC8

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF TARGET EMISSIONS 09 Jan 2014

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

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	42.3500 (1b)	x 2.3900 (2b)	= 101.2165 (1b) - (3b)
First floor	42.3500 (1c)	x 2.6100 (2c)	= 110.5335 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	84.7000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 211.7500 (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) = 0.1417 (8)
Pressure test					Yes
Measured/design AP50					5.0000
Infiltration rate					0.3917 (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) =	0.3329 (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	0.4245	0.4162	0.4078	0.3662	0.3579	0.3163	0.3163	0.3080	0.3329	0.3579	0.3745	0.3912 (22b)
Effective ac	0.5901	0.5866	0.5832	0.5671	0.5640	0.5500	0.5500	0.5474	0.5554	0.5640	0.5701	0.5765 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
TER Opaque door			2.1500	1.0000	2.1500		(26)
TER Opening Type (Uw = 1.40)			15.5300	1.3258	20.5890		(27)
Ground Floor			42.3500	0.1300	5.5055		(28a)
Brick and Block	100.4000	17.6800	82.7200	0.1800	14.8896		(29a)
Pitched Roof	42.3500		42.3500	0.1300	5.5055		(30)
Total net area of external elements Aum(A, m ²)			185.1000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	48.6396		(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)							9.7686 (36)
Total fabric heat loss						(33) + (36) =	58.4082 (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	41.2341	40.9897	40.7500	39.6246	39.4140	38.4338	38.4338	38.2522	38.8113	39.4140	39.8400	40.2853 (38)
Heat transfer coeff	99.6423	99.3979	99.1583	98.0328	97.8222	96.8420	96.8420	96.6604	97.2195	97.8222	98.2482	98.6935 (39)
Average = Sum(39)m / 12 =												98.0318 (39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1764	1.1735	1.1707	1.1574	1.1549	1.1434	1.1434	1.1412	1.1478	1.1549	1.1600	1.1652 (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												2.5460 (42)
Average daily hot water use (litres/day)												94.6679 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	104.1347	100.3480	96.5613	92.7746	88.9878	85.2011	85.2011	88.9878	92.7746	96.5613	100.3480	104.1347 (44)
Energy conte	154.4288	135.0644	139.3744	121.5099	116.5917	100.6098	93.2297	106.9825	108.2602	126.1668	137.7209	149.5560 (45)
Energy content (annual)										Total = Sum(45)m =		1489.4950 (45)
Distribution loss (46)m = 0.15 x (45)m												
23.1643	20.2597	20.9062	18.2265	17.4888	15.0915	13.9845	16.0474	16.2390	18.9250	20.6581	22.4334 (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												

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF TARGET EMISSIONS 09 Jan 2014

Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Total heat required for water heating calculated for each month	50.9589	46.0274	49.2066	45.7518	45.3472	42.0170	43.4176	45.3472	45.7518	49.2066	49.3151	50.9589 (61)
Solar input	205.3877	181.0918	188.5809	167.2618	161.9389	142.6267	136.6473	152.3297	154.0120	175.3734	187.0360	200.5149 (62)
	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	205.3877	181.0918	188.5809	167.2618	161.9389	142.6267	136.6473	152.3297	154.0120	175.3734	187.0360	200.5149 (64)
Heat gains from water heating, kWh/month	64.0873	56.4158	58.6436	51.8400	50.1035	43.9570	41.8533	46.9085	47.4345	54.2521	58.1210	62.4671 (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	127.3009	127.3009	127.3009	127.3009	127.3009	127.3009	127.3009	127.3009	127.3009	127.3009	127.3009	127.3009	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	20.7901	18.4656	15.0172	11.3690	8.4985	7.1748	7.7526	10.0771	13.5255	17.1737	20.0442	21.3679	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	228.9828	231.3589	225.3711	212.6239	196.5328	181.4095	171.3061	168.9300	174.9178	187.6650	203.7561	218.8794	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.7301	35.7301	35.7301	35.7301	35.7301	35.7301	35.7301	35.7301	35.7301	35.7301	35.7301	35.7301	(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)	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	(71)
Water heating gains (Table 5)	86.1388	83.9520	78.8221	72.0000	67.3435	61.0514	56.2544	63.0490	65.8812	72.9195	80.7236	83.9612	(72)
Total internal gains	400.1020	397.9668	383.4007	360.1832	336.5650	313.8259	299.5034	306.2464	318.5147	341.9485	368.7142	388.3988	(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				5.8000	10.6334	0.6300	0.7000		0.7700		18.8483 (74)	
South				7.8200	46.7521	0.6300	0.7000		0.7700		111.7325 (78)	
West				1.9100	19.6403	0.6300	0.7000		0.7700		11.4644 (80)	
Solar gains	142.0452	241.4359	331.2362	415.6282	472.9820	473.5536	454.8421	410.9685	360.0418	266.8593	169.9876	121.6878 (83)
Total gains	542.1472	639.4026	714.6369	775.8114	809.5470	787.3795	754.3455	717.2149	678.5565	608.8077	538.7018	510.0866 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Thl (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	59.0306	59.1758	59.3188	59.9998	60.1289	60.7376	60.7376	60.8516	60.5017	60.1289	59.8682	59.5981	
alpha	4.9354	4.9451	4.9546	5.0000	5.0086	5.0492	5.0492	5.0568	5.0334	5.0086	4.9912	4.9732	
util living area	0.9973	0.9935	0.9840	0.9551	0.8782	0.7217	0.5507	0.5977	0.8294	0.9678	0.9941	0.9980	(86)
MIT	19.7604	19.9345	20.1885	20.5070	20.7798	20.9428	20.9881	20.9823	20.8802	20.5257	20.0812	19.7295	(87)
Th 2	19.9389	19.9412	19.9435	19.9542	19.9562	19.9656	19.9656	19.9673	19.9620	19.9562	19.9522	19.9479	(88)
util rest of house	0.9964	0.9914	0.9783	0.9383	0.8326	0.6300	0.4285	0.4745	0.7541	0.9524	0.9918	0.9974	(89)
MIT 2	18.2935	18.5486	18.9180	19.3772	19.7394	19.9272	19.9612	19.9601	19.8674	19.4120	18.7713	18.2548	(90)
Living area fraction									fLA = Living area / (4) =			0.2288	(91)
MIT	18.6291	18.8657	19.2087	19.6357	19.9775	20.1596	20.1962	20.1940	20.0991	19.6669	19.0711	18.5922	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.6291	18.8657	19.2087	19.6357	19.9775	20.1596	20.1962	20.1940	20.0991	19.6669	19.0711	18.5922	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	539.3122	631.8657	695.3604	722.9439	674.8871	510.6390	344.4394	360.5902	519.3703	576.4350	532.7202	508.0754	(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	1427.7852	1388.1641	1260.1698	1052.4540	809.7189	538.4043	348.2605	366.7253	583.2312	886.9401	1176.1346	1420.4166	(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	661.0240	508.2326	420.2182	237.2473	100.3148	0.0000	0.0000	0.0000	0.0000	231.0158	463.2584	678.7818	(98)
Space heating												3300.0929	(98)
Space heating per m2												38.9621	(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 %)													93.4000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													3533.2900 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	661.0240	508.2326	420.2182	237.2473	100.3148	0.0000	0.0000	0.0000	0.0000	231.0158	463.2584	678.7818	(98)
Space heating efficiency (main heating system 1)	93.4000	93.4000	93.4000	93.4000	93.4000	0.0000	0.0000	0.0000	0.0000	93.4000	93.4000	93.4000	(210)
Space heating fuel (main heating system)	707.7344	544.1462	449.9125	254.0121	107.4035	0.0000	0.0000	0.0000	0.0000	247.3402	495.9940	726.7472	(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	205.3877	181.0918	188.5809	167.2618	161.9389	142.6267	136.6473	152.3297	154.0120	175.3734	187.0360	200.5149	(64)
Efficiency of water heater (217)m	87.7826	87.5084	87.0100	85.9309	83.8849	80.3000	80.3000	80.3000	80.3000	85.7458	87.2439	80.3000	(216)
Fuel for water heating, kWh/month	233.9730	206.9421	216.7348	194.6469	193.0489	177.6174	170.1710	189.7008	191.7958	204.5270	214.3830	228.1706	(219)
Water heating fuel used												2421.7110	(219)
Annual totals kWh/year													
Space heating fuel - main system												3533.2900	(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)												367.1600	(232)
Total delivered energy for all uses												6397.1610	(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	3533.2900	0.2160	763.1906 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2421.7110	0.2160	523.0896 (264)
Space and water heating			1286.2802 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	367.1600	0.5190	190.5560 (268)
Total CO2, kg/m2/year			1515.7612 (272)
Emissions per m2 for space and water heating			15.1863 (272a)
Fuel factor (mains gas)			1.0000
Emissions per m2 for lighting			2.2498 (272b)
Emissions per m2 for pumps and fans			0.4596 (272c)
Target Carbon Dioxide Emission Rate (TER) = (15.1863 * 1.00) + 2.2498 + 0.4596, rounded to 2 d.p.			17.9000 (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	42.3500 (1b)	x 2.3900 (2b)	= 101.2165 (1b) - (3b)
First floor	42.3500 (1c)	x 2.6100 (2c)	= 110.5335 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	84.7000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 211.7500 (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) = 0.1417 (8)
Pressure test					Yes
Measured/design AP50					3.7100
Infiltration rate					0.3272 (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) =	0.2781 (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	0.3546	0.3476	0.3407	0.3059	0.2990	0.2642	0.2642	0.2572	0.2781	0.2990	0.3129	0.3268 (22b)
Effective ac	0.5629	0.5604	0.5580	0.5468	0.5447	0.5349	0.5349	0.5331	0.5387	0.5447	0.5489	0.5534 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Front Door			2.1500	1.1000	2.3650		(26)
Windows (Uw = 1.20)			15.5300	1.1450	17.7824		(27)
Ground Floor			42.3500	0.1200	5.0820	84.0000	3557.4000 (28a)
Brick and Block	100.4000	17.6800	82.7200	0.2400	19.8528	42.2200	3492.4384 (29a)
Pitched Roof	42.3500		42.3500	0.1000	4.2350	9.1000	385.3850 (30)
Total net area of external elements Aum(A, m ²)			185.1000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	49.3172		(33)
Party Wall 1			29.9500	0.0000	0.0000	110.0000	3294.5000 (32)
Ground Floor Block			28.7600			75.0000	2157.0000 (32c)
Ground Floor Stud			47.0300			9.0000	423.2700 (32c)
First Floor Stud			103.6500			9.0000	932.8500 (32c)
Internal Floor 1			42.3500			18.0000	762.3000 (32d)
Internal Ceiling 1			42.3500			9.0000	381.1500 (32e)

Heat capacity Cm = Sum(A x k)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K
Thermal bridges (Sum(L x Psi) calculated using Appendix K)
Total fabric heat loss
(28)...(30) + (32) + (32a)...(32e) = 15386.2934 (34)
181.6564 (35)
11.0187 (36)
(33) + (36) = 60.3359 (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	39.3314	39.1609	38.9937	38.2084	38.0614	37.3774	37.3774	37.2508	37.6409	38.0614	38.3587	38.6694 (38)
Heat transfer coeff	99.6673	99.4968	99.3296	98.5443	98.3973	97.7133	97.7133	97.5867	97.9768	98.3973	98.6946	99.0053 (39)
Average = Sum(39)m / 12 =												98.5436 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.1767	1.1747	1.1727	1.1635	1.1617	1.1536	1.1536	1.1521	1.1568	1.1617	1.1652	1.1689 (40)
HLP (average)												1.1634 (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)
2.5460 (42)
94.6679 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	104.1347	100.3480	96.5613	92.7746	88.9878	85.2011	85.2011	88.9878	92.7746	96.5613	100.3480	104.1347 (44)
Energy conte	154.4288	135.0644	139.3744	121.5099	116.5917	100.6098	93.2297	106.9825	108.2602	126.1668	137.7209	149.5560 (45)

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Energy content (annual)	Total = Sum(45)m = 1489.4950 (45)											
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Heat gains from water heating, kWh/month	32.8161	28.7012	29.6171	25.8209	24.7757	21.3796	19.8113	22.7338	23.0053	26.8104	29.2657	31.7807 (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	127.3009	127.3009	127.3009	127.3009	127.3009	127.3009	127.3009	127.3009	127.3009	127.3009	127.3009	127.3009	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	20.7901	18.4656	15.0172	11.3690	8.4985	7.1748	7.7526	10.0771	13.5255	17.1737	20.0442	21.3679	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	228.9828	231.3589	225.3711	212.6239	196.5328	181.4095	171.3061	168.9300	174.9178	187.6650	203.7561	218.8794	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.7301	35.7301	35.7301	35.7301	35.7301	35.7301	35.7301	35.7301	35.7301	35.7301	35.7301	35.7301	(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)	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	(71)
Water heating gains (Table 5)	44.1077	42.7101	39.8079	35.8623	33.3007	29.6939	26.6281	30.5562	31.9518	36.0355	40.6468	42.7159	(72)
Total internal gains	355.0708	353.7248	341.3865	321.0455	299.5223	279.4684	266.8771	270.7535	281.5853	302.0645	325.6374	344.1536	(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				5.8000	10.6334	0.6300	0.7000		0.7700		18.8483 (74)	
South				7.8200	46.7521	0.6300	0.7000		0.7700		111.7325 (78)	
West				1.9100	19.6403	0.6300	0.7000		0.7700		11.4644 (80)	
Solar gains	142.0452	241.4359	331.2362	415.6282	472.9820	473.5536	454.8421	410.9685	360.0418	266.8593	169.9876	121.6878 (83)
Total gains	497.1160	595.1607	672.6227	736.6737	772.5043	753.0220	721.7192	681.7220	641.6271	568.9238	495.6250	465.8414 (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	42.8824	42.9559	43.0282	43.3711	43.4358	43.7399	43.7399	43.7967	43.6223	43.4358	43.3050	43.1691	
alpha	3.8588	3.8637	3.8685	3.8914	3.8957	3.9160	3.9160	3.9198	3.9082	3.8957	3.8870	3.8779	
util living area	0.9934	0.9862	0.9713	0.9352	0.8571	0.7169	0.5613	0.6083	0.8165	0.9522	0.9877	0.9948	(86)
MIT	19.3544	19.5725	19.8927	20.2901	20.6431	20.8791	20.9649	20.9517	20.7851	20.3206	19.7564	19.3102	(87)
Th 2	19.9387	19.9403	19.9419	19.9494	19.9507	19.9573	19.9573	19.9585	19.9548	19.9507	19.9479	19.9450	(88)
util rest of house	0.9917	0.9827	0.9637	0.9170	0.8150	0.6339	0.4430	0.4910	0.7494	0.9352	0.9840	0.9935	(89)
MIT 2	18.4406	18.6582	18.9753	19.3666	19.6937	19.8920	19.9455	19.9407	19.8237	19.4034	18.8481	18.4014	(90)
Living area fraction	18.6497	18.8674	19.1852	19.5779	19.9109	20.1179	20.1787	20.1720	20.0437	19.6132	19.0559	18.6094	(91)
MIT	18.6497	18.8674	19.1852	19.5779	19.9109	20.1179	20.1787	20.1720	20.0437	19.6132	19.0559	18.6094	(92)
Temperature adjustment	18.6497	18.8674	19.1852	19.5779	19.9109	20.1179	20.1787	20.1720	20.0437	19.6132	19.0559	18.6094	(93)
adjusted MIT	18.6497	18.8674	19.1852	19.5779	19.9109	20.1179	20.1787	20.1720	20.0437	19.6132	19.0559	18.6094	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	491.5877	582.1009	643.6036	669.8144	628.1874	487.8483	338.8246	352.2094	485.0544	528.1032	485.6124	461.7349	(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	1430.1914	1389.7129	1260.0158	1052.2420	807.9312	539.1717	349.6913	368.0998	582.3456	886.8778	1179.9810	1426.6030	(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	698.3212	542.7153	458.6107	275.3479	133.7294	0.0000	0.0000	0.0000	0.0000	266.9283	499.9454	717.8619	(98)
Space heating												3593.4600	(98)
Space heating per m2												42.4257	(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	918.5054	723.0787	741.6588	0.0000	0.0000	0.0000	0.0000	(100)

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Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8199	0.8851	0.8630	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	753.0686	640.0272	640.0403	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	975.6379	937.0664	891.9785	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												
Space cooling	0.0000	0.0000	0.0000	0.0000	0.0000	160.2499	220.9972	187.4420	0.0000	0.0000	0.0000	0.0000 (104)
Space cooling												568.6891 (104)
Cooled fraction									FC = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)												
Intermittency factor	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												
Space cooling	0.0000	0.0000	0.0000	0.0000	0.0000	40.0625	55.2493	46.8605	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling												142.1723 (107)
Space cooling per m2												1.6785 (108)
Energy for space heating												42.4257 (99)
Energy for space cooling												1.6785 (108)
Total												44.1043 (109)
Dwelling Fabric Energy Efficiency (DFEE)												44.1 (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	42.3500 (1b)	x 2.3900 (2b)	= 101.2165 (1b) - (3b)
First floor	42.3500 (1c)	x 2.6100 (2c)	= 110.5335 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	84.7000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 211.7500 (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) = 0.1417 (8)
Pressure test					Yes
Measured/design AP50					5.0000
Infiltration rate					0.3917 (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) =	0.3329 (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	0.4245	0.4162	0.4078	0.3662	0.3579	0.3163	0.3163	0.3080	0.3329	0.3579	0.3745	0.3912 (22b)
Effective ac	0.5901	0.5866	0.5832	0.5671	0.5640	0.5500	0.5500	0.5474	0.5554	0.5640	0.5701	0.5765 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
TER Opaque door			2.1500	1.0000	2.1500		(26)
TER Opening Type (Uw = 1.40)			15.5300	1.3258	20.5890		(27)
Ground Floor			42.3500	0.1300	5.5055		(28a)
Brick and Block	100.4000	17.6800	82.7200	0.1800	14.8896		(29a)
Pitched Roof	42.3500		42.3500	0.1300	5.5055		(30)
Total net area of external elements Aum(A, m ²)			185.1000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	48.6396		(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)							9.7686 (36)
Total fabric heat loss						(33) + (36) =	58.4082 (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	41.2341	40.9897	40.7500	39.6246	39.4140	38.4338	38.4338	38.2522	38.8113	39.4140	39.8400	40.2853 (38)
Heat transfer coeff	99.6423	99.3979	99.1583	98.0328	97.8222	96.8420	96.8420	96.6604	97.2195	97.8222	98.2482	98.6935 (39)
Average = Sum(39)m / 12 =												98.0318 (39)
HLP	1.1764	1.1735	1.1707	1.1574	1.1549	1.1434	1.1434	1.1412	1.1478	1.1549	1.1600	1.1652 (40)
HLP (average)												1.1574 (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												2.5460 (42)
Average daily hot water use (litres/day)												94.6679 (43)
Daily hot water use	104.1347	100.3480	96.5613	92.7746	88.9878	85.2011	85.2011	88.9878	92.7746	96.5613	100.3480	104.1347 (44)
Energy conte	154.4288	135.0644	139.3744	121.5099	116.5917	100.6098	93.2297	106.9825	108.2602	126.1668	137.7209	149.5560 (45)
Energy content (annual)										Total = Sum(45)m =		1489.4950 (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												

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Calculation Type: New Build (As Built)

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 (57)
Heat gains from water heating, kWh/month	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)
	32.8161	28.7012	29.6171	25.8209	24.7757	21.3796	19.8113	22.7338	23.0053	26.8104	29.2657	31.7807 (65)

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

Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	127.3009	127.3009	127.3009	127.3009	127.3009	127.3009	127.3009	127.3009	127.3009	127.3009	127.3009	127.3009 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	20.7901	18.4656	15.0172	11.3690	8.4985	7.1748	7.7526	10.0771	13.5255	17.1737	20.0442	21.3679 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	228.9828	231.3589	225.3711	212.6239	196.5328	181.4095	171.3061	168.9300	174.9178	187.6650	203.7561	218.8794 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.7301	35.7301	35.7301	35.7301	35.7301	35.7301	35.7301	35.7301	35.7301	35.7301	35.7301	35.7301 (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)	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407 (71)
Water heating gains (Table 5)	44.1077	42.7101	39.8079	35.8623	33.3007	29.6939	26.6281	30.5562	31.9518	36.0355	40.6468	42.7159 (72)
Total internal gains	355.0708	353.7248	341.3865	321.0455	299.5223	279.4684	266.8771	270.7535	281.5853	302.0645	325.6374	344.1536 (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				5.8000	10.6334		0.6300		0.7000		0.7700	18.8483 (74)
South				7.8200	46.7521		0.6300		0.7000		0.7700	111.7325 (78)
West				1.9100	19.6403		0.6300		0.7000		0.7700	11.4644 (80)

Solar gains	142.0452	241.4359	331.2362	415.6282	472.9820	473.5536	454.8421	410.9685	360.0418	266.8593	169.9876	121.6878 (83)
Total gains	497.1160	595.1607	672.6227	736.6737	772.5043	753.0220	721.7192	681.7220	641.6271	568.9238	495.6250	465.8414 (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	59.0306	59.1758	59.3188	59.9998	60.1289	60.7376	60.7376	60.8516	60.5017	60.1289	59.8682	59.5981
alpha	4.9354	4.9451	4.9546	5.0000	5.0086	5.0492	5.0492	5.0568	5.0334	5.0086	4.9912	4.9732
util living area	0.9982	0.9953	0.9875	0.9629	0.8937	0.7443	0.5728	0.6240	0.8522	0.9753	0.9959	0.9987 (86)
MIT	19.7113	19.8871	20.1455	20.4719	20.7570	20.9342	20.9859	20.9786	20.8625	20.4876	20.0348	19.6810 (87)
Th 2	19.9389	19.9412	19.9435	19.9542	19.9562	19.9656	19.9656	19.9673	19.9620	19.9562	19.9522	19.9479 (88)
util rest of house	0.9976	0.9936	0.9830	0.9484	0.8515	0.6533	0.4471	0.4977	0.7812	0.9629	0.9943	0.9982 (89)
MIT 2	18.7666	18.9435	19.2014	19.5279	19.7903	19.9349	19.9620	19.9612	19.8858	19.5492	19.1000	18.7436 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	18.9827	19.1594	19.4174	19.7439	20.0115	20.1635	20.1962	20.1940	20.1093	19.7639	19.3139	18.9581 (92)
Temperature adjustment	0.0000											
adjusted MIT	18.9827	19.1594	19.4174	19.7439	20.0115	20.1635	20.1962	20.1940	20.1093	19.7639	19.3139	18.9581 (93)

8. Space heating requirement												

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9968	0.9920	0.9800	0.9448	0.8541	0.6722	0.4762	0.5269	0.7929	0.9599	0.9929	0.9977 (94)
Useful gains	495.5194	590.4060	659.1990	696.0282	659.8265	506.2093	343.6623	359.1823	508.7190	546.1218	492.0835	464.7469 (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	1463.0222	1417.3546	1280.8650	1063.0589	813.0447	538.7817	348.2677	366.7284	584.2197	896.4335	1199.9952	1456.5258 (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	719.8221	555.7094	462.5195	264.2620	113.9943	0.0000	0.0000	0.0000	0.0000	260.6320	509.6965	737.8835 (98)
Space heating												3624.5193 (98)
Space heating per m2	(98) / (4) =											42.7924 (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	910.3145	716.6306	734.6193	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8622	0.9243	0.9044	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	784.8780	662.4025	664.3680	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	975.6379	937.0664	891.9785	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	137.3472	204.3500	169.3422	0.0000	0.0000	0.0000	0.0000 (104)
Space cooling												511.0393 (104)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

Cooled fraction											FC = cooled area / (4) =	1.0000 (105)
Intermittency factor (Table 10b)	0.0000	0.0000	0.0000	0.0000	0.0000	0.2500	0.2500	0.2500	0.0000	0.0000	0.0000	0.0000 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	34.3368	51.0875	42.3355	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling												127.7598 (107)
Space cooling per m2												1.5084 (108)
Energy for space heating												42.7924 (99)
Energy for space cooling												1.5084 (108)
Total												44.3008 (109)
Target Fabric Energy Efficiency (TFEE)												50.9 (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	42.3500 (1b)	x 2.3900 (2b)	= 101.2165 (1b) - (3b)
First floor	42.3500 (1c)	x 2.6100 (2c)	= 110.5335 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	84.7000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 211.7500 (5)

2. Ventilation rate

					main heating	secondary heating	other		total	m3 per hour		
Number of chimneys					0	+	0	+	0	=	0 * 40 =	0.0000 (6a)
Number of open flues					0	+	0	+	0	=	0 * 20 =	0.0000 (6b)
Number of intermittent fans											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												3.7100
Infiltration rate												0.1855 (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) =	0.1577 (21)
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	4.7000	4.4000	4.4000	4.0000	4.1000	3.9000	3.9000	3.8000	3.8000	4.1000	4.0000	4.1000 (22)
Wind factor	1.1750	1.1000	1.1000	1.0000	1.0250	0.9750	0.9750	0.9500	0.9500	1.0250	1.0000	1.0250 (22a)
Adj infilt rate	0.1853	0.1734	0.1734	0.1577	0.1616	0.1537	0.1537	0.1498	0.1498	0.1616	0.1577	0.1616 (22b)
Mechanical extract ventilation - centralised												
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 m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K					
Front Door			2.1500	1.1000	2.3650		(26)					
Windows (Uw = 1.20)			15.5300	1.1450	17.7824		(27)					
Ground Floor			42.3500	0.1200	5.0820	84.0000	3557.4000 (28a)					
Brick and Block	100.4000	17.6800	82.7200	0.2400	19.8528	42.2200	3492.4384 (29a)					
Pitched Roof	42.3500		42.3500	0.1000	4.2350	9.1000	385.3850 (30)					
Total net area of external elements Aum(A, m2)			185.1000				(31)					
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =	49.3172			(33)					
Party Wall 1			29.9500	0.0000	0.0000	110.0000	3294.5000 (32)					
Ground Floor Block			28.7600			75.0000	2157.0000 (32c)					
Ground Floor Stud			47.0300			9.0000	423.2700 (32c)					
First Floor Stud			103.6500			9.0000	932.8500 (32c)					
Internal Floor 1			42.3500			18.0000	762.3000 (32d)					
Internal Ceiling 1			42.3500			18.0000	762.3000 (32e)					
Heat capacity Cm = Sum(A x k)				(28) ... (30) + (32) + (32a) ... (32e) =	15767.4434		(34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							186.1564 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							11.0187 (36)					
Total fabric heat loss				(33) + (36) =	60.3359		(37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 34.9388	Feb 34.9388	Mar 34.9388	Apr 34.9388	May 34.9388	Jun 34.9388	Jul 34.9388	Aug 34.9388	Sep 34.9388	Oct 34.9388	Nov 34.9388	Dec 34.9388 (38)
Heat transfer coeff	95.2747	95.2747	95.2747	95.2747	95.2747	95.2747	95.2747	95.2747	95.2747	95.2747	95.2747	95.2747 (39)
Average = Sum(39)m / 12 =												95.2747 (39)
HLP	Jan 1.1248	Feb 1.1248	Mar 1.1248	Apr 1.1248	May 1.1248	Jun 1.1248	Jul 1.1248	Aug 1.1248	Sep 1.1248	Oct 1.1248	Nov 1.1248	Dec 1.1248 (40)
HLP (average)												1.1248 (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												2.5460 (42)
Average daily hot water use (litres/day)												94.6679 (43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF HEAT DEMAND 09 Jan 2014

Daily hot water use	104.1347	100.3480	96.5613	92.7746	88.9878	85.2011	85.2011	88.9878	92.7746	96.5613	100.3480	104.1347 (44)
Energy conte	154.4288	135.0644	139.3744	121.5099	116.5917	100.6098	93.2297	106.9825	108.2602	126.1668	137.7209	149.5560 (45)
Energy content (annual)										Total =	Sum (45)m =	1489.4950 (45)
Distribution loss (46)m = 0.15 x (45)m	23.1643	20.2597	20.9062	18.2265	17.4888	15.0915	13.9845	16.0474	16.2390	18.9250	20.6581	22.4334 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	0.6706	0.6070	0.6056	0.5073	0.4669	0.3857	0.3574	0.4284	0.4520	0.5482	0.6189	0.6495 (61)
Total heat required for water heating calculated for each month	155.0994	135.6714	139.9800	122.0172	117.0586	100.9955	93.5872	107.4109	108.7122	126.7150	138.3399	150.2055 (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	155.0994	135.6714	139.9800	122.0172	117.0586	100.9955	93.5872	107.4109	108.7122	126.7150	138.3399	150.2055 (64)
RHI water heating demand												1496 (64)
Heat gains from water heating, kWh/month	51.5152	45.0607	46.4934	40.5289	38.8835	33.5492	31.0882	35.6788	36.1095	42.0875	45.9469	49.8897 (65)

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

Metabolic gains (Table 5), Watts												
(66)m	152.7611	152.7611	152.7611	152.7611	152.7611	152.7611	152.7611	152.7611	152.7611	152.7611	152.7611	152.7611 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	51.9753	46.1640	37.5431	28.4225	21.2462	17.9369	19.3815	25.1928	33.8137	42.9342	50.1106	53.4198 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	341.7653	345.3118	336.3748	317.3491	293.3326	270.7604	255.6808	252.1344	261.0713	280.0970	304.1136	326.6857 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	52.8221	52.8221	52.8221	52.8221	52.8221	52.8221	52.8221	52.8221	52.8221	52.8221	52.8221	52.8221 (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)	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407 (71)
Water heating gains (Table 5)	69.2409	67.0545	62.4911	56.2901	52.2627	46.5961	41.7853	47.9553	50.1521	56.5692	63.8152	67.0561 (72)
Total internal gains	569.7240	565.2728	543.1515	508.8042	473.5839	442.0359	423.5900	432.0249	451.7796	486.3430	524.7818	553.9042 (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				5.8000	13.4684	0.6300	0.7000		0.7700	23.8735 (74)		
South				7.8200	56.5862	0.6300	0.7000		0.7700	135.2350 (78)		
West				1.9100	25.1733	0.6300	0.7000		0.7700	14.6942 (80)		
Solar gains	173.8027	251.5840	352.6872	447.7284	482.8499	536.5366	494.4986	463.5373	402.4065	300.3373	207.3195	140.9583 (83)
Total gains	743.5267	816.8568	895.8387	956.5326	956.4338	978.5725	918.0886	895.5623	854.1860	786.6803	732.1014	694.8624 (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)												
tau	45.9707	45.9707	45.9707	45.9707	45.9707	45.9707	45.9707	45.9707	45.9707	45.9707	45.9707	45.9707
alpha	4.0647	4.0647	4.0647	4.0647	4.0647	4.0647	4.0647	4.0647	4.0647	4.0647	4.0647	4.0647
util living area	0.9678	0.9531	0.9152	0.8341	0.6969	0.4816	0.3396	0.3376	0.5865	0.8314	0.9403	0.9736 (86)
MIT	19.9554	20.0910	20.3617	20.6637	20.8796	20.9796	20.9963	20.9965	20.9545	20.7291	20.3112	19.9085 (87)
Th 2	19.9806	19.9806	19.9806	19.9806	19.9806	19.9806	19.9806	19.9806	19.9806	19.9806	19.9806	19.9806 (88)
util rest of house	0.9601	0.9421	0.8954	0.7961	0.6309	0.3916	0.2362	0.2315	0.4940	0.7834	0.9238	0.9670 (89)
MIT 2	19.0636	19.1947	19.4533	19.7292	19.9078	19.9728	19.9799	19.9800	19.9605	19.7926	19.4105	19.0184 (90)
Living area fraction									fLA = Living area / (4) =			0.2288 (91)
MIT	19.2676	19.3998	19.6611	19.9431	20.1301	20.2032	20.2125	20.2126	20.1879	20.0069	19.6166	19.2220 (92)
Temperature adjustment												0.0000
adjusted MIT	19.2676	19.3998	19.6611	19.9431	20.1301	20.2032	20.2125	20.2126	20.1879	20.0069	19.6166	19.2220 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	708.7959	763.3814	795.6957	760.0008	613.3190	402.9606	238.6249	229.1778	438.8426	617.3846	671.0434	667.6415 (95)
Ext temp.	5.6000	6.0000	7.6000	10.1000	13.1000	15.9000	17.7000	17.8000	15.4000	12.1000	8.6000	5.7000 (96)
Heat loss rate W	1302.1788	1276.6629	1149.1198	937.7941	669.7946	409.9840	239.3754	229.8575	456.1658	753.3259	1049.6004	1288.3076 (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	441.4769	344.9251	262.9476	128.0111	42.0178	0.0000	0.0000	0.0000	0.0000	101.1403	272.5611	461.7756 (98)
Space heating												2054.8555 (98)
RHI space heating demand												2055 (98)

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	42.3500 (1b)	x 2.3900 (2b)	= 101.2165 (1b) - (3b)
First floor	42.3500 (1c)	x 2.6100 (2c)	= 110.5335 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	84.7000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 211.7500 (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					3.7100
Infiltration rate					0.1855 (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) =		0.1577 (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	0.2010	0.1971	0.1932	0.1734	0.1695	0.1498	0.1498	0.1458	0.1577	0.1695	0.1774	0.1853 (22b)
Mechanical extract ventilation - centralised												
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 m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K					
Front Door			2.1500	1.1000	2.3650		(26)					
Windows (Uw = 1.20)			15.5300	1.1450	17.7824		(27)					
Ground Floor			42.3500	0.1200	5.0820	84.0000	3557.4000 (28a)					
Brick and Block	100.4000	17.6800	82.7200	0.2400	19.8528	42.2200	3492.4384 (29a)					
Pitched Roof	42.3500		42.3500	0.1000	4.2350	9.1000	385.3850 (30)					
Total net area of external elements Aum(A, m2)			185.1000				(31)					
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =	49.3172			(33)					
Party Wall 1			29.9500	0.0000	0.0000	110.0000	3294.5000 (32)					
Ground Floor Block			28.7600			75.0000	2157.0000 (32c)					
Ground Floor Stud			47.0300			9.0000	423.2700 (32c)					
First Floor Stud			103.6500			9.0000	932.8500 (32c)					
Internal Floor 1			42.3500			18.0000	762.3000 (32d)					
Internal Ceiling 1			42.3500			18.0000	762.3000 (32e)					
Heat capacity Cm = Sum(A x k)				(28) ... (30) + (32) + (32a) ... (32e) =	15767.4434		(34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							186.1564 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							11.0187 (36)					
Total fabric heat loss				(33) + (36) =	60.3359		(37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	34.9388	34.9388	34.9388	34.9388	34.9388	34.9388	34.9388	34.9388	34.9388	34.9388	34.9388	34.9388 (38)
Average = Sum(39)m / 12 =	95.2747	95.2747	95.2747	95.2747	95.2747	95.2747	95.2747	95.2747	95.2747	95.2747	95.2747	95.2747 (39)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.1248	1.1248	1.1248	1.1248	1.1248	1.1248	1.1248	1.1248	1.1248	1.1248	1.1248	1.1248 (40)
HLP (average)												1.1248 (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												2.5460 (42)
Average daily hot water use (litres/day)												94.6679 (43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF ENERGY RATINGS 09 Jan 2014

Daily hot water use	104.1347	100.3480	96.5613	92.7746	88.9878	85.2011	85.2011	88.9878	92.7746	96.5613	100.3480	104.1347 (44)
Energy conte	154.4288	135.0644	139.3744	121.5099	116.5917	100.6098	93.2297	106.9825	108.2602	126.1668	137.7209	149.5560 (45)
Energy content (annual)										Total = Sum (45)m =		1489.4950 (45)
Distribution loss (46)m = 0.15 x (45)m	23.1643	20.2597	20.9062	18.2265	17.4888	15.0915	13.9845	16.0474	16.2390	18.9250	20.6581	22.4334 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	0.6706	0.6070	0.6056	0.5073	0.4669	0.3857	0.3574	0.4284	0.4520	0.5482	0.6189	0.6495 (61)
Total heat required for water heating calculated for each month	155.0994	135.6714	139.9800	122.0172	117.0586	100.9955	93.5872	107.4109	108.7122	126.7150	138.3399	150.2055 (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	155.0994	135.6714	139.9800	122.0172	117.0586	100.9955	93.5872	107.4109	108.7122	126.7150	138.3399	150.2055 (64)
Heat gains from water heating, kWh/month	51.5152	45.0607	46.4934	40.5289	38.8835	33.5492	31.0882	35.6788	36.1095	42.0875	45.9469	49.8897 (65)
										Total per year (kWh/year) = Sum (64)m =		1495.7926 (64)

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	152.7611	152.7611	152.7611	152.7611	152.7611	152.7611	152.7611	152.7611	152.7611	152.7611	152.7611	152.7611 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	51.9753	46.1640	37.5431	28.4225	21.2462	17.9369	19.3815	25.1928	33.8137	42.9342	50.1106	53.4198 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	341.7653	345.3118	336.3748	317.3491	293.3326	270.7604	255.6808	252.1344	261.0713	280.0970	304.1136	326.6857 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	52.8221	52.8221	52.8221	52.8221	52.8221	52.8221	52.8221	52.8221	52.8221	52.8221	52.8221	52.8221 (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)	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407 (71)
Water heating gains (Table 5)	69.2409	67.0545	62.4911	56.2901	52.2627	46.5961	41.7853	47.9553	50.1521	56.5692	63.8152	67.0561 (72)
Total internal gains	569.7240	565.2728	543.1515	508.8042	473.5839	442.0359	423.5900	432.0249	451.7796	486.3430	524.7818	553.9042 (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				5.8000	10.6334	0.6300	0.7000	0.7700			18.8483 (74)	
South				7.8200	46.7521	0.6300	0.7000	0.7700			111.7325 (78)	
West				1.9100	19.6403	0.6300	0.7000	0.7700			11.4644 (80)	

Solar gains	142.0452	241.4359	331.2362	415.6282	472.9820	473.5536	454.8421	410.9685	360.0418	266.8593	169.9876	121.6878 (83)
Total gains	711.7691	806.7087	874.3876	924.4324	946.5659	915.5895	878.4321	842.9934	811.8213	753.2023	694.7695	675.5919 (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	45.9707	45.9707	45.9707	45.9707	45.9707	45.9707	45.9707	45.9707	45.9707	45.9707	45.9707	45.9707
alpha	4.0647	4.0647	4.0647	4.0647	4.0647	4.0647	4.0647	4.0647	4.0647	4.0647	4.0647	4.0647
util living area	0.9786	0.9638	0.9366	0.8800	0.7752	0.6171	0.4646	0.5018	0.7103	0.8952	0.9641	0.9824 (86)
MIT	19.7501	19.9431	20.2139	20.5259	20.7872	20.9375	20.9845	20.9786	20.8871	20.5576	20.0855	19.6909 (87)
Th 2	19.9806	19.9806	19.9806	19.9806	19.9806	19.9806	19.9806	19.9806	19.9806	19.9806	19.9806	19.9806 (88)
util rest of house	0.9737	0.9556	0.9220	0.8519	0.7236	0.5353	0.3627	0.3985	0.6342	0.8646	0.9545	0.9783 (89)
MIT 2	18.8614	19.0502	19.3124	19.6059	19.8353	19.9491	19.9757	19.9733	19.9172	19.6418	19.1925	18.8033 (90)
Living area fraction									fLA = Living area / (4) =			0.2288 (91)
MIT	19.0648	19.2545	19.5187	19.8164	20.0531	20.1752	20.2065	20.2034	20.1391	19.8513	19.3968	19.0064 (92)
Temperature adjustment												0.0000
adjusted MIT	19.0648	19.2545	19.5187	19.8164	20.0531	20.1752	20.2065	20.2034	20.1391	19.8513	19.3968	19.0064 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9680	0.9485	0.9142	0.8468	0.7276	0.5517	0.3859	0.4218	0.6470	0.8601	0.9476	0.9732 (94)
Ext temp.	688.9930	765.1297	799.3228	782.8134	688.7233	505.1379	338.9631	355.5910	525.2551	647.8498	658.3820	657.4996 (95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Month fracti	1406.7085	1367.6164	1240.3513	1040.0591	795.8379	531.1790	343.6124	362.3637	575.3733	881.4169	1171.5716	1410.6724 (97)
Space heating kWh	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000 (97a)
Space heating	533.9803	404.8711	328.1252	185.2169	79.6933	0.0000	0.0000	0.0000	0.0000	173.7740	369.4965	560.3605 (98)
Space heating per m2												2635.5178 (98)
										(98) / (4) =		31.1159 (99)

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 %)													90.2000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													2921.8601 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	533.9803	404.8711	328.1252	185.2169	79.6933	0.0000	0.0000	0.0000	0.0000	173.7740	369.4965	560.3605	(98)
Space heating efficiency (main heating system 1)	90.2000	90.2000	90.2000	90.2000	90.2000	0.0000	0.0000	0.0000	0.0000	90.2000	90.2000	90.2000	(210)
Space heating fuel (main heating system)	591.9959	448.8593	363.7752	205.3402	88.3518	0.0000	0.0000	0.0000	0.0000	192.6541	409.6414	621.2423	(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	155.0994	135.6714	139.9800	122.0172	117.0586	100.9955	93.5872	107.4109	108.7122	126.7150	138.3399	150.2055	(64)
Efficiency of water heater	86.6761	86.2880	85.5776	84.1625	81.4472	76.4000	76.4000	76.4000	76.4000	83.8157	85.9699	76.4000	(216)
Fuel for water heating, kWh/month	178.9414	157.2308	163.5708	144.9781	143.7232	132.1931	122.4963	140.5902	142.2934	151.1829	160.9167	172.8833	(219)
Water heating fuel used												1811.0002	(219)
Annual totals kWh/year													
Space heating fuel - main system												2921.8601	(211)
Space heating fuel - secondary												0.0000	(215)
Electricity for pumps and fans:													
(MEV)Centralised, Database: in-use factor = 1.4000, SFP = 0.2380)													
mechanical ventilation fans (SFP = 0.2380)													61.4837 (230a)
central heating pump													30.0000 (230c)
main heating flue fan													45.0000 (230e)
Total electricity for the above, kWh/year													136.4837 (231)
Electricity for lighting (calculated in Appendix L)													367.1600 (232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV Unit 0 (0.80 * 0.82 * 1068 * 1.00) =										-700.6542			-700.6542 (233)
Total delivered energy for all uses													4535.8497 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2921.8601	3.4800	101.6807 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1811.0002	3.4800	63.0228 (247)
Mechanical ventilation fans	61.4837	13.1900	8.1097 (249)
Pumps and fans for heating	75.0000	13.1900	9.8925 (249)
Energy for lighting	367.1600	13.1900	48.4284 (250)
Additional standing charges			120.0000 (251)
Energy saving/generation technologies			
PV Unit	-700.6542	13.1900	-92.4163 (252)
Total energy cost			258.7178 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	0.4200 (256)
SAP value		0.8378 (257)
SAP rating (Section 12)		88.3128
SAP band		88 (258)
		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	2921.8601	0.2160	631.1218 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1811.0002	0.2160	391.1760 (264)
Space and water heating			1022.2978 (265)
Pumps and fans	136.4837	0.5190	70.8351 (267)
Energy for lighting	367.1600	0.5190	190.5560 (268)
Energy saving/generation technologies			
PV Unit	-700.6542	0.5190	-363.6395 (269)
Total kg/year			920.0493 (272)
CO2 emissions per m2			10.8600 (273)
EI value			90.4945
EI rating			90 (274)

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EI band B

Calculation of stars for heating and DHW	

Main heating energy efficiency	$3.48 \times (1 + 0.29 \times 0.00) / 0.9020 = 3.858$, stars = 4
Main heating environmental impact	$0.216 \times (1 + 0.29 \times 0.00) / 0.9020 = 0.2395$, stars = 4
Water heating energy efficiency	$3.48 / 0.8220 = 4.233$, stars = 4
Water heating environmental impact	$0.216 / 0.8220 = 0.2628$, stars = 4

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

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

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

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	42.3500 (1b)	x 2.3900 (2b)	= 101.2165 (1b) - (3b)
First floor	42.3500 (1c)	x 2.6100 (2c)	= 110.5335 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	84.7000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 211.7500 (5)

2. Ventilation rate

					main heating	secondary heating	other		total	m3 per hour		
Number of chimneys					0	+	0	+	0	=	0 * 40 =	0.0000 (6a)
Number of open flues					0	+	0	+	0	=	0 * 20 =	0.0000 (6b)
Number of intermittent fans											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												3.7100
Infiltration rate												0.1855 (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) =	0.1577 (21)
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	4.7000	4.4000	4.4000	4.0000	4.1000	3.9000	3.9000	3.8000	3.8000	4.1000	4.0000	4.1000 (22)
Wind factor	1.1750	1.1000	1.1000	1.0000	1.0250	0.9750	0.9750	0.9500	0.9500	1.0250	1.0000	1.0250 (22a)
Adj infilt rate	0.1853	0.1734	0.1734	0.1577	0.1616	0.1537	0.1537	0.1498	0.1498	0.1616	0.1577	0.1616 (22b)
Mechanical extract ventilation - centralised												
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 m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K					
Front Door			2.1500	1.1000	2.3650		(26)					
Windows (Uw = 1.20)			15.5300	1.1450	17.7824		(27)					
Ground Floor			42.3500	0.1200	5.0820	84.0000	3557.4000 (28a)					
Brick and Block	100.4000	17.6800	82.7200	0.2400	19.8528	42.2200	3492.4384 (29a)					
Pitched Roof	42.3500		42.3500	0.1000	4.2350	9.1000	385.3850 (30)					
Total net area of external elements Aum(A, m2)			185.1000				(31)					
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =	49.3172			(33)					
Party Wall 1			29.9500	0.0000	0.0000	110.0000	3294.5000 (32)					
Ground Floor Block			28.7600			75.0000	2157.0000 (32c)					
Ground Floor Stud			47.0300			9.0000	423.2700 (32c)					
First Floor Stud			103.6500			9.0000	932.8500 (32c)					
Internal Floor 1			42.3500			18.0000	762.3000 (32d)					
Internal Ceiling 1			42.3500			18.0000	762.3000 (32e)					
Heat capacity Cm = Sum(A x k)					(28) ... (30) + (32) + (32a) ... (32e) =		15767.4434 (34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							186.1564 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							11.0187 (36)					
Total fabric heat loss						(33) + (36) =	60.3359 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 34.9388	Feb 34.9388	Mar 34.9388	Apr 34.9388	May 34.9388	Jun 34.9388	Jul 34.9388	Aug 34.9388	Sep 34.9388	Oct 34.9388	Nov 34.9388	Dec 34.9388 (38)
Heat transfer coeff	95.2747	95.2747	95.2747	95.2747	95.2747	95.2747	95.2747	95.2747	95.2747	95.2747	95.2747	95.2747 (39)
Average = Sum(39)m / 12 =												95.2747 (39)
HLP	Jan 1.1248	Feb 1.1248	Mar 1.1248	Apr 1.1248	May 1.1248	Jun 1.1248	Jul 1.1248	Aug 1.1248	Sep 1.1248	Oct 1.1248	Nov 1.1248	Dec 1.1248 (40)
HLP (average)												1.1248 (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												2.5460 (42)
Average daily hot water use (litres/day)												94.6679 (43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

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

Daily hot water use	104.1347	100.3480	96.5613	92.7746	88.9878	85.2011	85.2011	88.9878	92.7746	96.5613	100.3480	104.1347 (44)
Energy conte	154.4288	135.0644	139.3744	121.5099	116.5917	100.6098	93.2297	106.9825	108.2602	126.1668	137.7209	149.5560 (45)
Energy content (annual)										Total = Sum (45)m =		1489.4950 (45)
Distribution loss (46)m = 0.15 x (45)m	23.1643	20.2597	20.9062	18.2265	17.4888	15.0915	13.9845	16.0474	16.2390	18.9250	20.6581	22.4334 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	0.6706	0.6070	0.6056	0.5073	0.4669	0.3857	0.3574	0.4284	0.4520	0.5482	0.6189	0.6495 (61)
Total heat required for water heating calculated for each month	155.0994	135.6714	139.9800	122.0172	117.0586	100.9955	93.5872	107.4109	108.7122	126.7150	138.3399	150.2055 (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	155.0994	135.6714	139.9800	122.0172	117.0586	100.9955	93.5872	107.4109	108.7122	126.7150	138.3399	150.2055 (64)
Heat gains from water heating, kWh/month	51.5152	45.0607	46.4934	40.5289	38.8835	33.5492	31.0882	35.6788	36.1095	42.0875	45.9469	49.8897 (65)
										Total per year (kWh/year) = Sum (64)m =		1495.7926 (64)

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	152.7611	152.7611	152.7611	152.7611	152.7611	152.7611	152.7611	152.7611	152.7611	152.7611	152.7611	152.7611 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	51.9753	46.1640	37.5431	28.4225	21.2462	17.9369	19.3815	25.1928	33.8137	42.9342	50.1106	53.4198 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	341.7653	345.3118	336.3748	317.3491	293.3326	270.7604	255.6808	252.1344	261.0713	280.0970	304.1136	326.6857 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	52.8221	52.8221	52.8221	52.8221	52.8221	52.8221	52.8221	52.8221	52.8221	52.8221	52.8221	52.8221 (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)	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407 (71)
Water heating gains (Table 5)	69.2409	67.0545	62.4911	56.2901	52.2627	46.5961	41.7853	47.9553	50.1521	56.5692	63.8152	67.0561 (72)
Total internal gains	569.7240	565.2728	543.1515	508.8042	473.5839	442.0359	423.5900	432.0249	451.7796	486.3430	524.7818	553.9042 (73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	g or Table 6b	Specific data FF or Table 6c				Access factor Table 6d	Gains W
North				5.8000	13.4684	0.6300		0.7000				0.7700	23.8735 (74)
South				7.8200	56.5862	0.6300		0.7000				0.7700	135.2350 (78)
West				1.9100	25.1733	0.6300		0.7000				0.7700	14.6942 (80)
Solar gains	173.8027	251.5840	352.6872	447.7284	482.8499	536.5366	494.4986	463.5373	402.4065	300.3373	207.3195	140.9583	(83)
Total gains	743.5267	816.8568	895.8387	956.5326	956.4338	978.5725	918.0886	895.5623	854.1860	786.6803	732.1014	694.8624	(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	45.9707	45.9707	45.9707	45.9707	45.9707	45.9707	45.9707	45.9707	45.9707	45.9707	45.9707	45.9707
alpha	4.0647	4.0647	4.0647	4.0647	4.0647	4.0647	4.0647	4.0647	4.0647	4.0647	4.0647	4.0647
util living area	0.9678	0.9531	0.9152	0.8341	0.6969	0.4816	0.3396	0.3376	0.5865	0.8314	0.9403	0.9736 (86)
MIT	19.9554	20.0910	20.3617	20.6637	20.8796	20.9796	20.9963	20.9965	20.9545	20.7291	20.3112	19.9085 (87)
Th 2	19.9806	19.9806	19.9806	19.9806	19.9806	19.9806	19.9806	19.9806	19.9806	19.9806	19.9806	19.9806 (88)
util rest of house	0.9601	0.9421	0.8954	0.7961	0.6309	0.3916	0.2362	0.2315	0.4940	0.7834	0.9238	0.9670 (89)
MIT 2	19.0636	19.1947	19.4533	19.7292	19.9078	19.9728	19.9799	19.9800	19.9605	19.7926	19.4105	19.0184 (90)
Living area fraction									fLA = Living area / (4) =			0.2288 (91)
MIT	19.2676	19.3998	19.6611	19.9431	20.1301	20.2032	20.2125	20.2126	20.1879	20.0069	19.6166	19.2220 (92)
Temperature adjustment												0.0000
adjusted MIT	19.2676	19.3998	19.6611	19.9431	20.1301	20.2032	20.2125	20.2126	20.1879	20.0069	19.6166	19.2220 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9533	0.9345	0.8882	0.7945	0.6413	0.4118	0.2599	0.2559	0.5138	0.7848	0.9166	0.9608 (94)
Useful gains	708.7959	763.3814	795.6957	760.0008	613.3190	402.9606	238.6249	229.1778	438.8426	617.3846	671.0434	667.6415 (95)
Ext temp.	5.6000	6.0000	7.6000	10.1000	13.1000	15.9000	17.7000	17.8000	15.4000	12.1000	8.6000	5.7000 (96)
Heat loss rate W	1302.1788	1276.6629	1149.1198	937.7941	669.7946	409.9840	239.3754	229.8575	456.1658	753.3259	1049.6004	1288.3076 (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	441.4769	344.9251	262.9476	128.0111	42.0178	0.0000	0.0000	0.0000	0.0000	101.1403	272.5611	461.7756 (98)
Space heating												2054.8555 (98)
Space heating per m2										(98) / (4) =		24.2604 (99)

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 %)													90.2000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													2278.1103 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	441.4769	344.9251	262.9476	128.0111	42.0178	0.0000	0.0000	0.0000	0.0000	101.1403	272.5611	461.7756	(98)
Space heating efficiency (main heating system 1)	90.2000	90.2000	90.2000	90.2000	90.2000	0.0000	0.0000	0.0000	0.0000	90.2000	90.2000	90.2000	(210)
Space heating fuel (main heating system)	489.4422	382.4004	291.5161	141.9192	46.5830	0.0000	0.0000	0.0000	0.0000	112.1290	302.1741	511.9463	(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	155.0994	135.6714	139.9800	122.0172	117.0586	100.9955	93.5872	107.4109	108.7122	126.7150	138.3399	150.2055	(64)
Efficiency of water heater	86.1542	85.8238	84.8740	82.8931	79.6174	76.4000	76.4000	76.4000	76.4000	81.9664	85.0291	76.4000	(216)
Fuel for water heating, kWh/month	180.0254	158.0814	164.9268	147.1984	147.0263	132.1931	122.4963	140.5902	142.2934	154.5939	162.6970	173.9076	(219)
Water heating fuel used												1826.0296	(219)
Annual totals kWh/year													
Space heating fuel - main system												2278.1103	(211)
Space heating fuel - secondary												0.0000	(215)
Electricity for pumps and fans:													
(MEV)Centralised, Database: in-use factor = 1.4000, SFP = 0.2380)													
mechanical ventilation fans (SFP = 0.2380)													61.4837 (230a)
central heating pump													30.0000 (230c)
main heating flue fan													45.0000 (230e)
Total electricity for the above, kWh/year													136.4837 (231)
Electricity for lighting (calculated in Appendix L)													367.1600 (232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV Unit 0 (0.80 * 0.82 * 1184 * 1.00) =													-776.6495 (233)
Total delivered energy for all uses													3831.1341 (238)

10a. Fuel costs - using BEDF prices (559)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2278.1103	5.7300	130.5357 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1826.0296	5.7300	104.6315 (247)
Mechanical ventilation fans	61.4837	24.1800	14.8668 (249)
Pumps and fans for heating	75.0000	24.1800	18.1350 (249)
Energy for lighting	367.1600	24.1800	88.7793 (250)
Additional standing charges			114.0000 (251)
Energy saving/generation technologies			
PV Unit	-776.6495	24.1800	-187.7939 (252)
Total energy cost			283.1544 (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	2278.1103	0.2160	492.0718 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1826.0296	0.2160	394.4224 (264)
Space and water heating			886.4942 (265)
Pumps and fans	136.4837	0.5190	70.8351 (267)
Energy for lighting	367.1600	0.5190	190.5560 (268)
Energy saving/generation technologies			
PV Unit	-776.6495	0.5190	-403.0811 (269)
Total kg/year			744.8042 (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	2278.1103	1.2200	2779.2946 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1826.0296	1.2200	2227.7561 (264)
Space and water heating			5007.0507 (265)
Pumps and fans	136.4837	3.0700	419.0051 (267)
Energy for lighting	367.1600	3.0700	1127.1810 (268)

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Energy saving/generation technologies			
PV Unit	-776.6495	3.0700	-2384.3140 (269)
Primary energy kWh/year			4168.9228 (272)
Primary energy kWh/m2/year			49.2199 (273)

SAP 2012 EPC IMPROVEMENTS

Current energy efficiency rating:	B 88
Current environmental impact rating:	B 90

(For testing purposes):

A	Not considered
B	Not considered
C	Not considered
D	Not considered
E Low energy lighting	Already installed
F	Not considered
G	Not considered
H	Not considered
I	Not considered
J	Not considered
K	Not considered
M	Not considered
N Solar water heating	Recommended
O	Not considered
P	Not considered
R	Not considered
S	Not considered
T	Not considered
U Solar photovoltaic panels	Already installed
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
N Solar water heating	+ 1.3	-£ 49	-204 kg (27.4%)

Recommended measures	Typical annual savings	Energy efficiency	Environmental impact
Solar water heating	£49 2.41 kg/m²	B 90	A 93
Total Savings	£49 2.41 kg/m²		

Potential energy efficiency rating:	B 90
Potential environmental impact rating:	A 93

Fuel prices for cost data on this page from database revision number 559 TEST (13 Dec 2024)
Recommendation texts revision number 4.9c (22 Feb 2014)

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

	Current	Potential	Saving
Electricity	£122	£134	-£12
Mains gas	£349	£288	£61
Space heating	£278	£278	£0
Water heating	£105	£56	£49
Lighting	£89	£89	£0
Generated (PV)	-£188	-£188	£0
Total cost of fuels	£283	£234	£49
Total cost of uses	£284	£235	£49
Delivered energy	45 kWh/m²	33 kWh/m²	12 kWh/m²
Carbon dioxide emissions	0.7 tonnes	0.5 tonnes	0.2 tonnes
CO2 emissions per m²	9 kg/m²	6 kg/m²	2 kg/m²
Primary energy	49 kWh/m²	36 kWh/m²	14 kWh/m²

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

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	42.3500 (1b)	x 2.3900 (2b)	= 101.2165 (1b) - (3b)
First floor	42.3500 (1c)	x 2.6100 (2c)	= 110.5335 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	84.7000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 211.7500 (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					3.7100
Infiltration rate					0.1855 (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) =	0.1577 (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	0.2010	0.1971	0.1932	0.1734	0.1695	0.1498	0.1498	0.1458	0.1577	0.1695	0.1774	0.1853 (22b)
Mechanical extract ventilation - centralised												
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 m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K					
Front Door			2.1500	1.1000	2.3650		(26)					
Windows (Uw = 1.20)			15.5300	1.1450	17.7824		(27)					
Ground Floor			42.3500	0.1200	5.0820	84.0000	3557.4000 (28a)					
Brick and Block	100.4000	17.6800	82.7200	0.2400	19.8528	42.2200	3492.4384 (29a)					
Pitched Roof	42.3500		42.3500	0.1000	4.2350	9.1000	385.3850 (30)					
Total net area of external elements Aum(A, m2)			185.1000				(31)					
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =	49.3172			(33)					
Party Wall 1			29.9500	0.0000	0.0000	110.0000	3294.5000 (32)					
Ground Floor Block			28.7600			75.0000	2157.0000 (32c)					
Ground Floor Stud			47.0300			9.0000	423.2700 (32c)					
First Floor Stud			103.6500			9.0000	932.8500 (32c)					
Internal Floor 1			42.3500			18.0000	762.3000 (32d)					
Internal Ceiling 1			42.3500			18.0000	762.3000 (32e)					
Heat capacity Cm = Sum(A x k)				(28) ... (30) + (32) + (32a) ... (32e) =	15767.4434		(34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							186.1564 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							11.0187 (36)					
Total fabric heat loss				(33) + (36) =	60.3359		(37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	34.9388	34.9388	34.9388	34.9388	34.9388	34.9388	34.9388	34.9388	34.9388	34.9388	34.9388	34.9388 (38)
Average = Sum(39)m / 12 =	95.2747	95.2747	95.2747	95.2747	95.2747	95.2747	95.2747	95.2747	95.2747	95.2747	95.2747	95.2747 (39)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.1248	1.1248	1.1248	1.1248	1.1248	1.1248	1.1248	1.1248	1.1248	1.1248	1.1248	1.1248 (40)
HLP (average)												1.1248 (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												2.5460 (42)
Average daily hot water use (litres/day)												94.6679 (43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	

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Calculation Type: New Build (As Built)

CALCULATION OF ENERGY RATINGS FOR IMPROVED DWELLING 09 Jan 2014

Daily hot water use	104.1347	100.3480	96.5613	92.7746	88.9878	85.2011	85.2011	88.9878	92.7746	96.5613	100.3480	104.1347 (44)
Energy conte	154.4288	135.0644	139.3744	121.5099	116.5917	100.6098	93.2297	106.9825	108.2602	126.1668	137.7209	149.5560 (45)
Energy content (annual)												1489.4950 (45)
Distribution loss (46)m = 0.15 x (45)m	23.1643	20.2597	20.9062	18.2265	17.4888	15.0915	13.9845	16.0474	16.2390	18.9250	20.6581	22.4334 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	0.6706	0.6070	0.6056	0.5073	0.4669	0.3857	0.3574	0.4284	0.4520	0.5482	0.6189	0.6495 (61)
Total heat required for water heating calculated for each month	155.0994	135.6714	139.9800	122.0172	117.0586	100.9955	93.5872	107.4109	108.7122	126.7150	138.3399	150.2055 (62)
Aperture area of solar collector												3.0000 (H1)
Zero-loss collector efficiency												0.7000 (H2)
Collector heat loss coefficient												1.8000 (H3)
Collector 2nd order heat loss coefficient												0.0050 (H3a)
Collector effective heat loss coefficient												1.8063 (H3b)
Collector performance ratio												2.5804 (H4)
Annual solar radiation per m2												1079.5246 (H5)
Overshading factor												0.8000 (H6)
Solar energy available												1813.6014 (H7)
Adjustment factor for showers												1.0000 (H7a)
Solar-to-load ratio												1.2176 (H8)
Utilisation factor												0.5601 (H9)
Collector performance factor												0.8793 (H10)
Dedicated solar storage volume												75.0000 (H11)
Effective solar volume												75.0000 (H13)
Daily hot water demand												94.6679 (H14)
Volume ratio Veff/V												0.7922 (H15)
Solar storage volume factor												0.9534 (H16)
Solar input												-851.6382 (H17)
Solar input	-24.6958	-41.2102	-70.1857	-94.0627	-116.2065	-114.2495	-112.7397	-98.5012	-77.1462	-52.6818	-29.2928	-20.6662 (63)
Solar input (sum of months) = Sum (63)m =												-851.6382 (63)
Output from w/h	130.4036	94.4612	69.7943	27.9546	0.8521	0.0000	0.0000	8.9097	31.5660	74.0333	109.0471	129.5393 (64)
Total per year (kWh/year) = Sum (64)m =												676.5609 (64)
Heat gains from water heating, kWh/month	51.5152	45.0607	46.4934	40.5289	38.8835	33.5492	31.0882	35.6788	36.1095	42.0875	45.9469	49.8897 (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	152.7611	152.7611	152.7611	152.7611	152.7611	152.7611	152.7611	152.7611	152.7611	152.7611	152.7611	152.7611	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	51.9753	46.1640	37.5431	28.4225	21.2462	17.9369	19.3815	25.1928	33.8137	42.9342	50.1106	53.4198	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	341.7653	345.3118	336.3748	317.3491	293.3326	270.7604	255.6808	252.1344	261.0713	280.0970	304.1136	326.6857	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	52.8221	52.8221	52.8221	52.8221	52.8221	52.8221	52.8221	52.8221	52.8221	52.8221	52.8221	52.8221	(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)	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	(71)
Water heating gains (Table 5)	69.2409	67.0545	62.4911	56.2901	52.2627	46.5961	41.7853	47.9553	50.1521	56.5692	63.8152	67.0561	(72)
Total internal gains	569.7240	565.2728	543.1515	508.8042	473.5839	442.0359	423.5900	432.0249	451.7796	486.3430	524.7818	553.9042	(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				5.8000	10.6334	0.6300	0.7000	0.7700			18.8483 (74)	
South				7.8200	46.7521	0.6300	0.7000	0.7700			111.7325 (78)	
West				1.9100	19.6403	0.6300	0.7000	0.7700			11.4644 (80)	

Solar gains	142.0452	241.4359	331.2362	415.6282	472.9820	473.5536	454.8421	410.9685	360.0418	266.8593	169.9876	121.6878 (83)
Total gains	711.7691	806.7087	874.3876	924.4324	946.5659	915.5895	878.4321	842.9934	811.8213	753.2023	694.7695	675.5919 (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	45.9707	45.9707	45.9707	45.9707	45.9707	45.9707	45.9707	45.9707	45.9707	45.9707	45.9707	45.9707
alpha	4.0647	4.0647	4.0647	4.0647	4.0647	4.0647	4.0647	4.0647	4.0647	4.0647	4.0647	4.0647
util living area	0.9786	0.9638	0.9366	0.8800	0.7752	0.6171	0.4646	0.5018	0.7103	0.8952	0.9641	0.9824 (86)
MIT	19.7501	19.9431	20.2139	20.5259	20.7872	20.9375	20.9845	20.9786	20.8871	20.5576	20.0855	19.6909 (87)
Th 2	19.9806	19.9806	19.9806	19.9806	19.9806	19.9806	19.9806	19.9806	19.9806	19.9806	19.9806	19.9806 (88)
util rest of house	0.9737	0.9556	0.9220	0.8519	0.7236	0.5353	0.3627	0.3985	0.6342	0.8646	0.9545	0.9783 (89)
MIT 2	18.8614	19.0502	19.3124	19.6059	19.8353	19.9491	19.9757	19.9733	19.9172	19.6418	19.1925	18.8033 (90)
Living area fraction									fLA = Living area / (4) =			0.2288 (91)
MIT	19.0648	19.2545	19.5187	19.8164	20.0531	20.1752	20.2065	20.2034	20.1391	19.8513	19.3968	19.0064 (92)
Temperature adjustment												0.0000
adjusted MIT	19.0648	19.2545	19.5187	19.8164	20.0531	20.1752	20.2065	20.2034	20.1391	19.8513	19.3968	19.0064 (93)

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CALCULATION OF ENERGY RATINGS FOR IMPROVED DWELLING 09 Jan 2014

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9680	0.9485	0.9142	0.8468	0.7276	0.5517	0.3859	0.4218	0.6470	0.8601	0.9476	0.9732	(94)
Useful gains	688.9930	765.1297	799.3228	782.8134	688.7233	505.1379	338.9631	355.5910	525.2551	647.8498	658.3820	657.4996	(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	1406.7085	1367.6164	1240.3513	1040.0591	795.8379	531.1790	343.6124	362.3637	575.3733	881.4169	1171.5716	1410.6724	(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	533.9803	404.8711	328.1252	185.2169	79.6933	0.0000	0.0000	0.0000	0.0000	173.7740	369.4965	560.3605	(98)
Space heating												2635.5178	(98)
Space heating per m2											(98) / (4) =	31.1159	(99)

8c. Space cooling requirement

Not applicable

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000	(201)
Fraction of space heat from main system(s)													1.0000	(202)
Efficiency of main space heating system 1 (in %)													90.2000	(206)
Efficiency of secondary/supplementary heating system, %													0.0000	(208)
Space heating requirement													2921.8601	(211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Space heating requirement	533.9803	404.8711	328.1252	185.2169	79.6933	0.0000	0.0000	0.0000	0.0000	173.7740	369.4965	560.3605	(98)	
Space heating efficiency (main heating system 1)	90.2000	90.2000	90.2000	90.2000	90.2000	0.0000	0.0000	0.0000	0.0000	90.2000	90.2000	90.2000	(210)	
Space heating fuel (main heating system)	591.9959	448.8593	363.7752	205.3402	88.3518	0.0000	0.0000	0.0000	0.0000	192.6541	409.6414	621.2423	(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	130.4036	94.4612	69.7943	27.9546	0.8521	0.0000	0.0000	8.9097	31.5660	74.0333	109.0471	129.5393	(64)	
Efficiency of water heater (217)m	87.1116	87.2197	87.4301	88.1129	90.0280	76.4000	76.4000	76.4000	76.4000	85.5817	86.6341	76.4000	(216)	
Fuel for water heating, kWh/month	149.6971	108.3026	79.8287	31.7258	0.9464	0.0000	0.0000	11.6619	41.3167	86.5059	125.8708	148.4842	(219)	
Water heating fuel used												784.3402	(219)	
Annual totals kWh/year														
Space heating fuel - main system												2921.8601	(211)	
Space heating fuel - secondary												0.0000	(215)	
Electricity for pumps and fans:														
(MEV)Centralised, Database: in-use factor = 1.4000, SFP = 0.2380)														
mechanical ventilation fans (SFP = 0.2380)													61.4837	(230a)
central heating pump													30.0000	(230c)
main heating flue fan													45.0000	(230e)
pump for solar water heating													50.0000	(230g)
Total electricity for the above, kWh/year													186.4837	(231)
Electricity for lighting (calculated in Appendix L)													367.1600	(232)
Energy saving/generation technologies (Appendices M ,N and Q)														
PV Unit 0 (0.80 * 0.82 * 1068 * 1.00) =										-700.6542		-700.6542	(233)	
Total delivered energy for all uses												3559.1897	(238)	

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2921.8601	3.4800	101.6807 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	784.3402	3.4800	27.2950 (247)
Mechanical ventilation fans	61.4837	13.1900	8.1097 (249)
Pumps and fans for heating	75.0000	13.1900	9.8925 (249)
Pump for solar water heating	50.0000	13.1900	6.5950 (249)
Energy for lighting	367.1600	13.1900	48.4284 (250)
Additional standing charges			120.0000 (251)
Energy saving/generation technologies			
PV Unit	-700.6542	13.1900	-92.4163 (252)
Total energy cost			229.5851 (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] =	0.7435 (257)
SAP value		89.6288
SAP rating (Section 12)		90 (258)
SAP band		B

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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	2921.8601	0.2160	631.1218 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	784.3402	0.2160	169.4175 (264)
Space and water heating			800.5393 (265)
Pumps and fans	186.4837	0.5190	96.7851 (267)
Energy for lighting	367.1600	0.5190	190.5560 (268)
Energy saving/generation technologies			
PV Unit	-700.6542	0.5190	-363.6395 (269)
Total kg/year			724.2408 (272)
CO2 emissions per m2			8.5500 (273)
EI value			92.5175
EI rating			93 (274)
EI band			A

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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

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	42.3500 (1b)	x 2.3900 (2b)	= 101.2165 (1b) - (3b)
First floor	42.3500 (1c)	x 2.6100 (2c)	= 110.5335 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	84.7000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 211.7500 (5)

2. Ventilation rate

										total	m3 per hour	
					main heating	+	secondary heating	+	other	=		
Number of chimneys					0	+	0	+	0	=	0 * 40 =	0.0000 (6a)
Number of open flues					0	+	0	+	0	=	0 * 20 =	0.0000 (6b)
Number of intermittent fans											0 * 10 =	0.0000 (7a)
Number of passive vents											0 * 10 =	0.0000 (7b)
Number of flueless gas fires											0 * 40 =	0.0000 (7c)
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												3.7100
Number of sides sheltered												0.1855 (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) =	0.1577 (21)
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	4.7000	4.4000	4.4000	4.0000	4.1000	3.9000	3.9000	3.8000	3.8000	4.1000	4.0000	4.1000 (22)
Wind factor	1.1750	1.1000	1.1000	1.0000	1.0250	0.9750	0.9750	0.9500	0.9500	1.0250	1.0000	1.0250 (22a)
Adj infilt rate												
	0.1853	0.1734	0.1734	0.1577	0.1616	0.1537	0.1537	0.1498	0.1498	0.1616	0.1577	0.1616 (22b)
Mechanical extract ventilation - centralised												
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 m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K					
Front Door			2.1500	1.1000	2.3650		(26)					
Windows (Uw = 1.20)			15.5300	1.1450	17.7824		(27)					
Ground Floor			42.3500	0.1200	5.0820	84.0000	3557.4000 (28a)					
Brick and Block	100.4000	17.6800	82.7200	0.2400	19.8528	42.2200	3492.4384 (29a)					
Pitched Roof	42.3500		42.3500	0.1000	4.2350	9.1000	385.3850 (30)					
Total net area of external elements Aum(A, m2)			185.1000				(31)					
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	49.3172			(33)					
Party Wall 1			29.9500	0.0000	0.0000	110.0000	3294.5000 (32)					
Ground Floor Block			28.7600			75.0000	2157.0000 (32c)					
Ground Floor Stud			47.0300			9.0000	423.2700 (32c)					
First Floor Stud			103.6500			9.0000	932.8500 (32c)					
Internal Floor 1			42.3500			18.0000	762.3000 (32d)					
Internal Ceiling 1			42.3500			18.0000	762.3000 (32e)					
Heat capacity Cm = Sum(A x k)				(28)...(30) + (32) + (32a)...(32e) = 15767.4434 (34)								
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K				186.1564 (35)								
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				11.0187 (36)								
Total fabric heat loss				(33) + (36) = 60.3359 (37)								
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 34.9388	Feb 34.9388	Mar 34.9388	Apr 34.9388	May 34.9388	Jun 34.9388	Jul 34.9388	Aug 34.9388	Sep 34.9388	Oct 34.9388	Nov 34.9388	Dec 34.9388 (38)
Heat transfer coeff	95.2747	95.2747	95.2747	95.2747	95.2747	95.2747	95.2747	95.2747	95.2747	95.2747	95.2747	95.2747 (39)
Average = Sum(39)m / 12 =				95.2747 (39)								
HLP	Jan 1.1248	Feb 1.1248	Mar 1.1248	Apr 1.1248	May 1.1248	Jun 1.1248	Jul 1.1248	Aug 1.1248	Sep 1.1248	Oct 1.1248	Nov 1.1248	Dec 1.1248 (40)
HLP (average)				1.1248 (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												2.5460 (42)
Average daily hot water use (litres/day)												94.6679 (43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	

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

Daily hot water use	104.1347	100.3480	96.5613	92.7746	88.9878	85.2011	85.2011	88.9878	92.7746	96.5613	100.3480	104.1347 (44)
Energy conte	154.4288	135.0644	139.3744	121.5099	116.5917	100.6098	93.2297	106.9825	108.2602	126.1668	137.7209	149.5560 (45)
Energy content (annual)												
Distribution loss (46)m = 0.15 x (45)m	23.1643	20.2597	20.9062	18.2265	17.4888	15.0915	13.9845	16.0474	16.2390	18.9250	20.6581	22.4334 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	0.6706	0.6070	0.6056	0.5073	0.4669	0.3857	0.3574	0.4284	0.4520	0.5482	0.6189	0.6495 (61)
Total heat required for water heating calculated for each month	155.0994	135.6714	139.9800	122.0172	117.0586	100.9955	93.5872	107.4109	108.7122	126.7150	138.3399	150.2055 (62)
Aperture area of solar collector												3.0000 (H1)
Zero-loss collector efficiency												0.7000 (H2)
Collector heat loss coefficient												1.8000 (H3)
Collector 2nd order heat loss coefficient												0.0050 (H3a)
Collector effective heat loss coefficient												1.8063 (H3b)
Collector performance ratio												2.5804 (H4)
Annual solar radiation per m2												1206.0102 (H5)
Overshading factor												0.8000 (H6)
Solar energy available												2026.0972 (H7)
Adjustment factor for showers												1.0000 (H7a)
Solar-to-load ratio												1.3603 (H8)
Utilisation factor												0.5206 (H9)
Collector performance factor												0.8793 (H10)
Dedicated solar storage volume												75.0000 (H11)
Effective solar volume												75.0000 (H13)
Daily hot water demand												94.6679 (H14)
Volume ratio Veff/V												0.7922 (H15)
Solar storage volume factor												0.9534 (H16)
Solar input												-884.2145 (H17)
Solar input	-28.8531	-41.0323	-71.2016	-95.7781	-111.3006	-121.0628	-114.7860	-104.6737	-81.9279	-56.6256	-34.1266	-22.8463 (63)
Solar input (sum of months) = Sum (63)m =												-884.2145 (63)
Output from w/h	126.2463	94.6391	68.7784	26.2391	5.7579	0.0000	0.0000	2.7372	26.7843	70.0894	104.2133	127.3592 (64)
Total per year (kWh/year) = Sum (64)m =												652.8443 (64)
Heat gains from water heating, kWh/month	51.5152	45.0607	46.4934	40.5289	38.8835	33.5492	31.0882	35.6788	36.1095	42.0875	45.9469	49.8897 (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	152.7611	152.7611	152.7611	152.7611	152.7611	152.7611	152.7611	152.7611	152.7611	152.7611	152.7611	152.7611	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	51.9753	46.1640	37.5431	28.4225	21.2462	17.9369	19.3815	25.1928	33.8137	42.9342	50.1106	53.4198	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	341.7653	345.3118	336.3748	317.3491	293.3326	270.7604	255.6808	252.1344	261.0713	280.0970	304.1136	326.6857	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	52.8221	52.8221	52.8221	52.8221	52.8221	52.8221	52.8221	52.8221	52.8221	52.8221	52.8221	52.8221	(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)	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	-101.8407	(71)
Water heating gains (Table 5)	69.2409	67.0545	62.4911	56.2901	52.2627	46.5961	41.7853	47.9553	50.1521	56.5692	63.8152	67.0561	(72)
Total internal gains	569.7240	565.2728	543.1515	508.8042	473.5839	442.0359	423.5900	432.0249	451.7796	486.3430	524.7818	553.9042	(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				5.8000	13.4684	0.6300	0.7000	0.7700	23.8735 (74)			
South				7.8200	56.5862	0.6300	0.7000	0.7700	135.2350 (78)			
West				1.9100	25.1733	0.6300	0.7000	0.7700	14.6942 (80)			
Solar gains	173.8027	251.5840	352.6872	447.7284	482.8499	536.5366	494.4986	463.5373	402.4065	300.3373	207.3195	140.9583 (83)
Total gains	743.5267	816.8568	895.8387	956.5326	956.4338	978.5725	918.0886	895.5623	854.1860	786.6803	732.1014	694.8624 (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	45.9707	45.9707	45.9707	45.9707	45.9707	45.9707	45.9707	45.9707	45.9707	45.9707	45.9707	45.9707
alpha	4.0647	4.0647	4.0647	4.0647	4.0647	4.0647	4.0647	4.0647	4.0647	4.0647	4.0647	4.0647
util living area	0.9678	0.9531	0.9152	0.8341	0.6969	0.4816	0.3396	0.3376	0.5865	0.8314	0.9403	0.9736 (86)
MIT	19.9554	20.0910	20.3617	20.6637	20.8796	20.9796	20.9963	20.9965	20.9545	20.7291	20.3112	19.9085 (87)
Th 2	19.9806	19.9806	19.9806	19.9806	19.9806	19.9806	19.9806	19.9806	19.9806	19.9806	19.9806	19.9806 (88)
util rest of house	0.9601	0.9421	0.8954	0.7961	0.6309	0.3916	0.2362	0.2315	0.4940	0.7834	0.9238	0.9670 (89)
MIT 2	19.0636	19.1947	19.4533	19.7292	19.9078	19.9728	19.9799	19.9800	19.9605	19.7926	19.4105	19.0184 (90)
Living area fraction									fLA = Living area / (4) =			0.2288 (91)
MIT	19.2676	19.3998	19.6611	19.9431	20.1301	20.2032	20.2125	20.2126	20.1879	20.0069	19.6166	19.2220 (92)
Temperature adjustment												0.0000
adjusted MIT	19.2676	19.3998	19.6611	19.9431	20.1301	20.2032	20.2125	20.2126	20.1879	20.0069	19.6166	19.2220 (93)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

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

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9533	0.9345	0.8882	0.7945	0.6413	0.4118	0.2599	0.2559	0.5138	0.7848	0.9166	0.9608	(94)
Useful gains	708.7959	763.3814	795.6957	760.0008	613.3190	402.9606	238.6249	229.1778	438.8426	617.3846	671.0434	667.6415	(95)
Ext temp.	5.6000	6.0000	7.6000	10.1000	13.1000	15.9000	17.7000	17.8000	15.4000	12.1000	8.6000	5.7000	(96)
Heat loss rate W	1302.1788	1276.6629	1149.1198	937.7941	669.7946	409.9840	239.3754	229.8575	456.1658	753.3259	1049.6004	1288.3076	(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	441.4769	344.9251	262.9476	128.0111	42.0178	0.0000	0.0000	0.0000	0.0000	101.1403	272.5611	461.7756	(98)
Space heating												2054.8555	(98)
Space heating per m2												24.2604	(99)
											(98) / (4) =		

8c. Space cooling requirement

Not applicable

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													90.2000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													2278.1103 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	441.4769	344.9251	262.9476	128.0111	42.0178	0.0000	0.0000	0.0000	0.0000	101.1403	272.5611	461.7756	(98)
Space heating efficiency (main heating system 1)	90.2000	90.2000	90.2000	90.2000	90.2000	0.0000	0.0000	0.0000	0.0000	90.2000	90.2000	90.2000	(210)
Space heating fuel (main heating system)	489.4422	382.4004	291.5161	141.9192	46.5830	0.0000	0.0000	0.0000	0.0000	112.1290	302.1741	511.9463	(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	126.2463	94.6391	68.7784	26.2391	5.7579	0.0000	0.0000	2.7372	26.7843	70.0894	104.2133	127.3592	(64)
Efficiency of water heater (217)m	86.7169	86.8235	86.9439	87.5111	88.2782	76.4000	76.4000	76.4000	76.4000	83.9901	85.9080	76.4000	(216)
Fuel for water heating, kWh/month	145.5846	109.0018	79.1067	29.9837	6.5225	0.0000	0.0000	3.5827	35.0580	83.4497	121.3080	146.7099	(219)
Water heating fuel used												760.3074	(219)
Annual totals kWh/year													
Space heating fuel - main system												2278.1103	(211)
Space heating fuel - secondary												0.0000	(215)
Electricity for pumps and fans:													
(MEV)Centralised, Database: in-use factor = 1.4000, SFP = 0.2380)													
mechanical ventilation fans (SFP = 0.2380)													61.4837 (230a)
central heating pump													30.0000 (230c)
main heating flue fan													45.0000 (230e)
pump for solar water heating													50.0000 (230g)
Total electricity for the above, kWh/year													186.4837 (231)
Electricity for lighting (calculated in Appendix L)													367.1600 (232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV Unit 0 (0.80 * 0.82 * 1184 * 1.00) =										-776.6495		-776.6495	(233)
Total delivered energy for all uses												2815.4119	(238)

10a. Fuel costs - using BEDF prices (559)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2278.1103	5.7300	130.5357 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	760.3074	5.7300	43.5656 (247)
Mechanical ventilation fans	61.4837	24.1800	14.8668 (249)
Pumps and fans for heating	75.0000	24.1800	18.1350 (249)
Pump for solar water heating	50.0000	24.1800	12.0900 (249)
Energy for lighting	367.1600	24.1800	88.7793 (250)
Additional standing charges			114.0000 (251)
Energy saving/generation technologies			
PV Unit	-776.6495	24.1800	-187.7939 (252)
Total energy cost			234.1785 (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	2278.1103	0.2160	492.0718 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	760.3074	0.2160	164.2264 (264)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

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

Space and water heating			656.2982 (265)
Pumps and fans	186.4837	0.5190	96.7851 (267)
Energy for lighting	367.1600	0.5190	190.5560 (268)
Energy saving/generation technologies			
PV Unit	-776.6495	0.5190	-403.0811 (269)
Total kg/year			540.5582 (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	2278.1103	1.2200	2779.2946 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	760.3074	1.2200	927.5751 (264)
Space and water heating			3706.8697 (265)
Pumps and fans	186.4837	3.0700	572.5051 (267)
Energy for lighting	367.1600	3.0700	1127.1810 (268)
Energy saving/generation technologies			
PV Unit	-776.6495	3.0700	-2384.3140 (269)
Primary energy kWh/year			3022.2418 (272)
Primary energy kWh/m2/year			35.6817 (273)

U-VALUE CALCULATOR REPORT

Property Reference	SAP 0943 Plot 20	Issued on Date	07/01/2025
Assessment Reference	As Built	Prop Type Ref	Type F
Project	14 Shaw Crescent, West End, SOUTHAMPTON, SO30 3LH		
Calculation Type	New Build (As Built)		

SAP Rating	88 B	DER	12.67	TER	17.90
Environmental	90 B	% DER<TER	29.20		
CO ₂ Emissions (t/year)	0.74	DFEE	44.10	TFEE	50.95
General Requirements Compliance	Pass	% DFEE<TFEE	13.43		

Assessor Details	Mr. Tobias Whiting, Abacus Energy (UK) Ltd, Tel: 07798936079, toby@abacusenergyuk.com	Assessor ID	E477-0001
Client	Foreman Homes, FORE		

Building Elements

Roof 000002 - Mineral Wool between and above

Roof Type: Pitched Roof, insulated flat ceiling

Layer	Description	Thickness (mm)	Conductivity (W/m ² K)	Resistance (m ² K/W)	Fraction (%)	Density (kg/m ³)	Heat Cap. (J/kgK)
Ext surface				0.0400			
Layer 1	Mineral wool batt						
	Main construction	350	0.0380	9.2105	100.00		
	Corrections - Air Gap: Level 1, Fasteners: None or plastic						
Layer 2	Mineral wool batt						
	Main construction	100	0.0380	2.6316	87.50		
	Main construction	100	0.1300	0.7692	12.50		
	Corrections - Air Gap: Level 1, Fasteners: None or plastic						
Layer 3	Plasterboard, standard						
	Main construction	12.5	0.2100	0.0595	100.00	700	1000
Int surface				0.1000			

Total resistance: Upper limit = 11.772 m² K/W Lower limit = 11.430 m² K/W Average = 11.601 m² K/W
Total correction = 0.0096 m² K/W U-value (unrounded) = 0.1 W/m² K

Unheated space: None

Total thickness: 463 mm

U-value: 0.10 W/m² K

Kappa: 9.10 kJ/m² K

U-VALUE CALCULATOR REPORT

Property Reference	SAP 0943 Plot 20	Issued on Date	07/01/2025
Assessment Reference	As Built	Prop Type Ref	Type F
Project	14 Shaw Crescent, West End, SOUTHAMPTON, SO30 3LH		
Calculation Type	New Build (As Built)		

SAP Rating	88 B	DER	12.67	TER	17.90
Environmental	90 B	% DER<TER	29.20		
CO ₂ Emissions (t/year)	0.74	DFEE	44.10	TFEE	50.95
General Requirements Compliance	Pass	% DFEE<TFEE	13.43		

Assessor Details	Mr. Tobias Whiting, Abacus Energy (UK) Ltd, Tel: 07798936079, toby@abacusenergyuk.com	Assessor ID	E477-0001
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Client	Foreman Homes, FORE
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Building Elements

Wall 000001

Wall Type: Standard Wall

Layer	Description	Thickness (mm)	Conductivity (W/m ² K)	Resistance (m ² K/W)	Fraction (%)	Density (kg/m ³)	Heat Cap. (J/kgK)
Ext surface				0.0400			
Layer 1	Brick, outer leaf						
	Main construction	102	0.7700	0.1325	82.81		
	Main construction	102	0.9407	0.1084	17.19		
Layer 2	Supafil 34						
	Main construction	100	0.0340	2.9412	100.00		
	Corrections - Air Gap: Level 0, Fasteners: None or plastic						
Layer 3	Supabloc						
	Main construction	100	0.1100	0.9091	94.04	460	1000
	Main construction	100	0.8803	0.1136	5.96	460	1000
	Corrections - Air Gap: Level 1, Fasteners: None or plastic						
Layer 4	airspace/plaster dabs						
	Main construction	15	0.0882	0.1700	80.00		
	Main construction	15	0.0882	0.1700	20.00		
	Corrections - Cavity Unventilated, Emissivity: Normal						
Layer 5	Plasterboard, standard						
	Main construction	12.5	0.2100	0.0595	100.00	700	1000
Int surface				0.1300			

Total resistance:	Upper limit = 4.321 m ² K/W	Lower limit = 4.110 m ² K/W	Average = 4.215 m ² K/W
	Total correction = 0.0002 m ² K/W	U-value (unrounded) = 0.24 W/m ² K	

Unheated space: None		
Total thickness: 330 mm	U-value: 0.24 W/m² K	Kappa: 42.22 kJ/m² K

U-VALUE CALCULATOR REPORT

Property Reference	SAP 0943 Plot 20	Issued on Date	07/01/2025
Assessment Reference	As Built	Prop Type Ref	Type F
Project	14 Shaw Crescent, West End, SOUTHAMPTON, SO30 3LH		
Calculation Type	New Build (As Built)		

SAP Rating	88 B	DER	12.67	TER	17.90
Environmental	90 B	% DER<TER	29.20		
CO ₂ Emissions (t/year)	0.74	DFEE	44.10	TFEE	50.95
General Requirements Compliance	Pass	% DFEE<TFEE	13.43		

Assessor Details	Mr. Tobias Whiting, Abacus Energy (UK) Ltd, Tel: 07798936079, toby@abacusenergyuk.com	Assessor ID	E477-0001
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Client	Foreman Homes, FORE
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Building Elements

Floor 000003 - Worst Case Slab

Floor Type: Slab On Ground Floor

Area = 34.96 m², Perimeter = 16.87 m, Wall thickness = 275.00 mm, Soil: Unknown

Horizontal edge insulation: none

Vertical edge insulation: none

Layer	Description	Thickness (mm)	Conductivity (W/m ² K)	Resistance (m ² K/W)	Fraction (%)	Density (kg/m ³)	Heat Cap. (J/kgK)
Ext surface				0.0400			
Layer 1	Concrete, medium density						
	Main construction	100	1.3500	0.0741	100.00		
Layer 2	Polythene,1000 gauge						
	Main construction	0.5	0.0000	0.0000	100.00		
Layer 3	Celotex XR4000						
	Main construction	150	0.0220	6.8182	100.00		
	Corrections - Air Gap: Level 1, Fasteners: None or plastic						
Layer 4	Polythene, 500 gauge						
	Main construction	0.5	0.0000	0.0000	100.00		
Layer 5	Screed						
	Main construction	70	1.1500	0.0609	100.00	1200	1000
Int surface				0.1700			

Total resistance: Upper limit = 6.953 m² K/W Lower limit = 6.953 m² K/W Average = 6.953 m² K/W

Total correction = 0.0096 m² K/W

U-value (unrounded) = 0.12 W/m² K

Unheated space: None

Total thickness: 321 mm

U-value: 0.12 W/m² K

Kappa: 84.00 kJ/m² K

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Built)

Property Reference	SAP 0943 Plot 20			Issued on Date	07/01/2025
Assessment Reference	As Built	Prop Type Ref	Type F		
Property	14 Shaw Crescent, West End, SOUTHAMPTON, SO30 3LH				
SAP Rating	88 B	DER	12.67	TER	17.90
Environmental	90 B	% DER<TER	29.20		
CO ₂ Emissions (t/year)	0.74	DFEE	44.10	TFEE	50.95
General Requirements Compliance	Pass	% DFEE<TFEE	13.43		
Assessor Details	Mr. Tobias Whiting, Abacus Energy (UK) Ltd, Tel: 07798936079, toby@abacusenergyuk.com			Assessor ID	E477-0001
Client	Foreman Homes, FORE				

SUMMARY FOR INPUT DATA FOR: New Build (As Built)

Orientation	North						
Property Tenure	Unknown						
Transaction Type	New dwelling						
Terrain Type	Suburban						
1.0 Property Type	House, Semi-Detached						
2.0 Number of Storeys	2						
3.0 Date Built	2023						
4.0 Sheltered Sides	2						
5.0 Sunlight/Shade	Average or unknown						
6.0 Measurements							
		Heat Loss Perimeter		Internal Floor Area		Average Storey Height	
Ground Floor:		20.08 m		42.35 m²		2.39 m	
1st Storey:		20.08 m		42.35 m²		2.61 m	
7.0 Living Area	19.38			m²			
8.0 Thermal Mass Parameter	Precise calculation						
Thermal Mass	186.16			kJ/m²K			
9.0 External Walls							
Description	Type	Construction		U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area (m²)	Nett Area (m²)
Brick and Block	Cavity Wall	Other		0.24	42.22	100.40	82.72
9.1 Party Walls							
Description	Type	Construction		U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	
Party Wall 1	Filled Cavity with Edge Sealing	Single plasterboard on dabs both sides, lightweight aggregate blocks, cavity or cavity fill		0.00	110.00	29.95	
9.2 Internal Walls							
Description	Construction					Kappa (kJ/m²K)	Area (m²)
Ground Floor Block	Dense block, plasterboard on dabs					75.00	28.76
Ground Floor Stud	Plasterboard on timber frame					9.00	47.03
First Floor Stud	Plasterboard on timber frame					9.00	103.65
10.0 External Roofs							
Description	Type	Construction		U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area (m²)	Nett Area (m²)
Pitched Roof	External Plane Roof	Other		0.10	9.10	42.35	42.35

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Built)

10.2 Internal Ceilings

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Ceiling 1	Plasterboard ceiling, carpeted chipboard floor	9.00	42.35

11.0 Heat Loss Floors

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)
Ground Floor	Ground Floor - Solid	Other	0.12	84.00	42.35

11.2 Internal Floors

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Floor 1	Plasterboard ceiling, carpeted chipboard floor	18.00	42.35

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Front Door	Manufacturer	Solid Door							1.10
Windows	Manufacturer	Window	Double Low-E Soft 0.1			0.63		0.70	1.20

13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width (m)	Height (m)	Count	Area (m²)	Curtain Closed
Front Door	Solid Door	[1] Brick and Block	North							2.15	
Front Elevation	Window	[1] Brick and Block	North	None	0.00					5.80	
Side Elevation	Window	[1] Brick and Block	West	None	0.00					1.91	
Rear Elevation	Window	[1] Brick and Block	South	None	0.00					7.82	

14.0 Conservatory

None

15.0 Draught Proofing

100 %

16.0 Draught Lobby

No

17.0 Thermal Bridging

Calculate Bridges

17.1 List of Bridges

Source Type	Bridge Type	Length	Psi	Imported	Reference:
Independently assessed	E2 Other lintels (including other steel lintels)	2.84	0.071	No	Birtley Supatherm
Independently assessed	E2 Other lintels (including other steel lintels)	8.74	0.064	No	Birtley Supatherm
Independently assessed	E2 Other lintels (including other steel lintels)	1.59	0.067	No	Birtley Supatherm
Independently assessed	E3 Sill	10.55	0.021	No	Knauf P5
Independently assessed	E4 Jamb	29.10	0.016	No	Knauf P6
Table K1 - Default	E5 Ground floor (normal)	20.08	0.320	No	
Independently assessed	E6 Intermediate floor within a dwelling	20.08	0.000	No	CD0029
Table K1 - Approved	E10 Eaves (insulation at ceiling level)	14.16	0.060	No	
Independently assessed	E12 Gable (insulation at ceiling level)	6.02	0.044	No	Knauf P21
Independently assessed	E16 Corner (normal)	10.00	0.039	No	Knauf P23
Independently assessed	E18 Party wall between dwellings	10.00	0.036	No	Knauf P25 Halved
Table K1 - Default	P1 Party wall - Ground floor	6.02	0.160	No	
Table K1 - Default	P2 Party wall - Intermediate floor within a dwelling	6.02	0.000	No	
Independently assessed	P4 Party wall - Roof (insulation at ceiling level)	6.02	0.035	No	Knauf P29 Halved

Y-value 0.060 W/m²K

18.0 Pressure Testing

Designed AP ₅₀	Yes	
Property Tested ?	5.00	m³/(h.m²) @ 50 Pa
As Built AP ₅₀	Yes	
	3.71	m³/(h.m²) @ 50 Pa

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Built)

19.0 Mechanical Ventilation

Summer Overheating

Windows open in hot weather	Windows half open
Cross ventilation possible	Yes
Night Ventilation	No
Air change rate	4.00

Mechanical Ventilation

Mechanical Ventilation System Present	Yes
Approved Installation	No
Mechanical Ventilation data Type	Database
Type	Mechanical extract ventilation - centralised
MV Reference Number	500107
Configuration	3
Manufacturer SFP	0.17
Duct Type	Rigid
Wet Rooms	3

20.0 Fans, Open Fireplaces, Flues

	MHS	SHS	Other	Total
Number of Chimneys	0		0	0
Number of open flues	0		0	0
Number of intermittent fans				0
Number of passive vents				0
Number of flueless gas fires				0

21.0 Fixed Cooling System

No

22.0 Lighting

Internal

Total number of light fittings	21	
Total number of L.E.L. fittings	21	
Percentage of L.E.L. fittings	100.00	%

External

External lights fitted	Yes
Light and motion sensor	Yes

23.0 Electricity Tariff

Standard

24.0 Main Heating 1

Description	Database	
Percentage of Heat	Gas Combi	%
Database Ref. No.	100	
Fuel Type	17960	
Main Heating	Mains gas	
SAP Code	BGW	
In Winter	104	
In Summer	90.2	
Controls	76.4	
PCDF Controls	CBE Programmer, room thermostat and TRVs	
Delayed Start Stat	0	
Sap Code	No	
Flue Type	2106	
	Balanced	

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Built)

Fan Assisted Flue	Yes
Is MHS Pumped	Pump in heated space
Heat Emitter	Radiators
Flow Temperature	Normal (> 45°C)
Combi boiler type	Standard Combi
Combi keep hot type	None
25.0 Main Heating 2	None

Community Heating	None
28.0 Water Heating	HWP From main heating 1
Water Heating	Main Heating 1
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
SAP Code	901
29.0 Hot Water Cylinder	None

32.0 Photovoltaic Unit		One Dwelling		
PV Cells kWp	Orientation	Elevation	Overshading	Connected to Dwelling
0.82	South	45°	None Or Little	Yes

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

	Typical Cost	Typical savings per year	Ratings after improvement	
			SAP rating	Environmental Impact
Solar water heating	£4,000 - £6,000	£49	B 90	