



SAP Report Submission for Building Regulations Compliance

Client: Foreman Homes

Project: 17 Haines Crescent
WEST END, SO30 3LG

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

Report Issue Date: 02/08/2022

EXCELLENCE
IN ENERGY
ASSESSMENT

BUILDING REGULATION COMPLIANCE

Calculation Type: New Build (As Built)

Property Reference	SAP 0647 Flat 99	Issued on Date	02/08/2022
Assessment Reference	As Built	Prop Type Ref	J (HA-AR)
Property	17 Haines Crescent, WEST END, SO30 3LG		
SAP Rating	82 B	DER	14.23
Environmental	91 B	TER	19.87
CO ₂ Emissions (t/year)	0.56	% DER<TER	28.37
General Requirements Compliance	Pass	DFEE	44.64
		TFEE	47.18
		% DFEE<TFEE	5.39
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)	19.87	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	14.23	kgCO ₂ /m ²	Pass
	-5.64 (-28.4%)	kgCO ₂ /m ²	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	47.18	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	44.64	kWh/m ² /yr	
	-2.6 (-5.5%)	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)	0.27 (max. 0.70)	Pass
Party wall	0.00 (max. 0.20)	-	Pass
Roof	0.13 (max. 0.20)	0.17 (max. 0.35)	Pass
Openings	1.21 (max. 2.00)	1.40 (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	4.37 (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
Worcester Greenstar 30Si Compact ErP
Combi boiler
Efficiency: 89.8% 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

0.35

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 East

2.88 m², No overhang

Air change rate

3.00 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

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

Maximum

10.0 m³/(h.m²) @ 50 Pa

Pass

10 Key features

Party wall U-value

0.00

W/m²K

Roof U-value

0.10

W/m²K

Door U-value

1.10

W/m²K

Photovoltaic array

628.87

kWh/Year

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THERMAL BRIDGING

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Environmental	91 B	TER	19.87
CO ₂ Emissions (t/year)	0.56	% DER<TER	28.37
General Requirements Compliance	Pass	DFEE	44.64
		TFEE	47.18
		% DFEE<TFEE	5.39
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			E477-0001
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	Junction detail	Source Type	Psi (W/mK)	Length (m)	Result	Reference
External wall	E2 Other lintels (including other steel lintels)	Table K1 - Approved	0.300	2.11	0.63	
External wall	E3 Sill	Table K1 - Approved	0.040	1.20	0.05	
External wall	E4 Jamb	Table K1 - Approved	0.050	6.60	0.33	
External wall	E7 Party floor between dwellings (in blocks of flats)	Table K1 - Approved	0.070	29.56	2.07	
External wall	E24 Eaves (insulation at ceiling level - inverted)	Table K1 - Default	0.240	1.47	0.35	
External wall	E11 Eaves (insulation at rafter level)	Table K1 - Approved	0.040	16.63	0.67	
External wall	E12 Gable (insulation at ceiling level)	Table K1 - Approved	0.240	5.41	1.30	
External wall	E13 Gable (insulation at rafter level)	Table K1 - Approved	0.040	5.11	0.20	
External wall	E16 Corner (normal)	Table K1 - Approved	0.090	10.62	0.96	
External wall	E17 Corner (inverted – internal area greater than external area)	Table K1 - Approved	-0.090	6.60	-0.59	
External wall	E18 Party wall between dwellings	Table K1 - Approved	0.060	1.05	0.06	
External wall	E25 Staggered party wall between dwellings	Table K1 - Default	0.120	2.35	0.28	
Party wall	P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	Table K1 - Default	0.000	3.49	0.00	
Party wall	P4 Party wall - Roof (insulation at ceiling level)	Table K1 - Default	0.240	1.70	0.41	
Party wall	P5 Party wall - Roof (insulation at rafter level)	Table K1 - Default	0.080	2.13	0.17	
External roof	R1 Head of roof window	Table K1 - Default	0.080	2.14	0.17	
External roof	R2 Sill of roof window	Table K1 - Default	0.060	2.14	0.13	
External roof	R3 Jamb of roof window	Table K1 - Default	0.080	2.36	0.19	
External roof	R4 Ridge (vaulted ceiling)	Table K1 - Default	0.080	0.62	0.05	
External roof	R5 Ridge (inverted)	Table K1 - Default	0.040	2.97	0.12	
External roof	R6 Flat ceiling	Table K1 - Default	0.060	20.76	1.25	
External roof	R7 Flat ceiling (inverted)	Table K1 - Default	0.040	7.18	0.29	
External roof	R8 Roof to wall (rafter)	Table K1 - Default	0.060	5.03	0.30	

Total: **9.38** W/mK:
Y-Value: **0.082** W/m²K:

FULL SAP CALCULATION PRINTOUT

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FULL SAP CALCULATION PRINTOUT

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

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

DWELLING AS BUILT

Top-floor flat, total floor area 55 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) 19.87 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 14.23 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)47.2 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)44.6 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.24 (max. 0.30)	0.27 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	(no floor)		
Roof	0.13 (max. 0.20)	0.17 (max. 0.35)	OK
Openings	1.21 (max. 2.00)	1.40 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals: 4.37 (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
Worcester Greenstar 30Si Compact ErP
Combi boiler
Efficiency: 89.8% 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: 0.35
Maximum 0.7 OK

9 Summertime temperature

Overheating risk (Southern England): Slight OK
Based on:
Overshading: Average
Windows facing North East: 2.88 m², No overhang
Air change rate: 3.00 ach
Blinds/curtains: None

10 Key features

Party wall U-value 0.00 W/m²K
Roof U-value 0.10 W/m²K
Door U-value 1.10 W/m²K
Photovoltaic array 628.87 kWh/Year

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	54.6200 (1b)	x 2.1400 (2b)	= 116.8868 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.6200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 116.8868 (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					4.3700
Infiltration rate					0.2185 (18)
Number of sides sheltered					1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =				0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =				0.2021 (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	0.2577	0.2526	0.2476	0.2223	0.2173	0.1920	0.1920	0.1870	0.2021	0.2173	0.2274	0.2375 (22b)
Mechanical extract ventilation - centralised												0.5000 (23a)
If mechanical ventilation:												0.5000 (23a)
Effective ac	0.5077	0.5026	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			1.9200	1.1000	2.1120		(26)
Windows (Uw = 1.20)			2.8800	1.1450	3.2977		(27)
Roof Window (Uw = 1.40)			1.1100	1.3258	1.4716		(27a)
Cavity Walls	24.3600	1.4400	22.9200	0.2700	6.1884		(29a)
Wall to Corridor	13.2100	1.9200	11.2900	0.2041	2.3041		(29a)
Walls Inset	12.0900		12.0900	0.2200	2.6598		(29a)
Dormer	3.7700	1.4400	2.3300	0.2100	0.4893		(29a)
Pitched Roof	34.7000		34.7000	0.1000	3.4700		(30)
Sloping Ceilings	25.8400	1.1100	24.7300	0.1700	4.2041		(30)
Total net area of external elements Aum(A, m2)			113.9700				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	26.1970		(33)
Party Wall 1			7.1100	0.0000	0.0000		(32)
Party Floor 1			49.7900				(32d)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							9.3776 (36)
Total fabric heat loss						(33) + (36) =	35.5746 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 19.5831	Feb 19.3882	Mar 19.2863	Apr 19.2863	May 19.2863	Jun 19.2863	Jul 19.2863	Aug 19.2863	Sep 19.2863	Oct 19.2863	Nov 19.2863	Dec 19.2863 (38)
Heat transfer coeff	55.1577	54.9628	54.8609	54.8609	54.8609	54.8609	54.8609	54.8609	54.8609	54.8609	54.8609	54.8609 (39)
Average = Sum(39)m / 12 =												54.8941 (39)
HLP	Jan 1.0098	Feb 1.0063	Mar 1.0044	Apr 1.0044	May 1.0044	Jun 1.0044	Jul 1.0044	Aug 1.0044	Sep 1.0044	Oct 1.0044	Nov 1.0044	Dec 1.0044 (40)
HLP (average)												1.0050 (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												1.8262 (42)
Average daily hot water use (litres/day)												77.5726 (43)
Daily hot water use	Jan 85.3299	Feb 82.2270	Mar 79.1241	Apr 76.0212	May 72.9183	Jun 69.8154	Jul 69.8154	Aug 72.9183	Sep 76.0212	Oct 79.1241	Nov 82.2270	Dec 85.3299 (44)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Energy conte	126.5418	110.6743	114.2059	99.5675	95.5374	82.4415	76.3942	87.6634	88.7104	103.3834	112.8511	122.5490 (45)
Energy content (annual)										Total =	Sum (45)m =	1220.5197 (45)
Distribution loss (46)m = 0.15 x (45)m	18.9813	16.6011	17.1309	14.9351	14.3306	12.3662	11.4591	13.1495	13.3066	15.5075	16.9277	18.3823 (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	31.1552	28.1278	31.1218	30.0955	31.0825	30.0611	31.0514	31.0715	30.0798	31.1055	30.1280	31.1488 (61)
Total heat required for water heating calculated for each month	157.6970	138.8021	145.3277	129.6630	126.6198	112.5025	107.4456	118.7350	118.7902	134.4889	142.9791	153.6977 (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	157.6970	138.8021	145.3277	129.6630	126.6198	112.5025	107.4456	118.7350	118.7902	134.4889	142.9791	153.6977 (64)
Heat gains from water heating, kWh/month	49.8640	43.8311	45.7539	40.6301	39.5368	34.9271	33.1639	36.9160	37.0162	42.1514	45.0550	48.5347 (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	91.3108	91.3108	91.3108	91.3108	91.3108	91.3108	91.3108	91.3108	91.3108	91.3108	91.3108	91.3108 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	17.2449	15.3168	12.4564	9.4303	7.0493	5.9513	6.4306	8.3587	11.2190	14.2451	16.6262	17.7242 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	159.2058	160.8578	156.6947	147.8319	136.6442	126.1293	119.1047	117.4527	121.6158	130.4786	141.6663	152.1812 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.1311	32.1311	32.1311	32.1311	32.1311	32.1311	32.1311	32.1311	32.1311	32.1311	32.1311	32.1311 (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)	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487 (71)
Water heating gains (Table 5)	67.0214	65.2249	61.4972	56.4307	53.1408	48.5098	44.5752	49.6182	51.4113	56.6551	62.5764	65.2348 (72)
Total internal gains	296.8653	294.7927	284.0416	267.0861	250.2275	233.9836	223.5037	228.8229	237.6394	254.7721	274.2621	288.5335 (73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g	Specific data or Table 6b	FF	Specific data or Table 6c	Access factor Table 6d	Gains W	
Northeast				2.8800	11.2829		0.6300		0.7000	0.7700	9.9309 (75)	
Southwest				1.1100	39.9751		0.6300		0.7000	1.0000	17.6114 (82)	
Solar gains	27.5423	52.5882	85.8120	127.5755	160.8592	167.2153	158.1124	132.3846	100.2664	61.9747	34.0518	22.8670 (83)
Total gains	324.4076	347.3809	369.8535	394.6616	411.0868	401.1990	381.6161	361.2075	337.9059	316.7468	308.3140	311.4004 (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	68.7675	69.0114	69.1395	69.1395	69.1395	69.1395	69.1395	69.1395	69.1395	69.1395	69.1395	69.1395
alpha	5.5845	5.6008	5.6093	5.6093	5.6093	5.6093	5.6093	5.6093	5.6093	5.6093	5.6093	5.6093
util living area	0.9981	0.9968	0.9927	0.9773	0.9239	0.7869	0.6138	0.6676	0.8924	0.9833	0.9963	0.9985 (86)
MIT	19.9460	20.0489	20.2434	20.5088	20.7697	20.9374	20.9874	20.9802	20.8640	20.5423	20.1956	19.9213 (87)
Th 2	20.0751	20.0781	20.0797	20.0797	20.0797	20.0797	20.0797	20.0797	20.0797	20.0797	20.0797	20.0797 (88)
util rest of house	0.9975	0.9957	0.9900	0.9682	0.8918	0.7056	0.4950	0.5492	0.8359	0.9748	0.9948	0.9980 (89)
MIT 2	19.1108	19.2158	19.4105	19.6713	19.9152	20.0487	20.0762	20.0735	19.9991	19.7065	19.3637	19.0898 (90)
Living area fraction	19.4813	19.5854	19.7800	20.0428	20.2943	20.4430	20.4804	20.4757	20.3828	20.0773	19.7327	19.4587 (92)
MIT	19.4813	19.5854	19.7800	20.0428	20.2943	20.4430	20.4804	20.4757	20.3828	20.0773	19.7327	19.4587 (93)
Temperature adjustment												0.0000
adjusted MIT	19.4813	19.5854	19.7800	20.0428	20.2943	20.4430	20.4804	20.4757	20.3828	20.0773	19.7327	19.4587 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	323.4093	345.6134	365.7449	381.9399	370.1252	296.8800	209.2419	217.5631	289.5823	308.7654	306.4847	310.6367 (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	837.3644	807.1506	728.5531	611.3044	471.4898	320.5496	212.8818	223.5976	344.6799	519.9316	693.0435	837.1047 (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	382.3826	310.1530	269.9293	165.1424	75.4152	0.0000	0.0000	0.0000	0.0000	157.1076	278.3224	391.6922 (98)
Space heating												2030.1447 (98)
Space heating per m ²										(98) / (4) =		37.1685 (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 %)													90.7000	(206)
Efficiency of secondary/supplementary heating system, %													0.0000	(208)
Space heating requirement													2238.3073	(211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Space heating requirement	382.3826	310.1530	269.9293	165.1424	75.4152	0.0000	0.0000	0.0000	0.0000	157.1076	278.3224	391.6922	(98)	
Space heating efficiency (main heating system 1)	90.7000	90.7000	90.7000	90.7000	90.7000	0.0000	0.0000	0.0000	0.0000	90.7000	90.7000	90.7000	(210)	
Space heating fuel (main heating system)	421.5905	341.9548	297.6067	182.0755	83.1480	0.0000	0.0000	0.0000	0.0000	173.2168	306.8604	431.8547	(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	157.6970	138.8021	145.3277	129.6630	126.6198	112.5025	107.4456	118.7350	118.7902	134.4889	142.9791	153.6977	(64)	
Efficiency of water heater (217)m	89.5875	89.5229	89.3698	89.0346	88.3453	87.0000	87.0000	87.0000	87.0000	88.9552	89.4095	89.6258	(216)	
Fuel for water heating, kWh/month	176.0257	155.0464	162.6138	145.6322	143.3238	129.3133	123.5007	136.4770	136.5405	151.1873	159.9148	171.4882	(219)	
Water heating fuel used												1791.0637	(219)	
Annual totals kWh/year														
Space heating fuel - main system													2238.3073	(211)
Space heating fuel - secondary													0.0000	(215)
Electricity for pumps and fans:														
(MEV)Centralised, Database: in-use factor = 1.4000, SFP = 0.4900)														
mechanical ventilation fans (SFP = 0.4900)													69.8749	(230a)
central heating pump													30.0000	(230c)
main heating flue fan													45.0000	(230e)
Total electricity for the above, kWh/year													144.8749	(231)
Electricity for lighting (calculated in Appendix L)													304.5500	(232)
Energy saving/generation technologies (Appendices M ,N and Q)														
Total delivered energy for all uses													4478.7960	(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	2238.3073	0.2160	483.4744	(261)
Space heating - secondary	0.0000	0.0000	0.0000	(263)
Water heating (other fuel)	1791.0637	0.2160	386.8698	(264)
Space and water heating			870.3441	(265)
Pumps and fans	144.8749	0.5190	75.1901	(267)
Energy for lighting	304.5500	0.5190	158.0615	(268)
Energy saving/generation technologies				
PV Unit	-628.8700	0.5190	-326.3835	(269)
Total CO2, kg/year			777.2122	(272)
Dwelling Carbon Dioxide Emission Rate (DER)			14.2300	(273)

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

DER			14.2300	ZC1
Total Floor Area		TFA	54.6200	
Assumed number of occupants		N	1.8262	
CO2 emission factor in Table 12 for electricity displaced from grid		EF	0.5190	
CO2 emissions from appliances, equation (L14)			17.2724	ZC2
CO2 emissions from cooking, equation (L16)			2.9811	ZC3
Total CO2 emissions			34.4836	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			34.4836	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	54.6200 (1b)	x 2.1400 (2b)	= 116.8868 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.6200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 116.8868 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					2 * 10 = 20.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
					Air changes per hour
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					20.0000 / (5) = 0.1711 (8)
Pressure test					Yes
Measured/design AP50					5.0000
Infiltration rate					0.4211 (18)
Number of sides sheltered					1 (19)
Shelter factor					(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor					(21) = (18) x (20) = 0.3895 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate												
Effective ac	0.4966	0.4869	0.4772	0.4285	0.4187	0.3700	0.3700	0.3603	0.3895	0.4187	0.4382	0.4577 (22b)
	0.6233	0.6185	0.6138	0.5918	0.5877	0.5685	0.5685	0.5649	0.5759	0.5877	0.5960	0.6047 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
TER Opaque door			1.9200	1.0000	1.9200		(26)
TER Opening Type (Uw = 1.40)			2.8800	1.3258	3.8182		(27)
TER Room Window (Uw = 1.70)			1.1100	1.5918	1.7669		(27a)
Cavity Walls	24.3600	1.4400	22.9200	0.1800	4.1256		(29a)
Wall to Corridor	13.2100	1.9200	11.2900	0.1800	2.0322		(29a)
Walls Inset	12.0900		12.0900	0.1800	2.1762		(29a)
Dormer	3.7700	1.4400	2.3300	0.1800	0.4194		(29a)
Pitched Roof	34.7000		34.7000	0.1300	4.5110		(30)
Sloping Ceilings	25.8400	1.1100	24.7300	0.1300	3.2149		(30)
Total net area of external elements Aum(A, m ²)			113.9700				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	23.9843		(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)	7.7477 (36)
Total fabric heat loss	(33) + (36) = 31.7320 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	24.0433	23.8586	23.6776	22.8271	22.6680	21.9273	21.9273	21.7901	22.2126	22.6680	22.9899	23.3264 (38)
Heat transfer coeff	55.7754	55.5907	55.4096	54.5592	54.4000	53.6593	53.6593	53.5222	53.9446	54.4000	54.7219	55.0584 (39)
Average = Sum(39)m / 12 =												54.5584 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.0212	1.0178	1.0145	0.9989	0.9960	0.9824	0.9824	0.9799	0.9876	0.9960	1.0019	1.0080 (40)
HLP (average)												0.9989 (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	1.8262 (42)
Average daily hot water use (litres/day)	77.5726 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	85.3299	82.2270	79.1241	76.0212	72.9183	69.8154	69.8154	72.9183	76.0212	79.1241	82.2270	85.3299 (44)
Energy conte	126.5418	110.6743	114.2059	99.5675	95.5374	82.4415	76.3942	87.6634	88.7104	103.3834	112.8511	122.5490 (45)
Energy content (annual)												Total = Sum(45)m = 1220.5197 (45)
Distribution loss (46)m = 0.15 x (45)m												
	18.9813	16.6011	17.1309	14.9351	14.3306	12.3662	11.4591	13.1495	13.3066	15.5075	16.9277	18.3823 (46)
Water storage loss:												

FULL SAP CALCULATION PRINTOUT

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CALCULATION OF TARGET EMISSIONS 09 Jan 2014

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	43.4832	37.8469	40.3208	37.4899	37.1584	34.4295	35.5772	37.1584	37.4899	40.3208	40.5503	43.4832 (61)
Total heat required for water heating calculated for each month	170.0250	148.5212	154.5267	137.0574	132.6957	116.8710	111.9713	124.8218	126.2003	143.7042	153.4014	166.0321 (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	170.0250	148.5212	154.5267	137.0574	132.6957	116.8710	111.9713	124.8218	126.2003	143.7042	153.4014	166.0321 (64)
Heat gains from water heating, kWh/month	52.9459	46.2609	48.0537	42.4787	41.0558	36.0192	34.2953	38.4377	38.8687	44.4552	47.6606	51.6183 (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	91.3108	91.3108	91.3108	91.3108	91.3108	91.3108	91.3108	91.3108	91.3108	91.3108	91.3108	91.3108 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	17.2449	15.3168	12.4564	9.4303	7.0493	5.9513	6.4306	8.3587	11.2190	14.2451	16.6262	17.7242 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	159.2058	160.8578	156.6947	147.8319	136.6442	126.1293	119.1047	117.4527	121.6158	130.4786	141.6663	152.1812 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.1311	32.1311	32.1311	32.1311	32.1311	32.1311	32.1311	32.1311	32.1311	32.1311	32.1311	32.1311 (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)	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487 (71)
Water heating gains (Table 5)	71.1639	68.8407	64.5883	58.9981	55.1825	50.0266	46.0959	51.6635	53.9843	59.7516	66.1952	69.3795 (72)
Total internal gains	301.0078	298.4085	287.1326	269.6536	252.2692	235.5005	225.0244	230.8682	240.2124	257.8686	277.8810	292.6781 (73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W			
Northeast				2.8800	11.2829	0.6300	0.7000	0.7700	9.9309 (75)			
Southwest				1.1100	39.9751	0.6300	0.7000	1.0000	17.6114 (82)			
Solar gains	27.5423	52.5882	85.8120	127.5755	160.8592	167.2153	158.1124	132.3846	100.2664	61.9747	34.0518	22.8670 (83)
Total gains	328.5501	350.9966	372.9446	397.2291	413.1284	402.7158	383.1368	363.2528	340.4788	319.8433	311.9328	315.5451 (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	68.0059	68.2319	68.4548	69.5219	69.7252	70.6877	70.6877	70.8689	70.3139	69.7252	69.3151	68.8914
alpha	5.5337	5.5488	5.5637	5.6348	5.6483	5.7125	5.7125	5.7246	5.6876	5.6483	5.6210	5.5928
util living area	0.9980	0.9966	0.9925	0.9764	0.9211	0.7758	0.6007	0.6523	0.8856	0.9823	0.9961	0.9984 (86)
MIT	19.9373	20.0394	20.2361	20.5185	20.7782	20.9450	20.9895	20.9836	20.8748	20.5549	20.2049	19.9234 (87)
Th 2	20.0657	20.0686	20.0713	20.0843	20.0867	20.0980	20.0980	20.1001	20.0937	20.0867	20.0818	20.0766 (88)
util rest of house	0.9973	0.9955	0.9897	0.9670	0.8883	0.6948	0.4856	0.5374	0.8276	0.9734	0.9945	0.9979 (89)
MIT 2	18.6430	18.7942	19.0827	19.4988	19.8555	20.0585	20.0938	20.0927	19.9859	19.5562	19.0460	18.6308 (90)
Living area fraction										fLA = Living area / (4) =		0.4436 (91)
MIT	19.2172	19.3466	19.5943	19.9512	20.2648	20.4518	20.4911	20.4879	20.3802	19.9992	19.5601	19.2042 (92)
Temperature adjustment												0.0000
adjusted MIT	19.2172	19.3466	19.5943	19.9512	20.2648	20.4518	20.4911	20.4879	20.3802	19.9992	19.5601	19.2042 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9965	0.9943	0.9879	0.9653	0.8956	0.7286	0.5371	0.5887	0.8483	0.9723	0.9933	0.9972 (94)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	21.8544	28.8407	31.0989	30.98343	31.46472 (95)
Heat loss rate W	832.0103	803.0968	725.5524	602.9426	465.9250	314.0014	208.7943	218.7950	338.7822	511.3188	681.8422	826.1083 (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	375.4414	305.1617	265.7080	158.0284	71.3573	0.0000	0.0000	0.0000	0.0000	149.0447	267.8457	380.5270 (98)
Space heating												1973.1143 (98)
Space heating per m2										(98) / (4) =		36.1244 (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													2112.5421 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	375.4414	305.1617	265.7080	158.0284	71.3573	0.0000	0.0000	0.0000	0.0000	149.0447	267.8457	380.5270	(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)	401.9716	326.7256	284.4840	169.1953	76.3997	0.0000	0.0000	0.0000	0.0000	159.5768	286.7727	407.4165	(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	170.0250	148.5212	154.5267	137.0574	132.6957	116.8710	111.9713	124.8218	126.2003	143.7042	153.4014	166.0321	(64)
Efficiency of water heater (217)m	86.9895	86.8249	86.4038	85.4103	83.5649	80.3000	80.3000	80.3000	80.3000	85.1431	86.4407	80.3000	(216)
Fuel for water heating, kWh/month	195.4546	171.0583	178.8425	160.4693	158.7936	145.5430	139.4412	155.4443	157.1610	168.7796	177.4643	190.6814	(219)
Water heating fuel used												1999.1330	(219)
Annual totals kWh/year													
Space heating fuel - main system												2112.5421	(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)												304.5500	(232)
Total delivered energy for all uses												4491.2251	(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	2112.5421	0.2160	456.3091 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1999.1330	0.2160	431.8127 (264)
Space and water heating			888.1218 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	304.5500	0.5190	158.0615 (268)
Total CO2, kg/m2/year			1085.1083 (272)
Emissions per m2 for space and water heating			16.2600 (272a)
Fuel factor (mains gas)			1.0000
Emissions per m2 for lighting			2.8938 (272b)
Emissions per m2 for pumps and fans			0.7127 (272c)
Target Carbon Dioxide Emission Rate (TER) = (16.2600 * 1.00) + 2.8938 + 0.7127, rounded to 2 d.p.			19.8700 (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	54.6200 (1b)	x 2.1400 (2b)	= 116.8868 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.6200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 116.8868 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					2 * 10 = 20.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
					Air changes per hour
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					20.0000 / (5) = 0.1711 (8)
Pressure test					Yes
Measured/design AP50					4.3700
Infiltration rate					0.3896 (18)
Number of sides sheltered					1 (19)
Shelter factor					(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor					(21) = (18) x (20) = 0.3604 (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	0.4595	0.4505	0.4415	0.3964	0.3874	0.3424	0.3424	0.3334	0.3604	0.3874	0.4054	0.4235 (22b)
Effective ac	0.6056	0.6015	0.5974	0.5786	0.5750	0.5586	0.5586	0.5556	0.5649	0.5750	0.5822	0.5897 (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			1.9200	1.1000	2.1120		(26)
Windows (Uw = 1.20)			2.8800	1.1450	3.2977		(27)
Roof Window (Uw = 1.40)			1.1100	1.3258	1.4716		(27a)
Cavity Walls	24.3600	1.4400	22.9200	0.2700	6.1884		(29a)
Wall to Corridor	13.2100	1.9200	11.2900	0.2041	2.3041		(29a)
Walls Inset	12.0900		12.0900	0.2200	2.6598		(29a)
Dormer	3.7700	1.4400	2.3300	0.2100	0.4893		(29a)
Pitched Roof	34.7000		34.7000	0.1000	3.4700		(30)
Sloping Ceilings	25.8400	1.1100	24.7300	0.1700	4.2041		(30)
Total net area of external elements Aum(A, m ²)			113.9700				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	26.1970		(33)
Party Wall 1			7.1100	0.0000	0.0000		(32)
Party Floor 1			49.7900				(32d)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K 250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K) 9.3776 (36)
Total fabric heat loss (33) + (36) = 35.5746 (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	23.3583	23.2002	23.0452	22.3172	22.1810	21.5470	21.5470	21.4295	21.7912	22.1810	22.4565	22.7446 (38)
Heat transfer coeff	58.9329	58.7747	58.6198	57.8918	57.7556	57.1215	57.1215	57.0041	57.3658	57.7556	58.0311	58.3192 (39)
Average = Sum(39)m / 12 =												57.8911 (39)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.0790	1.0761	1.0732	1.0599	1.0574	1.0458	1.0458	1.0436	1.0503	1.0574	1.0625	1.0677 (40)
HLP (average)												1.0599 (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												1.8262 (42)
Average daily hot water use (litres/day)												77.5726 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	85.3299	82.2270	79.1241	76.0212	72.9183	69.8154	69.8154	72.9183	76.0212	79.1241	82.2270	85.3299 (44)
Energy conte	126.5418	110.6743	114.2059	99.5675	95.5374	82.4415	76.3942	87.6634	88.7104	103.3834	112.8511	122.5490 (45)
Energy content (annual)												Total = Sum(45)m = 1220.5197 (45)
Distribution loss (46)m = 0.15 x (45)m												

FULL SAP CALCULATION PRINTOUT

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Water storage loss:	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
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	26.8901	23.5183	24.2688	21.1581	20.3017	17.5188	16.2338	18.6285	18.8510	21.9690	23.9809	26.0417 (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	91.3108	91.3108	91.3108	91.3108	91.3108	91.3108	91.3108	91.3108	91.3108	91.3108	91.3108	91.3108	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	17.2449	15.3168	12.4564	9.4303	7.0493	5.9513	6.4306	8.3587	11.2190	14.2451	16.6262	17.7242	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	159.2058	160.8578	156.6947	147.8319	136.6442	126.1293	119.1047	117.4527	121.6158	130.4786	141.6663	152.1812	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.1311	32.1311	32.1311	32.1311	32.1311	32.1311	32.1311	32.1311	32.1311	32.1311	32.1311	32.1311	(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)	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487	(71)
Water heating gains (Table 5)	36.1426	34.9974	32.6193	29.3862	27.2872	24.3317	21.8196	25.0383	26.1819	29.5282	33.3067	35.0022	(72)
Total internal gains	262.9865	261.5653	252.1637	237.0417	221.3739	206.8055	197.7481	201.2429	209.4100	224.6452	241.9925	255.3008	(73)

6. Solar gains

[Jan]				Area	Solar flux	g		FF	Access		Gains	
				m2	Table 6a	Specific data		Specific data	factor		W	
					W/m2	or Table 6b		or Table 6c	Table 6d			
Northeast				2.8800	11.2829	0.6300		0.7000	0.7700		9.9309 (75)	
Southwest				1.1100	39.9751	0.6300		0.7000	1.0000		17.6114 (82)	

Solar gains	27.5423	52.5882	85.8120	127.5755	160.8592	167.2153	158.1124	132.3846	100.2664	61.9747	34.0518	22.8670 (83)
Total gains	290.5288	314.1534	337.9756	364.6172	382.2331	374.0208	355.8605	333.6275	309.6764	286.6199	276.0443	278.1678 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	64.3623	64.5355	64.7061	65.5198	65.6743	66.4032	66.4032	66.5400	66.1205	65.6743	65.3624	65.0396	
alpha	5.2908	5.3024	5.3137	5.3680	5.3783	5.4269	5.4269	5.4360	5.4080	5.3783	5.3575	5.3360	
util living area	0.9989	0.9981	0.9955	0.9854	0.9478	0.8346	0.6711	0.7283	0.9272	0.9901	0.9979	0.9991	(86)
MIT	19.7911	19.8972	20.1045	20.4035	20.6942	20.9064	20.9780	20.9663	20.8096	20.4458	20.0719	19.7749	(87)
Th 2	20.0181	20.0204	20.0228	20.0337	20.0358	20.0453	20.0453	20.0471	20.0417	20.0358	20.0316	20.0273	(88)
util rest of house	0.9985	0.9974	0.9938	0.9790	0.9227	0.7575	0.5429	0.6043	0.8814	0.9848	0.9970	0.9988	(89)
MIT 2	18.9098	19.0176	19.2261	19.5310	19.8106	19.9967	20.0390	20.0361	19.9228	19.5763	19.2013	18.9010	(90)
Living area fraction									fLA = Living area / (4) =			0.4436	(91)
MIT	19.3007	19.4078	19.6158	19.9181	20.2026	20.4003	20.4556	20.4487	20.3162	19.9620	19.5875	19.2887	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.3007	19.4078	19.6158	19.9181	20.2026	20.4003	20.4556	20.4487	20.3162	19.9620	19.5875	19.2887	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9981	0.9968	0.9929	0.9781	0.9278	0.7890	0.6006	0.6600	0.8969	0.9843	0.9965	0.9985	(94)
Ext temp.	289.9873	313.1557	335.5598	356.6305	354.6356	295.1183	213.7294	220.2093	277.7477	282.1075	275.0715	277.7597	(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	884.0371	852.6930	768.8439	637.8550	491.0700	331.3195	220.2365	230.7941	356.5964	540.7097	724.6626	879.9593	(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 per m2	441.9730	362.5691	322.3634	202.4816	101.5072	0.0000	0.0000	0.0000	0.0000	192.4000	323.7056	448.0365	(98)
												2395.0364	(98)
												43.8491	(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	536.9425	422.6994	433.2314	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8067	0.8867	0.8591	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	433.1268	374.8075	372.1750	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	493.4570	471.6221	448.7223	0.0000	0.0000	0.0000	0.0000	(103)

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Month fraction	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	43.4378	72.0301	56.9512	0.0000	0.0000	0.0000	0.0000 (104)
Space cooling												172.4190 (104)
Cooled fraction									fC = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)	0.0000	0.0000	0.0000	0.0000	0.0000	0.2500	0.2500	0.2500	0.0000	0.0000	0.0000	0.0000 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	10.8594	18.0075	14.2378	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling												43.1048 (107)
Space cooling per m2												0.7892 (108)
Energy for space heating												43.8491 (99)
Energy for space cooling												0.7892 (108)
Total												44.6382 (109)
Dwelling Fabric Energy Efficiency (DFEE)												44.6 (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	54.6200 (1b)	x 2.1400 (2b)	= 116.8868 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.6200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 116.8868 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					2 * 10 = 20.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
					Air changes per hour
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					20.0000 / (5) = 0.1711 (8)
Pressure test					Yes
Measured/design AP50					5.0000
Infiltration rate					0.4211 (18)
Number of sides sheltered					1 (19)
Shelter factor			(20) = 1 - [0.075 x (19)] =		0.9250 (20)
Infiltration rate adjusted to include shelter factor			(21) = (18) x (20) =		0.3895 (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												
	0.4966	0.4869	0.4772	0.4285	0.4187	0.3700	0.3700	0.3603	0.3895	0.4187	0.4382	0.4577 (22b)
Effective ac	0.6233	0.6185	0.6138	0.5918	0.5877	0.5685	0.5685	0.5649	0.5759	0.5877	0.5960	0.6047 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
TER Opaque door			1.9200	1.0000	1.9200		(26)
TER Opening Type (Uw = 1.40)			2.8800	1.3258	3.8182		(27)
TER Room Window (Uw = 1.70)			1.1100	1.5918	1.7669		(27a)
Cavity Walls	24.3600	1.4400	22.9200	0.1800	4.1256		(29a)
Wall to Corridor	13.2100	1.9200	11.2900	0.1800	2.0322		(29a)
Walls Inset	12.0900		12.0900	0.1800	2.1762		(29a)
Dormer	3.7700	1.4400	2.3300	0.1800	0.4194		(29a)
Pitched Roof	34.7000		34.7000	0.1300	4.5110		(30)
Sloping Ceilings	25.8400	1.1100	24.7300	0.1300	3.2149		(30)
Total net area of external elements Aum(A, m ²)			113.9700				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		23.9843		(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)												7.7477 (36)
Total fabric heat loss												(33) + (36) = 31.7320 (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	24.0433	23.8586	23.6776	22.8271	22.6680	21.9273	21.9273	21.7901	22.2126	22.6680	22.9899	23.3264 (38)
Average = Sum(39)m / 12 =	55.7754	55.5907	55.4096	54.5592	54.4000	53.6593	53.6593	53.5222	53.9446	54.4000	54.7219	55.0584 (39)
												54.5584 (39)
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0212	1.0178	1.0145	0.9989	0.9960	0.9824	0.9824	0.9799	0.9876	0.9960	1.0019	1.0080 (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												1.8262 (42)
Average daily hot water use (litres/day)												77.5726 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	85.3299	82.2270	79.1241	76.0212	72.9183	69.8154	69.8154	72.9183	76.0212	79.1241	82.2270	85.3299 (44)
Energy content (annual)	126.5418	110.6743	114.2059	99.5675	95.5374	82.4415	76.3942	87.6634	88.7104	103.3834	112.8511	122.5490 (45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 1220.5197 (45)
	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:												

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Calculation Type: New Build (As Built)

CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

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	26.8901	23.5183	24.2688	21.1581	20.3017	17.5188	16.2338	18.6285	18.8510	21.9690	23.9809	26.0417 (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	91.3108	91.3108	91.3108	91.3108	91.3108	91.3108	91.3108	91.3108	91.3108	91.3108	91.3108	91.3108	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	17.2449	15.3168	12.4564	9.4303	7.0493	5.9513	6.4306	8.3587	11.2190	14.2451	16.6262	17.7242	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	159.2058	160.8578	156.6947	147.8319	136.6442	126.1293	119.1047	117.4527	121.6158	130.4786	141.6663	152.1812	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.1311	32.1311	32.1311	32.1311	32.1311	32.1311	32.1311	32.1311	32.1311	32.1311	32.1311	32.1311	(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)	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487	(71)
Water heating gains (Table 5)	36.1426	34.9974	32.6193	29.3862	27.2872	24.3317	21.8196	25.0383	26.1819	29.5282	33.3067	35.0022	(72)
Total internal gains	262.9865	261.5653	252.1637	237.0417	221.3739	206.8055	197.7481	201.2429	209.4100	224.6452	241.9925	255.3008	(73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W		
Northeast					2.8800	11.2829	0.6300	0.7000	0.7700	9.9309 (75)		
Southwest					1.1100	39.9751	0.6300	0.7000	1.0000	17.6114 (82)		
Solar gains	27.5423	52.5882	85.8120	127.5755	160.8592	167.2153	158.1124	132.3846	100.2664	61.9747	34.0518	22.8670 (83)
Total gains	290.5288	314.1534	337.9756	364.6172	382.2331	374.0208	355.8605	333.6275	309.6764	286.6199	276.0443	278.1678 (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	68.0059	68.2319	68.4548	69.5219	69.7252	70.6877	70.6877	70.8689	70.3139	69.7252	69.3151	68.8914	
alpha	5.5337	5.5488	5.5637	5.6348	5.6483	5.7125	5.7125	5.7246	5.6876	5.6483	5.6210	5.5928	
util living area	0.9989	0.9981	0.9953	0.9839	0.9406	0.8124	0.6406	0.6989	0.9166	0.9893	0.9979	0.9992	(86)
MIT	19.8709	19.9755	20.1766	20.4671	20.7410	20.9298	20.9856	20.9769	20.8434	20.5007	20.1426	19.8579	(87)
Th 2	20.0657	20.0686	20.0713	20.0843	20.0867	20.0980	20.0980	20.1001	20.0937	20.0867	20.0818	20.0766	(88)
util rest of house	0.9985	0.9974	0.9935	0.9771	0.9137	0.7349	0.5209	0.5810	0.8682	0.9836	0.9970	0.9989	(89)
MIT 2	19.0282	19.1349	19.3376	19.6353	19.8974	20.0622	20.0939	20.0927	19.9971	19.6725	19.3128	19.0241	(90)
Living area fraction									fLA = Living area / (4) =			0.4436	(91)
MIT	19.4021	19.5078	19.7098	20.0043	20.2717	20.4471	20.4894	20.4849	20.3726	20.0399	19.6809	19.3940	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.4021	19.5078	19.7098	20.0043	20.2717	20.4471	20.4894	20.4849	20.3726	20.0399	19.6809	19.3940	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9982	0.9968	0.9926	0.9764	0.9200	0.7673	0.5746	0.6340	0.8854	0.9833	0.9965	0.9986	(94)
Ext temp.	290.0019	313.1603	335.4898	356.0167	351.6599	286.9967	204.4934	211.5139	274.1950	281.8206	275.0704	277.7746	(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	842.3235	812.0588	731.9484	605.8400	466.2982	313.7523	208.7048	218.6344	338.3710	513.5308	688.4511	836.5585	(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 per m2	410.9272	335.2598	294.9651	179.8728	85.2909	0.0000	0.0000	0.0000	0.0000	172.3924	297.6341	415.7353	(98)
												2192.0776	(98)
												40.1332	(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	504.3976	397.0790	406.7684	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8415	0.9136	0.8897	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	424.4682	362.7829	361.8961	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	493.4570	471.6221	448.7223	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													

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

Space cooling	0.0000	0.0000	0.0000	0.0000	0.0000	49.6719	80.9764	64.5987	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction												195.2470 (104)
Intermittency factor (Table 10b)									fC = cooled area / (4) =			1.0000 (105)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.2500	0.2500	0.2500	0.0000	0.0000	0.0000	0.0000 (106)
Space cooling	0.0000	0.0000	0.0000	0.0000	0.0000	12.4180	20.2441	16.1497	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling per m2												48.8118 (107)
Energy for space heating												0.8937 (108)
Energy for space cooling												40.1332 (99)
Total												0.8937 (108)
Target Fabric Energy Efficiency (TFEE)												41.0269 (109)
												47.2 (109)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF HEAT DEMAND 09 Jan 2014

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

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	54.6200 (1b)	x 2.1400 (2b)	= 116.8868 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.6200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 116.8868 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					0 * 10 = 0.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					Air changes per hour
Pressure test					0.0000 / (5) = 0.0000 (8)
Measured/design AP50					Yes
Infiltration rate					4.3700
Number of sides sheltered					0.2185 (18)
					1 (19)
Shelter factor				(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor				(21) = (18) x (20) =	0.2021 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	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	0.2375	0.2223	0.2223	0.2021	0.2072	0.1971	0.1971	0.1920	0.1920	0.2072	0.2021	0.2072 (22b)
Mechanical extract ventilation - centralised												0.5000 (23a)
If mechanical ventilation:												0.5000 (23a)
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Front Door			1.9200	1.1000	2.1120		(26)
Windows (Uw = 1.20)			2.8800	1.1450	3.2977		(27)
Roof Window (Uw = 1.40)			1.1100	1.3258	1.4716		(27a)
Cavity Walls	24.3600	1.4400	22.9200	0.2700	6.1884		(29a)
Wall to Corridor	13.2100	1.9200	11.2900	0.2041	2.3041		(29a)
Walls Inset	12.0900		12.0900	0.2200	2.6598		(29a)
Dormer	3.7700	1.4400	2.3300	0.2100	0.4893		(29a)
Pitched Roof	34.7000		34.7000	0.1000	3.4700		(30)
Sloping Ceilings	25.8400	1.1100	24.7300	0.1700	4.2041		(30)
Total net area of external elements Aum(A, m ²)			113.9700				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	26.1970		(33)
Party Wall 1			7.1100	0.0000	0.0000		(32)
Party Floor 1			49.7900				(32d)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							9.3776 (36)
Total fabric heat loss						(33) + (36) =	35.5746 (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	19.2863	19.2863	19.2863	19.2863	19.2863	19.2863	19.2863	19.2863	19.2863	19.2863	19.2863	19.2863 (38)
Heat transfer coeff	54.8609	54.8609	54.8609	54.8609	54.8609	54.8609	54.8609	54.8609	54.8609	54.8609	54.8609	54.8609 (39)
Average = Sum(39)m / 12 =												54.8609 (39)
HLP	1.0044	1.0044	1.0044	1.0044	1.0044	1.0044	1.0044	1.0044	1.0044	1.0044	1.0044	1.0044 (40)
HLP (average)												1.0044 (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												1.8262 (42)
Average daily hot water use (litres/day)												77.5726 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	85.3299	82.2270	79.1241	76.0212	72.9183	69.8154	69.8154	72.9183	76.0212	79.1241	82.2270	85.3299 (44)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF HEAT DEMAND 09 Jan 2014

Energy content (annual)	126.5418	110.6743	114.2059	99.5675	95.5374	82.4415	76.3942	87.6634	88.7104	103.3834	112.8511	122.5490 (45)
Distribution loss (46)m = 0.15 x (45)m	18.9813	16.6011	17.1309	14.9351	14.3306	12.3662	11.4591	13.1495	13.3066	15.5075	16.9277	18.3823 (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	31.1552	28.1278	31.1218	30.0955	31.0825	30.0611	31.0514	31.0715	30.0798	31.1055	30.1280	31.1488 (61)
Total heat required for water heating calculated for each month	157.6970	138.8021	145.3277	129.6630	126.6198	112.5025	107.4456	118.7350	118.7902	134.4889	142.9791	153.6977 (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	157.6970	138.8021	145.3277	129.6630	126.6198	112.5025	107.4456	118.7350	118.7902	134.4889	142.9791	153.6977 (64)
RHI water heating demand	49.8640	43.8311	45.7539	40.6301	39.5368	34.9271	33.1639	36.9160	37.0162	42.1514	45.0550	48.5347 (65)
Heat gains from water heating, kWh/month												
	49.8640	43.8311	45.7539	40.6301	39.5368	34.9271	33.1639	36.9160	37.0162	42.1514	45.0550	48.5347 (65)

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

Metabolic gains (Table 5), Watts												
(66)m	109.5730	109.5730	109.5730	109.5730	109.5730	109.5730	109.5730	109.5730	109.5730	109.5730	109.5730	109.5730 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	43.1122	38.2919	31.1410	23.5758	17.6232	14.8782	16.0764	20.8968	28.0476	35.6129	41.5655	44.3104 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	237.6206	240.0863	233.8727	220.6446	203.9465	188.2527	177.7682	175.3025	181.5161	194.7442	211.4423	227.1361 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	47.7835	47.7835	47.7835	47.7835	47.7835	47.7835	47.7835	47.7835	47.7835	47.7835	47.7835	47.7835 (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)	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487 (71)
Water heating gains (Table 5)	67.0214	65.2249	61.4972	56.4307	53.1408	48.5098	44.5752	49.6182	51.4113	56.6551	62.5764	65.2348 (72)
Total internal gains	435.0620	430.9110	413.8188	387.9589	362.0184	338.9486	325.7277	333.1253	348.2829	374.3200	402.8920	423.9892 (73)

6. Solar gains

[Jan]				Area	Solar flux	g		FF	Access		Gains	
				m2	Table 6a	Specific data		Specific data	factor		W	
					W/m2	or Table 6b		or Table 6c	Table 6d			
Northeast				2.8800	14.6130	0.6300		0.7000	0.7700		12.8619 (75)	
Southwest				1.1100	50.1759	0.6300		0.7000	1.0000		22.1054 (82)	

Solar gains	34.9673	57.0620	95.1368	142.0116	168.1370	193.1091	175.5574	153.7087	116.4264	72.6871	43.1463	27.4460 (83)
Total gains	470.0294	487.9730	508.9556	529.9705	530.1554	532.0577	501.2851	486.8340	464.7093	447.0071	446.0383	451.4353 (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	69.1395	69.1395	69.1395	69.1395	69.1395	69.1395	69.1395	69.1395	69.1395	69.1395	69.1395	69.1395
Feb	5.6093	5.6093	5.6093	5.6093	5.6093	5.6093	5.6093	5.6093	5.6093	5.6093	5.6093	5.6093
Mar	0.9831	0.9776	0.9571	0.8949	0.7520	0.5190	0.3604	0.3598	0.6376	0.8835	0.9656	0.9855 (86)
Apr	20.3239	20.3891	20.5619	20.7815	20.9387	20.9935	20.9993	20.9993	20.9807	20.8352	20.5592	20.3032 (87)
May	20.0797	20.0797	20.0797	20.0797	20.0797	20.0797	20.0797	20.0797	20.0797	20.0797	20.0797	20.0797 (88)
Jun	0.9778	0.9706	0.9434	0.8622	0.6857	0.4288	0.2603	0.2568	0.5434	0.8397	0.9531	0.9808 (89)
Jul	19.4884	19.5519	19.7185	19.9197	20.0454	20.0776	20.0796	20.0796	20.0722	19.9694	19.7181	19.4684 (90)
Aug	19.8590	19.9233	20.0926	20.3020	20.4417	20.4839	20.4876	20.4876	20.4752	20.3535	20.0912	19.8387 (91)
Sep	19.8590	19.9233	20.0926	20.3020	20.4417	20.4839	20.4876	20.4876	20.4752	20.3535	20.0912	19.8387 (92)
Oct												0.0000
Nov												19.8387 (93)
Dec												

8. Space heating requirement

Utilisation	0.9763	0.9692	0.9436	0.8709	0.7131	0.4689	0.3048	0.3026	0.5851	0.8541	0.9533	0.9794 (94)
Useful gains	458.8719	472.9226	480.2617	461.5257	378.0300	249.4824	152.7930	147.3176	271.9040	381.7890	425.1861	442.1143 (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	782.2628	763.8433	685.3574	559.6901	402.7707	251.4780	152.9293	147.4441	278.4323	452.7923	630.4196	775.6629 (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	240.6029	195.4987	152.5912	70.6784	18.4071	0.0000	0.0000	0.0000	0.0000	52.8265	147.7681	248.1602 (98)
Space heating												1126.5331 (98)
RHI space heating demand												1127 (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	54.6200 (1b)	x 2.1400 (2b)	= 116.8868 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.6200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 116.8868 (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					4.3700
Infiltration rate					0.2185 (18)
Number of sides sheltered					1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =				0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =				0.2021 (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	0.2577	0.2526	0.2476	0.2223	0.2173	0.1920	0.1920	0.1870	0.2021	0.2173	0.2274	0.2375 (22b)
Mechanical extract ventilation - centralised												0.5000 (23a)
If mechanical ventilation:												0.5000 (25)
Effective ac	0.5077	0.5026	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Front Door			1.9200	1.1000	2.1120		(26)
Windows (Uw = 1.20)			2.8800	1.1450	3.2977		(27)
Roof Window (Uw = 1.40)			1.1100	1.3258	1.4716		(27a)
Cavity Walls	24.3600	1.4400	22.9200	0.2700	6.1884		(29a)
Wall to Corridor	13.2100	1.9200	11.2900	0.2041	2.3041		(29a)
Walls Inset	12.0900		12.0900	0.2200	2.6598		(29a)
Dormer	3.7700	1.4400	2.3300	0.2100	0.4893		(29a)
Pitched Roof	34.7000		34.7000	0.1000	3.4700		(30)
Sloping Ceilings	25.8400	1.1100	24.7300	0.1700	4.2041		(30)
Total net area of external elements Aum(A, m ²)				113.9700			(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	26.1970		(33)
Party Wall 1				7.1100	0.0000		(32)
Party Floor 1				49.7900			(32d)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							9.3776 (36)
Total fabric heat loss							(33) + (36) = 35.5746 (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	19.5831	19.3882	19.2863	19.2863	19.2863	19.2863	19.2863	19.2863	19.2863	19.2863	19.2863	19.2863 (38)
Heat transfer coeff	55.1577	54.9628	54.8609	54.8609	54.8609	54.8609	54.8609	54.8609	54.8609	54.8609	54.8609	54.8609 (39)
Average = Sum(39)m / 12 =												54.8941 (39)
HLP	1.0098	1.0063	1.0044	1.0044	1.0044	1.0044	1.0044	1.0044	1.0044	1.0044	1.0044	1.0044 (40)
HLP (average)												1.0050 (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												1.8262 (42)
Average daily hot water use (litres/day)												77.5726 (43)
Daily hot water use	85.3299	82.2270	79.1241	76.0212	72.9183	69.8154	69.8154	72.9183	76.0212	79.1241	82.2270	85.3299 (44)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF ENERGY RATINGS 09 Jan 2014

Energy conte	126.5418	110.6743	114.2059	99.5675	95.5374	82.4415	76.3942	87.6634	88.7104	103.3834	112.8511	122.5490 (45)
Energy content (annual)										Total =	Sum (45)m =	1220.5197 (45)
Distribution loss (46)m = 0.15 x (45)m												
	18.9813	16.6011	17.1309	14.9351	14.3306	12.3662	11.4591	13.1495	13.3066	15.5075	16.9277	18.3823 (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	31.1552	28.1278	31.1218	30.0955	31.0825	30.0611	31.0514	31.0715	30.0798	31.1055	30.1280	31.1488 (61)
Total heat required for water heating calculated for each month												
	157.6970	138.8021	145.3277	129.6630	126.6198	112.5025	107.4456	118.7350	118.7902	134.4889	142.9791	153.6977 (62)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63)
								Solar input (sum of months) =	Sum (63)m =			0.0000 (63)
Output from w/h												
	157.6970	138.8021	145.3277	129.6630	126.6198	112.5025	107.4456	118.7350	118.7902	134.4889	142.9791	153.6977 (64)
Heat gains from water heating, kWh/month								Total per year (kWh/year) =	Sum (64)m =			1586.7487 (64)
	49.8640	43.8311	45.7539	40.6301	39.5368	34.9271	33.1639	36.9160	37.0162	42.1514	45.0550	48.5347 (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	109.5730	109.5730	109.5730	109.5730	109.5730	109.5730	109.5730	109.5730	109.5730	109.5730	109.5730	109.5730 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	43.1122	38.2919	31.1410	23.5758	17.6232	14.8782	16.0764	20.8968	28.0476	35.6129	41.5655	44.3104 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	237.6206	240.0863	233.8727	220.6446	203.9465	188.2527	177.7682	175.3025	181.5161	194.7442	211.4423	227.1361 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	47.7835	47.7835	47.7835	47.7835	47.7835	47.7835	47.7835	47.7835	47.7835	47.7835	47.7835	47.7835 (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)												
	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487 (71)
Water heating gains (Table 5)												
	67.0214	65.2249	61.4972	56.4307	53.1408	48.5098	44.5752	49.6182	51.4113	56.6551	62.5764	65.2348 (72)
Total internal gains												
	435.0620	430.9110	413.8188	387.9589	362.0184	338.9486	325.7277	333.1253	348.2829	374.3200	402.8920	423.9892 (73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W
Northeast				2.8800	11.2829	0.6300		0.7000		0.7700		9.9309 (75)
Southwest				1.1100	39.9751	0.6300		0.7000		1.0000		17.6114 (82)
Solar gains	27.5423	52.5882	85.8120	127.5755	160.8592	167.2153	158.1124	132.3846	100.2664	61.9747	34.0518	22.8670 (83)
Total gains	462.6043	483.4991	499.6307	515.5343	522.8776	506.1639	483.8401	465.5100	448.5493	436.2947	436.9438	446.8562 (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	68.7675	69.0114	69.1395	69.1395	69.1395	69.1395	69.1395	69.1395	69.1395	69.1395	69.1395	69.1395
alpha	5.5845	5.6008	5.6093	5.6093	5.6093	5.6093	5.6093	5.6093	5.6093	5.6093	5.6093	5.6093
util living area												
	0.9893	0.9843	0.9713	0.9334	0.8381	0.6637	0.4938	0.5340	0.7685	0.9371	0.9807	0.9910 (86)
MIT	20.1822	20.2779	20.4521	20.6774	20.8729	20.9732	20.9956	20.9933	20.9403	20.7144	20.4100	20.1543 (87)
Th 2	20.0751	20.0781	20.0797	20.0797	20.0797	20.0797	20.0797	20.0797	20.0797	20.0797	20.0797	20.0797 (88)
util rest of house												
	0.9860	0.9796	0.9623	0.9118	0.7892	0.5805	0.3932	0.4314	0.6925	0.9124	0.9740	0.9883 (89)
MIT 2	19.3447	19.4414	19.6130	19.8267	19.9965	20.0677	20.0785	20.0778	20.0488	19.8642	19.5736	19.3210 (90)
Living area fraction												
	19.7162	19.8125	19.9852	20.2041	20.3853	20.4694	20.4854	20.4839	20.4443	20.2414	19.9447	19.6907 (92)
MIT												
Temperature adjustment												0.0000
adjusted MIT	19.7162	19.8125	19.9852	20.2041	20.3853	20.4694	20.4854	20.4839	20.4443	20.2414	19.9447	19.6907 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9845	0.9780	0.9612	0.9151	0.8066	0.6169	0.4381	0.4771	0.7244	0.9174	0.9728	0.9869 (94)
Useful gains	455.4312	472.8577	480.2419	471.7803	421.7718	312.2421	211.9490	222.1099	324.9347	400.2495	425.0665	441.0158 (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												
	850.3212	819.6323	739.8121	620.1513	476.4815	321.9992	213.1553	224.0476	348.0531	528.9332	704.6692	849.8314 (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												
	293.7982	233.0326	193.1202	106.8271	40.7040	0.0000	0.0000	0.0000	0.0000	95.7407	201.3139	304.1588 (98)
Space heating												1468.6956 (98)
Space heating per m ²										(98) / (4) =		26.8893 (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 %)													90.7000	(206)
Efficiency of secondary/supplementary heating system, %													0.0000	(208)
Space heating requirement													1619.2895	(211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Space heating requirement	293.7982	233.0326	193.1202	106.8271	40.7040	0.0000	0.0000	0.0000	0.0000	95.7407	201.3139	304.1588	(98)	
Space heating efficiency (main heating system 1)	90.7000	90.7000	90.7000	90.7000	90.7000	0.0000	0.0000	0.0000	0.0000	90.7000	90.7000	90.7000	(210)	
Space heating fuel (main heating system)	323.9230	256.9267	212.9220	117.7807	44.8776	0.0000	0.0000	0.0000	0.0000	105.5576	221.9558	335.3459	(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	157.6970	138.8021	145.3277	129.6630	126.6198	112.5025	107.4456	118.7350	118.7902	134.4889	142.9791	153.6977	(64)	
Efficiency of water heater (217)m	89.3724	89.2826	89.0734	88.6333	87.8720	87.0000	87.0000	87.0000	87.0000	88.5013	89.1259	89.4234	(216)	
Fuel for water heating, kWh/month	176.4493	155.4638	163.1550	146.2916	144.0957	129.3133	123.5007	136.4770	136.5405	151.9626	160.4237	171.8765	(219)	
Water heating fuel used												1795.5496	(219)	
Annual totals kWh/year														
Space heating fuel - main system												1619.2895	(211)	
Space heating fuel - secondary												0.0000	(215)	
Electricity for pumps and fans:														
(MEV)Centralised, Database: in-use factor = 1.4000, SFP = 0.4900)														
mechanical ventilation fans (SFP = 0.4900)													69.8749	(230a)
central heating pump													30.0000	(230c)
main heating flue fan													45.0000	(230e)
Total electricity for the above, kWh/year													144.8749	(231)
Electricity for lighting (calculated in Appendix L)													304.5500	(232)
Energy saving/generation technologies (Appendices M ,N and Q)														
Total delivered energy for all uses													3864.2640	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1619.2895	3.4800	56.3513 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1795.5496	3.4800	62.4851 (247)
Mechanical ventilation fans	69.8749	13.1900	9.2165 (249)
Pumps and fans for heating	75.0000	13.1900	9.8925 (249)
Energy for lighting	304.5500	13.1900	40.1701 (250)
Additional standing charges			120.0000 (251)
Energy saving/generation technologies			
PV Unit	0.0000	13.1900	0.0000 (252)
Total energy cost			298.1155 (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] =	1.2569 (257)
SAP value		82.4668
SAP rating (Section 12)		82 (258)
SAP band		B

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1619.2895	0.2160	349.7665 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1795.5496	0.2160	387.8387 (264)
Space and water heating			737.6052 (265)
Pumps and fans	144.8749	0.5190	75.1901 (267)
Energy for lighting	304.5500	0.5190	158.0615 (268)
Energy saving/generation technologies			
PV Unit	-628.8700	0.5190	-326.3835 (269)
Total kg/year			644.4733 (272)
CO2 emissions per m2			11.8000 (273)
EI value			91.3311
EI rating			91 (274)
EI band			B

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)



CALCULATION OF ENERGY RATINGS 09 Jan 2014

Calculation of stars for heating and DHW	

Main heating energy efficiency	$3.48 \times (1 + 0.29 \times 0.00) / 0.9070 = 3.837$, stars = 4
Main heating environmental impact	$0.216 \times (1 + 0.29 \times 0.00) / 0.9070 = 0.2381$, stars = 4
Water heating energy efficiency	$3.48 / 0.8827 = 3.942$, stars = 4
Water heating environmental impact	$0.216 / 0.8827 = 0.2447$, 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	54.6200 (1b)	x 2.1400 (2b)	= 116.8868 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.6200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 116.8868 (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					4.3700
Infiltration rate					0.2185 (18)
Number of sides sheltered					1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =				0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =				0.2021 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	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	0.2375	0.2223	0.2223	0.2021	0.2072	0.1971	0.1971	0.1920	0.1920	0.2072	0.2021	0.2072 (22b)
Mechanical extract ventilation - centralised												0.5000 (23a)
If mechanical ventilation:												0.5000 (23a)
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (25)

3. Heat losses and heat loss parameter

Element	Gross 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			1.9200	1.1000	2.1120		(26)
Windows (Uw = 1.20)			2.8800	1.1450	3.2977		(27)
Roof Window (Uw = 1.40)			1.1100	1.3258	1.4716		(27a)
Cavity Walls	24.3600	1.4400	22.9200	0.2700	6.1884		(29a)
Wall to Corridor	13.2100	1.9200	11.2900	0.2041	2.3041		(29a)
Walls Inset	12.0900		12.0900	0.2200	2.6598		(29a)
Dormer	3.7700	1.4400	2.3300	0.2100	0.4893		(29a)
Pitched Roof	34.7000		34.7000	0.1000	3.4700		(30)
Sloping Ceilings	25.8400	1.1100	24.7300	0.1700	4.2041		(30)
Total net area of external elements Aum(A, m2)			113.9700				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	26.1970		(33)
Party Wall 1			7.1100	0.0000	0.0000		(32)
Party Floor 1			49.7900				(32d)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							9.3776 (36)
Total fabric heat loss						(33) + (36) =	35.5746 (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	19.2863	19.2863	19.2863	19.2863	19.2863	19.2863	19.2863	19.2863	19.2863	19.2863	19.2863	19.2863 (38)
Heat transfer coeff	54.8609	54.8609	54.8609	54.8609	54.8609	54.8609	54.8609	54.8609	54.8609	54.8609	54.8609	54.8609 (39)
Average = Sum(39)m / 12 =												54.8609 (39)
HLP	1.0044	1.0044	1.0044	1.0044	1.0044	1.0044	1.0044	1.0044	1.0044	1.0044	1.0044	1.0044 (40)
HLP (average)												1.0044 (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												1.8262 (42)
Average daily hot water use (litres/day)												77.5726 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	85.3299	82.2270	79.1241	76.0212	72.9183	69.8154	69.8154	72.9183	76.0212	79.1241	82.2270	85.3299 (44)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

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

Energy conte	126.5418	110.6743	114.2059	99.5675	95.5374	82.4415	76.3942	87.6634	88.7104	103.3834	112.8511	122.5490 (45)
Energy content (annual)										Total =	Sum (45)m =	1220.5197 (45)
Distribution loss (46)m = 0.15 x (45)m	18.9813	16.6011	17.1309	14.9351	14.3306	12.3662	11.4591	13.1495	13.3066	15.5075	16.9277	18.3823 (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	31.1552	28.1278	31.1218	30.0955	31.0825	30.0611	31.0514	31.0715	30.0798	31.1055	30.1280	31.1488 (61)
Total heat required for water heating calculated for each month	157.6970	138.8021	145.3277	129.6630	126.6198	112.5025	107.4456	118.7350	118.7902	134.4889	142.9791	153.6977 (62)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63)
Solar input (sum of months) =	Sum (63)m =											
Output from w/h	157.6970	138.8021	145.3277	129.6630	126.6198	112.5025	107.4456	118.7350	118.7902	134.4889	142.9791	153.6977 (64)
Heat gains from water heating, kWh/month	49.8640	43.8311	45.7539	40.6301	39.5368	34.9271	33.1639	36.9160	37.0162	42.1514	45.0550	48.5347 (65)
Total per year (kWh/year) =	Sum (64)m =											
	1586.7487 (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	109.5730	109.5730	109.5730	109.5730	109.5730	109.5730	109.5730	109.5730	109.5730	109.5730	109.5730	109.5730 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	43.1122	38.2919	31.1410	23.5758	17.6232	14.8782	16.0764	20.8968	28.0476	35.6129	41.5655	44.3104 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	237.6206	240.0863	233.8727	220.6446	203.9465	188.2527	177.7682	175.3025	181.5161	194.7442	211.4423	227.1361 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	47.7835	47.7835	47.7835	47.7835	47.7835	47.7835	47.7835	47.7835	47.7835	47.7835	47.7835	47.7835 (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)	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487	-73.0487 (71)
Water heating gains (Table 5)	67.0214	65.2249	61.4972	56.4307	53.1408	48.5098	44.5752	49.6182	51.4113	56.6551	62.5764	65.2348 (72)
Total internal gains	435.0620	430.9110	413.8188	387.9589	362.0184	338.9486	325.7277	333.1253	348.2829	374.3200	402.8920	423.9892 (73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W
Northeast				2.8800	14.6130	0.6300		0.7000		0.7700		12.8619 (75)
Southwest				1.1100	50.1759	0.6300		0.7000		1.0000		22.1054 (82)
Solar gains	34.9673	57.0620	95.1368	142.0116	168.1370	193.1091	175.5574	153.7087	116.4264	72.6871	43.1463	27.4460 (83)
Total gains	470.0294	487.9730	508.9556	529.9705	530.1554	532.0577	501.2851	486.8340	464.7093	447.0071	446.0383	451.4353 (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	69.1395	69.1395	69.1395	69.1395	69.1395	69.1395	69.1395	69.1395	69.1395	69.1395	69.1395	69.1395
alpha	5.6093	5.6093	5.6093	5.6093	5.6093	5.6093	5.6093	5.6093	5.6093	5.6093	5.6093	5.6093
util living area	0.9831	0.9776	0.9571	0.8949	0.7520	0.5190	0.3604	0.3598	0.6376	0.8835	0.9656	0.9855 (86)
MIT	20.3239	20.3891	20.5619	20.7815	20.9387	20.9935	20.9993	20.9993	20.9807	20.8352	20.5592	20.3032 (87)
Th 2	20.0797	20.0797	20.0797	20.0797	20.0797	20.0797	20.0797	20.0797	20.0797	20.0797	20.0797	20.0797 (88)
util rest of house	0.9778	0.9706	0.9434	0.8622	0.6857	0.4288	0.2603	0.2568	0.5434	0.8397	0.9531	0.9808 (89)
MIT 2	19.4884	19.5519	19.7185	19.9197	20.0454	20.0776	20.0796	20.0796	20.0722	19.9694	19.7181	19.4684 (90)
Living area fraction	19.8590	19.9233	20.0926	20.3020	20.4417	20.4839	20.4876	20.4876	20.4752	20.3535	20.0912	19.8387 (92)
MIT	19.8590	19.9233	20.0926	20.3020	20.4417	20.4839	20.4876	20.4876	20.4752	20.3535	20.0912	19.8387 (93)
Temperature adjustment												0.0000
adjusted MIT	19.8590	19.9233	20.0926	20.3020	20.4417	20.4839	20.4876	20.4876	20.4752	20.3535	20.0912	19.8387 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	458.8719	472.9226	480.2617	461.5257	378.0300	249.4824	152.7930	147.3176	271.9040	381.7890	425.1861	442.1143 (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	782.2628	763.8433	685.3574	559.6901	402.7707	251.4780	152.9293	147.4441	278.4323	452.7923	630.4196	775.6629 (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	240.6029	195.4987	152.5912	70.6784	18.4071	0.0000	0.0000	0.0000	0.0000	52.8265	147.7681	248.1602 (98)
Space heating												1126.5331 (98)
Space heating per m2												20.6249 (99)
	(98) / (4) =											

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

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

8c. Space cooling requirement

Not applicable

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													90.7000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													1242.0432 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	240.6029	195.4987	152.5912	70.6784	18.4071	0.0000	0.0000	0.0000	0.0000	52.8265	147.7681	248.1602	(98)
Space heating efficiency (main heating system 1)	90.7000	90.7000	90.7000	90.7000	90.7000	0.0000	0.0000	0.0000	0.0000	90.7000	90.7000	90.7000	(210)
Space heating fuel (main heating system)	265.2733	215.5444	168.2373	77.9255	20.2945	0.0000	0.0000	0.0000	0.0000	58.2431	162.9196	273.6055	(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	157.6970	138.8021	145.3277	129.6630	126.6198	112.5025	107.4456	118.7350	118.7902	134.4889	142.9791	153.6977	(64)
Efficiency of water heater (217)m	89.1981	89.1262	88.8566	88.2704	87.4528	87.0000	87.0000	87.0000	87.0000	88.0126	88.8419	89.2483	(216)
Fuel for water heating, kWh/month	176.7942	155.7365	163.5531	146.8930	144.7865	129.3133	123.5007	136.4770	136.5405	152.8065	160.9365	172.2136	(219)
Water heating fuel used												1799.5514	(219)
Annual totals kWh/year													
Space heating fuel - main system												1242.0432	(211)
Space heating fuel - secondary												0.0000	(215)
Electricity for pumps and fans:													
(MEV)Centralised, Database: in-use factor = 1.4000, SFP = 0.4900)													
mechanical ventilation fans (SFP = 0.4900)													69.8749 (230a)
central heating pump													30.0000 (230c)
main heating flue fan													45.0000 (230e)
Total electricity for the above, kWh/year													144.8749 (231)
Electricity for lighting (calculated in Appendix L)													304.5500 (232)
Energy saving/generation technologies (Appendices M ,N and Q)													
Total delivered energy for all uses													3491.0195 (238)

10a. Fuel costs - using BEDF prices (500)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1242.0432	3.6300	45.0862 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1799.5514	3.6300	65.3237 (247)
Mechanical ventilation fans	69.8749	19.4400	13.5837 (249)
Pumps and fans for heating	75.0000	19.4400	14.5800 (249)
Energy for lighting	304.5500	19.4400	59.2045 (250)
Additional standing charges			95.0000 (251)
Energy saving/generation technologies			
PV Unit	0.0000	19.4400	0.0000 (252)
Total energy cost			292.7781 (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	1242.0432	0.2160	268.2813 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1799.5514	0.2160	388.7031 (264)
Space and water heating			656.9844 (265)
Pumps and fans	144.8749	0.5190	75.1901 (267)
Energy for lighting	304.5500	0.5190	158.0615 (268)
Energy saving/generation technologies			
PV Unit	-628.8700	0.5190	-326.3835 (269)
Total kg/year			563.8524 (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	1242.0432	1.2200	1515.2926 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1799.5514	1.2200	2195.4527 (264)
Space and water heating			3710.7454 (265)
Pumps and fans	144.8749	3.0700	444.7660 (267)
Energy for lighting	304.5500	3.0700	934.9685 (268)
Energy saving/generation technologies			
PV Unit	-628.8700	3.0700	-1930.6309 (269)
Primary energy kWh/year			3159.8490 (272)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

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

Primary energy kWh/m²/year

57.8515 (273)

SAP 2012 EPC IMPROVEMENTS

Current energy efficiency rating: B 82
Current environmental impact rating: B 91

(For testing purposes):

A	Not considered
B	Not considered
C	Not considered
D	Not considered
E	Low energy lighting
F	Already installed
G	Not considered
H	Not considered
I	Not considered
J	Not considered
K	Not considered
M	Not considered
N	Solar water heating
O	Not applicable
P	Not considered
R	Not considered
S	Not considered
T	Not considered
U	Solar photovoltaic panels
A2	Not applicable
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
L2	Not applicable
Q3	Not considered
O3	Not considered

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

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

Potential energy efficiency rating: B 82
Potential environmental impact rating: B 91

Fuel prices for cost data on this page from database revision number 500 TEST (30 Jun 2022)
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	£87	£87	£0
Mains gas	£205	£205	£0
Space heating	£168	£168	£0
Water heating	£65	£65	£0
Lighting	£59	£59	£0
Total cost of fuels	£292	£292	£0
Total cost of uses	£292	£292	£0
Delivered energy	64 kWh/m ²	64 kWh/m ²	0 kWh/m ²
Carbon dioxide emissions	0.6 tonnes	0.6 tonnes	0.0 tonnes
CO2 emissions per m ²	10 kg/m ²	10 kg/m ²	0 kg/m ²
Primary energy	58 kWh/m ²	58 kWh/m ²	0 kWh/m ²

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF ENERGY RATINGS FOR IMPROVED DWELLING 09 Jan 2014

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

No improvements selected / applicable

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

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

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

No improvements selected / applicable

U-VALUE CALCULATOR REPORT

Property Reference	SAP 0647 Flat 99	Issued on Date	02/08/2022
Assessment Reference	As Built	Prop Type Ref	J (HA-AR)
Project	17 Haines Crescent, WEST END, SO30 3LG		
Calculation Type	New Build (As Built)		

SAP Rating	82 B	DER	14.23	TER	19.87
Environmental	91 B	% DER<TER	28.37		
CO ₂ Emissions (t/year)	0.56	DFEE	44.64	TTEE	47.18
General Requirements Compliance	Pass	% DFEE<TTEE	5.39		

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 000006 - 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	Earthwool Loft Roll 40						
	Main construction	150	0.0400	3.7500	100.00		
	Corrections - Air Gap: Level 1, Fasteners: None or plastic						
Layer 2	Earthwool Loft Roll 40						
	Main construction	200	0.0400	5.0000	100.00		
	Corrections - Air Gap: Level 1, Fasteners: None or plastic						
Layer 3	Earthwool Loft Roll 40						
	Main construction	100	0.0400	2.5000	87.50		
	Main construction	100	0.1300	0.7692	12.50		
	Corrections - Air Gap: Level 1, Fasteners: None or plastic						
Layer 4	Plasterboard, standard						
	Main construction	12.5	0.2100	0.0595	100.00	700	1000
Int surface				0.1000			

Total resistance:	Upper limit = 11.200 m ² K/W	Lower limit = 10.901 m ² K/W	Average = 11.050 m ² K/W
	Total correction = 0.0065 m ² K/W	U-value (unrounded) = 0.1 W/m ² 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 0647 Flat 99	Issued on Date	02/08/2022
Assessment Reference	As Built	Prop Type Ref	J (HA-AR)
Project	17 Haines Crescent, WEST END, SO30 3LG		
Calculation Type	New Build (As Built)		

SAP Rating	82 B	DER	14.23	TER	19.87
Environmental	91 B	% DER<TER	28.37		
CO ₂ Emissions (t/year)	0.56	DFEE	44.64	TFEE	47.18
General Requirements Compliance	Pass	% DFEE<TFEE	5.39		

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 000007 - Pitched roof- insulated slope, flat ceiling

Roof Type: Pitched Roof, insulated slope, flat ceiling

Layer	Description	Thickness (mm)	Conductivity (W/m ² K)	Resistance (m ² K/W)	Fraction (%)
Ext surface				0.0346	
Layer 1	Tiling, concrete				
	Main construction	30	1.5000	0.0173	100.00
Layer 2	airspace/timber battens				
	Main construction	22	0.0000	0.0000	89.63
	Main construction	22	0.1375	0.1386	10.37
	Corrections - Cavity Ventilated, Emissivity: Normal				
Layer 3	Breather membrane				
	Main construction	0.5	0.0000	0.0000	100.00
Layer 4	Standard cavity				
	Main construction	50	0.6250	0.0693	87.50
	Main construction	50	0.1300	0.3331	12.50
	Corrections - Cavity Slightly ventilated, Openings Area: 1000 mm, Emissivity: Normal				
Layer 5	Celotex GA4000				
	Main construction	100	0.0220	3.9365	87.50
	Main construction	100	0.1300	0.6662	12.50
	Corrections - Air Gap: Level 1, Fasteners: None or plastic				
Layer 6	Celotex GA4000				
	Main construction	50	0.0220	1.9682	100.00
	Corrections - Air Gap: Level 1, Fasteners: None or plastic				
Layer 7	Roof space				
	Main construction	0	0.0600	0.0600	100.00
Layer 8	Plasterboard, standard				
	Main construction	12.5	0.2100	0.0595	100.00
Int surface				0.1000	

Total resistance:	Upper limit = 5.541 m ² K/W	Lower limit = 6.092 m ² K/W	Average = 5.816 m ² K/W
	Total correction = 0.0029 m ² K/W	U-value (unrounded) = 0.17 W/m ² K	

Unheated space: None

Total thickness: 265 mm

U-value: 0.17 W/m² K

Kappa: n/a

U-VALUE CALCULATOR REPORT

Property Reference	SAP 0647 Flat 99	Issued on Date	02/08/2022
Assessment Reference	As Built	Prop Type Ref	J (HA-AR)
Project	17 Haines Crescent, WEST END, SO30 3LG		
Calculation Type	New Build (As Built)		

SAP Rating	82 B	DER	14.23	TER	19.87
Environmental	91 B	% DER<TER	28.37		
CO ₂ Emissions (t/year)	0.56	DFEE	44.64	TFEE	47.18
General Requirements Compliance	Pass	% DFEE<TFEE	5.39		

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 Ground Floor Flats

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	102.5	0.7700	0.1331	82.81		
	Main construction	102.5	0.9407	0.1090	17.19		
Layer 2	Supafil 34						
	Main construction	100	0.0340	2.9412	100.00		
	Corrections - Air Gap: Level 1, Fasteners: None or plastic						
Layer 3	Hemelite standard solid *7.3N						
	Main construction	140	0.4700	0.2979	93.43	1450	1000
	Main construction	140	0.8803	0.1590	6.57	1450	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 = 3.758 m ² K/W	Lower limit = 3.751 m ² K/W	Average = 3.754 m ² K/W
	Total correction = 0.0062 m ² K/W	U-value (unrounded) = 0.27 W/m ² K	

Unheated space: None

Total thickness: 370 mm

U-value: 0.27 W/m² K

Kappa: 113.50 kJ/m² K

U-VALUE CALCULATOR REPORT

Property Reference	SAP 0647 Flat 99	Issued on Date	02/08/2022
Assessment Reference	As Built	Prop Type Ref	J (HA-AR)
Project	17 Haines Crescent, WEST END, SO30 3LG		
Calculation Type	New Build (As Built)		

SAP Rating	82 B	DER	14.23	TER	19.87
Environmental	91 B	% DER<TER	28.37		
CO ₂ Emissions (t/year)	0.56	DFEE	44.64	TFEE	47.18
General Requirements Compliance	Pass	% DFEE<TFEE	5.39		

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 Wall to Corridor

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	Plasterboard, standard						
	Main construction	12.5	0.2100	0.0595	100.00		
Layer 2	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 3	Hemelite standard solid *7.3N						
	Main construction	100	0.4700	0.2128	93.43		
	Main construction	100	0.8803	0.1136	6.57		
	Corrections - Air Gap: Level 1, Fasteners: None or plastic						
Layer 4	Supafil 34						
	Main construction	100	0.0340	2.9412	100.00		
	Corrections - Air Gap: Level 1, Fasteners: None or plastic						
Layer 5	Hemelite standard solid *7.3N						
	Main construction	100	0.4700	0.2128	93.43	1450	1000
	Main construction	100	0.8803	0.1136	6.57	1450	1000
	Corrections - Air Gap: Level 1, Fasteners: None or plastic						
Layer 6	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 7	Plasterboard, standard						
	Main construction	12.5	0.2100	0.0595	100.00	700	1000
Int surface				0.1300			

Total resistance:	Upper limit = 3.982 m ² K/W	Lower limit = 3.973 m ² K/W	Average = 3.978 m ² K/W
	Total correction = 0.0055 m ² K/W	U-value (unrounded) = 0.25 W/m ² K	

U-VALUE CALCULATOR REPORT

Unheated space: None

Total thickness: 355 mm

U-value: 0.25 W/m² K

Kappa: 113.50 kJ/m² K

U-VALUE CALCULATOR REPORT

Property Reference	SAP 0647 Flat 99	Issued on Date	02/08/2022
Assessment Reference	As Built	Prop Type Ref	J (HA-AR)
Project	17 Haines Crescent, WEST END, SO30 3LG		
Calculation Type	New Build (As Built)		

SAP Rating	82 B	DER	14.23	TER	19.87
Environmental	91 B	% DER<TER	28.37		
CO ₂ Emissions (t/year)	0.56	DFEE	44.64	TFEE	47.18
General Requirements Compliance	Pass	% DFEE<TFEE	5.39		

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 000005

Wall Type: Standard Wall

Layer	Description	Thickness (mm)	Conductivity (W/m ² K)	Resistance (m ² K/W)	Fraction (%)
Ext surface				0.0400	
Layer 1	Brick, outer leaf				
	Main construction	102.5	0.7700	0.1331	82.81
	Main construction	102.5	0.9407	0.1090	17.19
Layer 2	Supafil 34				
	Main construction	100	0.0340	2.9412	100.00
	Corrections - Air Gap: Level 1, Fasteners: None or plastic				
Layer 3	Hemelite standard solid *7.3N				
	Main construction	140	0.4700	0.2979	93.43
	Main construction	140	0.8803	0.1590	6.57
	Corrections - Air Gap: Level 1, Fasteners: None or plastic				
Layer 4	Standard cavity				
	Main construction	300	1.6667	0.1800	100.00
	Corrections - Cavity Unventilated, Emissivity: Normal				
Layer 5	Mineral wool batt				
	Main construction	58	0.0380	1.5263	99.00
	Main construction	58	50.0000	0.0012	1.00
	Corrections - Air Gap: Level 1, Fasteners: None or plastic				
Layer 6	Plasterboard, standard				
	Main construction	12.5	0.2100	0.0595	100.00
Int surface				0.1300	

Total resistance:	Upper limit = 5.273 m ² K/W	Lower limit = 3.869 m ² K/W	Average = 4.571 m ² K/W
	Total correction = 0.0042 m ² K/W		U-value (unrounded) = 0.22 W/m ² K

Unheated space:	None		
Total thickness:	713 mm	U-value:	0.22 W/m ² K
		Kappa:	n/a

U-VALUE CALCULATOR REPORT

Property Reference	SAP 0647 Flat 99	Issued on Date	02/08/2022
Assessment Reference	As Built	Prop Type Ref	J (HA-AR)
Project	17 Haines Crescent, WEST END, SO30 3LG		
Calculation Type	New Build (As Built)		

SAP Rating	82 B	DER	14.23	TER	19.87
Environmental	91 B	% DER<TER	28.37		
CO ₂ Emissions (t/year)	0.56	DFEE	44.64	TFEE	47.18
General Requirements Compliance	Pass	% DFEE<TFEE	5.39		

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 000008

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				0.1300			
Layer 1	Tiling, clay						
	Main construction	30	1.0000	0.0000	100.00		
Layer 2	Standard cavity						
	Main construction	25	0.0000	0.0000	90.50		
	Main construction	25	0.1300	0.0000	9.50		
	Corrections - Cavity Ventilated, Emissivity: Normal						
Layer 3	Breather membrane						
	Main construction	0.5	0.0000	0.0000	100.00		
Layer 4	Plywood						
	Main construction	18	0.1300	0.1385	100.00		
Layer 5	Celotex XR4000						
	Main construction	120	0.0220	5.4545	87.50		
	Main construction	120	0.1300	0.9231	12.50		
	Corrections - Air Gap: Level 1, Fasteners: None or plastic						
Layer 6	Celotex PL3015 [27.5mm]						
	Main construction	27.5	0.0393	0.7000	100.00		
	Corrections - Air Gap: Level 1, Fasteners: None or plastic						
Int surface				0.1300			

Total resistance:	Upper limit = 5.119 m ² K/W	Lower limit = 4.479 m ² K/W	Average = 4.799 m ² K/W
	Total correction = 0.0052 m ² K/W	U-value (unrounded) = 0.21 W/m ² K	

Unheated space: None

Total thickness: 221 mm

U-value: 0.21 W/m² K

Kappa: 0.00 kJ/m² K

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Built)

Property Reference	SAP 0647 Flat 99	Issued on Date	02/08/2022
Assessment Reference	As Built	Prop Type Ref	J (HA-AR)
Property	17 Haines Crescent, WEST END, SO30 3LG		
SAP Rating	82 B	DER	14.23
Environmental	91 B	TER	19.87
CO ₂ Emissions (t/year)	0.56	% DER<TER	28.37
General Requirements Compliance	Pass	DFEE	44.64
		TFEE	47.18
		% DFEE<TFEE	5.39
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	South East
Property Tenure	Unknown
Transaction Type	New dwelling
Terrain Type	Suburban
1.0 Property Type	Flat, Semi-Detached
2.0 Number of Storeys	1
3.0 Date Built	2020
4.0 Sheltered Sides	1
5.0 Sunlight/Shade	Average or unknown

6.0 Measurements		Heat Loss Perimeter	Internal Floor Area	Average Storey Height
	Ground Floor:	29.56 m	54.62 m ²	2.14 m

7.0 Living Area	24.23	m ²
8.0 Thermal Mass Parameter	Simple calculation - Medium	
Thermal Mass	250.00	kJ/m ² K

9.0 External Walls		U-Value (W/m ² K)	Gross Area (m ²)	Nett Area (m ²)
Description	Type			
Cavity Walls	Cavity Wall	0.27	24.36	22.92
Wall to Corridor	Cavity Wall	0.25	13.21	11.29
Walls Inset	Cavity Wall	0.22	12.09	12.09
Dormer	Timber Frame	0.21	3.77	2.33

9.1 Party Walls		U-Value (W/m ² K)	Area (m ²)
Description	Type		
Party Wall 1	Filled Cavity with Edge Sealing	0.00	7.11

10.0 External Roofs		U-Value (W/m ² K)	Gross Area (m ²)	Nett Area (m ²)
Description	Type			
Pitched Roof	External Plane Roof	0.10	34.70	34.70
Sloping Ceilings	External Slope Roof	0.17	25.84	24.73

11.1 Party Floors

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Built)

Description		Construction						Area (m²)	
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
Roof Window	Manufacturer	Roof Window	Double Low-E Soft 0.1			0.63		0.70	1.40

13.0 Openings											
Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width (m)	Height (m)	Count	Area (m²)	Curtain Closed
Flat Entrance Door	Solid Door	[2] Wall to Corridor	South East							1.92	
North East	Window	[1] Cavity Walls	North East	None	0.00					1.44	
Dormer	Window	[4] Dormer	North East	None	0.00					1.44	
Roof Window	Roof Window	[2] Sloping Ceilings	South West	None						1.11	

14.0 Conservatory

15.0 Draught Proofing %

16.0 Draught Lobby

17.0 Thermal Bridging

17.1 List of Bridges

Source Type	Bridge Type	Length	Psi	Imported
Table K1 - Approved	E2 Other lintels (including other steel lintels)	2.11	0.300	No
Table K1 - Approved	E3 Sill	1.20	0.040	No
Table K1 - Approved	E4 Jamb	6.60	0.050	No
Table K1 - Approved	E7 Party floor between dwellings (in blocks of flats)	29.56	0.070	No
Table K1 - Default	E24 Eaves (insulation at ceiling level - inverted)	1.47	0.240	No
Table K1 - Approved	E11 Eaves (insulation at rafter level)	16.63	0.040	No
Table K1 - Approved	E12 Gable (insulation at ceiling level)	5.41	0.240	No
Table K1 - Approved	E13 Gable (insulation at rafter level)	5.11	0.040	No
Table K1 - Approved	E16 Corner (normal)	10.62	0.090	No
Table K1 - Approved	E17 Corner (inverted – internal area greater than external area)	6.60	-0.090	No
Table K1 - Approved	E18 Party wall between dwellings	1.05	0.060	No
Table K1 - Default	E25 Staggered party wall between dwellings	2.35	0.120	No
Table K1 - Default	P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	3.49	0.000	No
Table K1 - Default	P4 Party wall - Roof (insulation at ceiling level)	1.70	0.240	No
Table K1 - Default	P5 Party wall - Roof (insulation at rafter level)	2.13	0.080	No
Table K1 - Default	R1 Head of roof window	2.14	0.080	No
Table K1 - Default	R2 Sill of roof window	2.14	0.060	No
Table K1 - Default	R3 Jamb of roof window	2.36	0.080	No
Table K1 - Default	R4 Ridge (vaulted ceiling)	0.62	0.080	No
Table K1 - Default	R5 Ridge (inverted)	2.97	0.040	No
Table K1 - Default	R6 Flat ceiling	20.76	0.060	No
Table K1 - Default	R7 Flat ceiling (inverted)	7.18	0.040	No
Table K1 - Default	R8 Roof to wall (rafter)	5.03	0.060	No

Y-value W/m²K

18.0 Pressure Testing

Designed AP₅₀ m³/(h.m²) @ 50 Pa

Property Tested ?

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Built)

As Built AP₅₀

4.37

m³/(h.m²) @ 50 Pa

19.0 Mechanical Ventilation

Summer Overheating

Windows open in hot weather	Windows half open
Cross ventilation possible	Yes
Night Ventilation	Yes
Air change rate	3.00

Mechanical Ventilation

Mechanical Ventilation System Present	Yes
Approved Installation	No
Mechanical Ventilation data Type	Database
Type	Mechanical extract ventilation - centralised
MV Reference Number	500233
Configuration	1
Manufacturer SFP	0.35
Duct Type	Rigid
Wet Rooms	1

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	8	
Total number of L.E.L. fittings	8	
Percentage of L.E.L. fittings	100.00	%

External

External lights fitted	No
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23.0 Electricity Tariff

Standard

24.0 Main Heating 1

	Database	
Description	Gas Combi	
Percentage of Heat	100	%
Database Ref. No.	17503	
Fuel Type	Mains gas	
Main Heating	BGW	
SAP Code	104	
In Winter	90.7	
In Summer	87.0	
Controls	CBE Programmer, room thermostat and TRVs	
PCDF Controls	0	
Delayed Start Stat	No	
Sap Code	2106	

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Built)

Flue Type	Balanced
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	Gas/Oil, time clock
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	More Dwellings, One Block
Apportioned	628.87 kWh/Year

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None

BLOCK COMPLIANCE

Calculation Type: New Build (As Built)

Block Reference	SAP 0647	Issued on Date	02/08/2022
Block Name	Moorgreen 92-100		
Assessor Details	Mr. Tobias Whiting, Abacus Energy (UK) Ltd, Tel: 07798936079, toby@abacusenergyuk.com		Assessor ID E477-0001
Client	Foreman Homes, FORE		

Block Compliance Report - DER

Block Reference: SAP 0647		Block Name: Moorgreen 92-100			
Property-Assessment Reference	Multiplier	Floor Area (m ²)	DER (kgCO ₂ /m ²)	TER (kgCO ₂ /m ²)	% DER/TER
SAP 0647 Flat 92-As Built	1	71.26	17.06	21.57	20.92 %
SAP 0647 Flat 93-As Built	1	63.01	17.57	22.24	20.99 %
SAP 0647 Flat 94-As Built	1	60.8	16.09	20.95	23.19 %
SAP 0647 Flat 95-As Built	1	62	13.38	18.55	27.86 %
SAP 0647 Flat 96-As Built	1	62.8	13.75	18.87	27.13 %
SAP 0647 Flat 97-As Built	1	60.66	12.30	17.63	30.24 %
SAP 0647 Flat 98-As Built	1	65.7	12.49	18.12	31.06 %
SAP 0647 Flat 99-As Built	1	54.62	14.23	19.87	28.37 %
SAP 0647 Flat 100-As Built	1	69.78	11.78	17.64	33.22 %
Totals:	9	570.63	128.65	175.43	
Average DER = 14.30 kgCO ₂ /m ²		% DER/TER	PASS		
Average TER = 19.49 kgCO ₂ /m ²		26.63 %			

Block Compliance Report - DFEE

Block Reference: SAP 0647		Block Name: Moorgreen 92-100			
Property-Assessment Reference	Multiplier	Floor Area (m ²)	DFEE (kWh/m ² /yr)	TFEE (kWh/m ² /yr)	% DFEE/TFEE
SAP 0647 Flat 92-As Built	1	71.26	61.49	64.19	4.21 %
SAP 0647 Flat 93-As Built	1	63.01	61.71	65.13	5.24 %
SAP 0647 Flat 94-As Built	1	60.8	55.10	57.90	4.84 %
SAP 0647 Flat 95-As Built	1	62	44.33	45.09	1.68 %
SAP 0647 Flat 96-As Built	1	62.8	46.27	47.46	2.49 %
SAP 0647 Flat 97-As Built	1	60.66	39.75	40.54	1.95 %
SAP 0647 Flat 98-As Built	1	65.7	41.07	43.41	5.38 %
SAP 0647 Flat 99-As Built	1	54.62	44.64	47.18	5.39 %
SAP 0647 Flat 100-As Built	1	69.78	39.42	42.80	7.88 %
Totals:	9	570.63	433.79	453.69	
Average DFEE = 48.32 kWh/m ² /yr		% DFEE/TFEE	PASS		
Average TFEE = 50.55 kWh/m ² /yr		4.41 %			