



SAP Report Submission for Building Regulations Compliance

Client: Foreman Homes

Project: 12 Haines Crescent
WEST END, SO30 3LG

Contact: Tobias Whiting
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Report Issue Date: 02/08/2022

EXCELLENCE
IN ENERGY
ASSESSMENT

BUILDING REGULATION COMPLIANCE

Calculation Type: New Build (As Built)

Property Reference	SAP 0647 Flat 97	Issued on Date	02/08/2022
Assessment Reference	As Built	Prop Type Ref	J (HA-AR)
Property	12 Haines Crescent, WEST END, SO30 3LG		
SAP Rating	83 B	DER	12.30
Environmental	92 A	TER	17.63
CO ₂ Emissions (t/year)	0.53	% DER<TER	30.24
General Requirements Compliance	Pass	DfEE	39.75
		TfEE	40.54
		% DfEE<TfEE	1.95
Assessor Details	Mr. Tobias Whiting, Abacus Energy (UK) Ltd, Tel: 07798936079, toby@abacusenergyuk.com		Assessor ID
			E477-0001
Client	Foreman Homes, FORE		

SUMMARY FOR INPUT DATA FOR New Build (As Built)

Criterion 1 – Achieving the TER and TfEE rate

1a TER and DER

Fuel for main heating	Mains gas		
Fuel factor	1.00 (mains gas)		
Target Carbon Dioxide Emission Rate (TER)	17.63	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	12.30	kgCO ₂ /m ²	Pass
	-5.33 (-30.2%)	kgCO ₂ /m ²	

1b TfEE and DfEE

Target Fabric Energy Efficiency (TfEE)	40.54	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DfEE)	39.75	kWh/m ² /yr	
	-0.7 (-1.7%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.27 (max. 0.30)	0.27 (max. 0.70)	Pass
Party wall	0.00 (max. 0.20)	-	Pass
Openings	1.18 (max. 2.00)	1.20 (max. 3.30)	Pass

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	4.19 (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 South East

3.84 m², No overhang

Windows facing North West

4.48 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

4.19 (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

Door U-value

1.10

W/m²K

Photovoltaic array

698.41

kWh/Year

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THERMAL BRIDGING

Calculation Type: New Build (As Built)

Property Reference	SAP 0647 Flat 97	Issued on Date	02/08/2022
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SAP Rating	83 B	DER	12.30
Environmental	92 A	TER	17.63
CO ₂ Emissions (t/year)	0.53	% DER<TER	30.24
General Requirements Compliance	Pass	DFEE	39.75
		TFEE	40.54
		% DFEE<TFEE	1.95
Assessor Details	Mr. Tobias Whiting, Abacus Energy (UK) Ltd, Tel: 07798936079, toby@abacusenergyuk.com		Assessor ID
			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	7.54	2.26	
External wall	E3 Sill	Table K1 - Approved	0.040	6.63	0.27	
External wall	E4 Jamb	Table K1 - Approved	0.050	19.20	0.96	
External wall	E7 Party floor between dwellings (in blocks of flats)	Table K1 - Approved	0.070	57.00	3.99	
External wall	E16 Corner (normal)	Table K1 - Approved	0.090	7.15	0.64	
External wall	E18 Party wall between dwellings	Table K1 - Approved	0.060	2.38	0.14	
External wall	E25 Staggered party wall between dwellings	Table K1 - Default	0.120	2.38	0.29	
Party wall	P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	Table K1 - Default	0.000	6.92	0.00	

Total: **8.55** W/mK:
Y-Value: **0.126** W/m²K:

FULL SAP CALCULATION PRINTOUT

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Environmental	92 A	% DER<TER	30.24		
CO ₂ Emissions (t/year)	0.53	DFEE	39.75	TFEE	40.54
General Requirements Compliance	Pass	% DFEE<TFEE	1.95		
Assessor Details	Mr. Tobias Whiting, Abacus Energy (UK) Ltd, Tel: 07798936079, toby@abacusenergyuk.com			Assessor ID	E477-0001
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FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

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

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

DWELLING AS BUILT

Mid-floor flat, total floor area 61 m²

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

1a TER and DER

Fuel for main heating:Mains gas
Fuel factor:1.00 (mains gas)
Target Carbon Dioxide Emission Rate (TER) 17.63 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 12.30 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)40.5 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)39.8 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.27 (max. 0.30)	0.27 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	(no floor)		
Roof	(no roof)		
Openings	1.18 (max. 2.00)	1.20 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals:	4.19 (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
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6 Controls

Space heating controls:	Programmer, room thermostat and TRVs	OK
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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
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Based on:

Overshading:	Average
Windows facing South East:	3.84 m ² , No overhang
Windows facing North West:	4.48 m ² , No overhang
Air change rate:	3.00 ach
Blinds/curtains:	None

10 Key features

Party wall U-value	0.00 W/m ² K
Door U-value	1.10 W/m ² K
Photovoltaic array	698.41 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	60.6600 (1b)	x 2.3800 (2b)	= 144.3708 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	60.6600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 144.3708 (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					4.1900
Infiltration rate					0.2095 (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) =				0.1938 (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	0.2471	0.2422	0.2374	0.2132	0.2083	0.1841	0.1841	0.1793	0.1938	0.2083	0.2180	0.2277 (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			2.1200	1.1000	2.3320		(26)
Windows (Uw = 1.20)			8.3200	1.1450	9.5267		(27)
Ground Floor Walls	61.3700	8.3200	53.0500	0.2700	14.3235		(29a)
Wall to Corridor	6.4600	2.1200	4.3400	0.2041	0.8857		(29a)
Total net area of external elements Aum(A, m ²)					67.8300		(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	27.0679	(33)
Party Wall 1				8.2500	0.0000	0.0000	(32)
Party Floor 1				60.5800			(32d)
Party Ceilings 1				51.1700			(32b)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							8.5491 (36)
Total fabric heat loss							(33) + (36) = 35.6170 (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	23.8212	23.8212	23.8212	23.8212	23.8212	23.8212	23.8212	23.8212	23.8212	23.8212	23.8212	23.8212 (38)
Average = Sum(39)m / 12 =	59.4382	59.4382	59.4382	59.4382	59.4382	59.4382	59.4382	59.4382	59.4382	59.4382	59.4382	59.4382 (39)
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.9799	0.9799	0.9799	0.9799	0.9799	0.9799	0.9799	0.9799	0.9799	0.9799	0.9799	0.9799 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												
Average daily hot water use (litres/day)												2.0002 (42)
												81.7055 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	89.8761	86.6079	83.3396	80.0714	76.8032	73.5350	73.5350	76.8032	80.0714	83.3396	86.6079	89.8761 (44)
Energy content (annual)	133.2836	116.5707	120.2905	104.8722	100.6274	86.8338	80.4643	92.3339	93.4367	108.8914	118.8635	129.0781 (45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 1285.5460 (45)
	19.9925	17.4856	18.0436	15.7308	15.0941	13.0251	12.0696	13.8501	14.0155	16.3337	17.8295	19.3617 (46)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	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	31.1777	28.1467	31.1406	30.1112	31.0969	30.0730	31.0625	31.0848	30.0939	31.1225	30.1473	31.1705	(61)
Total heat required for water heating calculated for each month	164.4613	144.7175	151.4311	134.9834	131.7243	116.9068	111.5268	123.4187	123.5305	140.0139	149.0108	160.2486	(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	164.4613	144.7175	151.4311	134.9834	131.7243	116.9068	111.5268	123.4187	123.5305	140.0139	149.0108	160.2486	(64)
Heat gains from water heating, kWh/month	52.1112	45.7964	47.7817	42.3978	41.2328	36.3905	34.5200	38.4722	38.5912	43.9870	47.0589	50.7111	(65)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	100.0116	100.0116	100.0116	100.0116	100.0116	100.0116	100.0116	100.0116	100.0116	100.0116	100.0116	100.0116	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	16.7749	14.8993	12.1169	9.1733	6.8572	5.7891	6.2553	8.1309	10.9133	13.8569	16.1731	17.2411	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	174.6084	176.4202	171.8543	162.1341	149.8640	138.3318	130.6277	128.8158	133.3817	143.1019	155.3720	166.9042	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.0012	33.0012	33.0012	33.0012	33.0012	33.0012	33.0012	33.0012	33.0012	33.0012	33.0012	33.0012	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093	(71)
Water heating gains (Table 5)	70.0420	68.1495	64.2228	58.8859	55.4205	50.5423	46.3978	51.7100	53.5988	59.1223	65.3596	68.1601	(72)
Total internal gains	317.4287	315.4725	304.1975	286.1967	268.1451	250.6668	239.2843	244.6602	253.8973	272.0847	292.9082	308.3088	(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
Southeast				3.8400	36.7938	0.6300	0.7000			0.7700			43.1795 (77)
Northwest				4.4800	11.2829	0.6300	0.7000			0.7700			15.4480 (81)
Solar gains	58.6275	104.9956	157.2889	217.7336	264.7315	271.9891	258.4096	221.9447	178.0001	119.7173	71.1567	49.5683	(83)
Total gains	376.0563	420.4681	461.4865	503.9303	532.8766	522.6559	497.6939	466.6049	431.8974	391.8020	364.0649	357.8772	(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	70.8719	70.8719	70.8719	70.8719	70.8719	70.8719	70.8719	70.8719	70.8719	70.8719	70.8719	70.8719		
alpha	5.7248	5.7248	5.7248	5.7248	5.7248	5.7248	5.7248	5.7248	5.7248	5.7248	5.7248	5.7248		
util living area	0.9976	0.9949	0.9868	0.9570	0.8664	0.6914	0.5191	0.5743	0.8284	0.9718	0.9948	0.9982	(86)	
MIT	20.0134	20.1394	20.3506	20.6214	20.8545	20.9696	20.9949	20.9913	20.9164	20.6207	20.2586	19.9753	(87)	
Th 2	20.1002	20.1002	20.1002	20.1002	20.1002	20.1002	20.1002	20.1002	20.1002	20.1002	20.1002	20.1002	(88)	
util rest of house	0.9968	0.9933	0.9823	0.9417	0.8222	0.6088	0.4164	0.4680	0.7593	0.9587	0.9928	0.9976	(89)	
MIT 2	19.1986	19.3239	19.5328	19.7947	20.0025	20.0862	20.0988	20.0976	20.0543	19.7981	19.4431	19.1606	(90)	
Living area fraction	19.4729	19.5984	19.8081	20.0730	20.2893	20.3836	20.4005	20.3985	20.3445	20.0750	19.7176	19.4348	(92)	
Temperature adjustment	19.4729	19.5984	19.8081	20.0730	20.2893	20.3836	20.4005	20.3985	20.3445	20.0750	19.7176	19.4348	(93)	
adjusted MIT	19.4729	19.5984	19.8081	20.0730	20.2893	20.3836	20.4005	20.3985	20.3445	20.0750	19.7176	19.4348	(93)	

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9961	0.9921	0.9804	0.9411	0.8325	0.6360	0.4512	0.5040	0.7800	0.9582	0.9917	0.9970	(94)
Ext temp.	374.5860	417.1289	452.4526	474.2595	443.6010	332.3964	224.5475	235.1833	336.8645	375.4386	361.0507	356.8103	(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	901.8494	873.6485	791.0106	664.1029	510.5314	343.7661	225.8946	237.6613	371.1631	563.1766	749.9689	905.5321	(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	392.2840	306.7811	251.8871	136.6872	49.7962	0.0000	0.0000	0.0000	0.0000	139.6770	280.0212	408.2490	(98)
												1965.3830	(98)
												32.4000	(99)

8c. Space cooling requirement

Not applicable

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 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 %)													90.7000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													2166.9052 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	392.2840	306.7811	251.8871	136.6872	49.7962	0.0000	0.0000	0.0000	0.0000	139.6770	280.0212	408.2490	(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)	432.5072	338.2372	277.7146	150.7026	54.9021	0.0000	0.0000	0.0000	0.0000	153.9989	308.7334	450.1092	(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	164.4613	144.7175	151.4311	134.9834	131.7243	116.9068	111.5268	123.4187	123.5305	140.0139	149.0108	160.2486	(64)
Efficiency of water heater (217)m	89.5747	89.4802	89.2745	88.8231	87.9846	87.0000	87.0000	87.0000	87.0000	88.8093	89.3798	89.6256	(216)
Fuel for water heating, kWh/month	183.6025	161.7312	169.6242	151.9689	149.7129	134.3756	128.1917	141.8606	141.9891	157.6569	166.7165	178.7978	(219)
Water heating fuel used												1866.2279	(219)
Annual totals kWh/year													
Space heating fuel - main system												2166.9052	(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)													86.3049 (230a)
central heating pump													30.0000 (230c)
main heating flue fan													45.0000 (230e)
Total electricity for the above, kWh/year													161.3049 (231)
Electricity for lighting (calculated in Appendix L)													296.2500 (232)
Energy saving/generation technologies (Appendices M ,N and Q)													
Total delivered energy for all uses													4490.6879 (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	2166.9052	0.2160	468.0515 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1866.2279	0.2160	403.1052 (264)
Space and water heating			871.1567 (265)
Pumps and fans	161.3049	0.5190	83.7172 (267)
Energy for lighting	296.2500	0.5190	153.7537 (268)
Energy saving/generation technologies			
PV Unit	-698.4100	0.5190	-362.4748 (269)
Total CO2, kg/year			746.1529 (272)
Dwelling Carbon Dioxide Emission Rate (DER)			12.3000 (273)

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

DER			12.3000 ZC1
Total Floor Area		TFA	60.6600
Assumed number of occupants		N	2.0002
CO2 emission factor in Table 12 for electricity displaced from grid		EF	0.5190
CO2 emissions from appliances, equation (L14)			17.0572 ZC2
CO2 emissions from cooking, equation (L16)			2.7531 ZC3
Total CO2 emissions			32.1104 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			32.1104 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	60.6600 (1b)	x 2.3800 (2b)	= 144.3708 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	60.6600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 144.3708 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					2 * 10 = 20.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(7a)+(7b)+(7c) =				20.0000 / (5) = 0.1385 (8)
Pressure test					Yes
Measured/design AP50					5.0000
Infiltration rate					0.3885 (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) =				0.3594 (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												
	0.4582	0.4492	0.4403	0.3953	0.3863	0.3414	0.3414	0.3324	0.3594	0.3863	0.4043	0.4223 (22b)
Effective ac	0.6050	0.6009	0.5969	0.5781	0.5746	0.5583	0.5583	0.5553	0.5646	0.5746	0.5817	0.5892 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K					
TER Opaque door			2.1200	1.0000	2.1200		(26)					
TER Opening Type (Uw = 1.40)			8.3200	1.3258	11.0303		(27)					
Ground Floor Walls	61.3700	8.3200	53.0500	0.1800	9.5490		(29a)					
Wall to Corridor	6.4600	2.1200	4.3400	0.1800	0.7812		(29a)					
Total net area of external elements Aum(A, m2)			67.8300				(31)					
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 23.4805		(33)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							6.5876 (36)					
Total fabric heat loss						(33) + (36) =	30.0681 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 28.8229	Feb 28.6287	Mar 28.4383	Apr 27.5441	May 27.3768	Jun 26.5980	Jul 26.5980	Aug 26.4538	Sep 26.8980	Oct 27.3768	Nov 27.7153	Dec 28.0691 (38)
Heat transfer coeff	58.8910	58.6968	58.5064	57.6122	57.4449	56.6661	56.6661	56.5219	56.9661	57.4449	57.7834	58.1372 (39)
Average = Sum(39)m / 12 =												57.6114 (39)
HLP	Jan 0.9708	Feb 0.9676	Mar 0.9645	Apr 0.9498	May 0.9470	Jun 0.9342	Jul 0.9342	Aug 0.9318	Sep 0.9391	Oct 0.9470	Nov 0.9526	Dec 0.9584 (40)
HLP (average)												0.9497 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.0002 (42)
Average daily hot water use (litres/day)												81.7055 (43)
Daily hot water use	Jan 89.8761	Feb 86.6079	Mar 83.3396	Apr 80.0714	May 76.8032	Jun 73.5350	Jul 73.5350	Aug 76.8032	Sep 80.0714	Oct 83.3396	Nov 86.6079	Dec 89.8761 (44)
Energy conte	133.2836	116.5707	120.2905	104.8722	100.6274	86.8338	80.4643	92.3339	93.4367	108.8914	118.8635	129.0781 (45)
Energy content (annual)										Total = Sum(45)m =		1285.5460 (45)
Distribution loss (46)m = 0.15 x (45)m	19.9925	17.4856	18.0436	15.7308	15.0941	13.0251	12.0696	13.8501	14.0155	16.3337	17.8295	19.3617 (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	45.7999	39.8633	42.4690	39.4873	39.1381	36.2638	37.4726	39.1381	39.4873	42.4690	42.7107	45.7999 (61)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF TARGET EMISSIONS 09 Jan 2014

Total heat required for water heating calculated for each month	179.0835	156.4341	162.7595	144.3595	139.7654	123.0976	117.9369	131.4720	132.9239	151.3604	161.5742	174.8779 (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	179.0835	156.4341	162.7595	144.3595	139.7654	123.0976	117.9369	131.4720	132.9239	151.3604	161.5742	174.8779 (64)
Heat gains from water heating, kWh/month	55.7668	48.7256	50.6138	44.7418	43.2431	37.9382	36.1225	40.4855	40.9395	46.8236	50.1998	54.3684 (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)
(66)m	100.0116	100.0116	100.0116	100.0116	100.0116	100.0116	100.0116	100.0116	100.0116	100.0116	100.0116	100.0116	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	16.7749	14.8993	12.1169	9.1733	6.8572	5.7891	6.2553	8.1309	10.9133	13.8569	16.1731	17.2411	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	174.6084	176.4202	171.8543	162.1341	149.8640	138.3318	130.6277	128.8158	133.3817	143.1019	155.3720	166.9042	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.0012	33.0012	33.0012	33.0012	33.0012	33.0012	33.0012	33.0012	33.0012	33.0012	33.0012	33.0012	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093	(71)
Water heating gains (Table 5)	74.9553	72.5083	68.0294	62.1414	58.1225	52.6919	48.5518	54.4160	56.8604	62.9350	69.7219	73.0758	(72)
Total internal gains	322.3421	319.8314	308.0041	289.4523	270.8471	252.8164	241.4382	247.3662	257.1589	275.8973	297.2705	313.2246	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	Specific data or Table 6c	Access factor Table 6d	Gains W
Southeast	3.8400	36.7938	0.6300	0.7000	0.7700	43.1795 (77)
Northwest	4.4800	11.2829	0.6300	0.7000	0.7700	15.4480 (81)

Solar gains	58.6275	104.9956	157.2889	217.7336	264.7315	271.9891	258.4096	221.9447	178.0001	119.7173	71.1567	49.5683 (83)
Total gains	380.9696	424.8270	465.2931	507.1858	535.5786	524.8055	499.8478	469.3110	435.1590	395.6147	368.4272	362.7929 (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	71.5304	71.7671	72.0006	73.1182	73.3311	74.3390	74.3390	74.5287	73.9475	73.3311	72.9016	72.4579	
alpha	5.7687	5.7845	5.8000	5.8745	5.8887	5.9559	5.9559	5.9686	5.9298	5.8887	5.8601	5.8305	
util living area	0.9974	0.9946	0.9859	0.9526	0.8538	0.6655	0.4948	0.5466	0.8088	0.9683	0.9943	0.9980	(86)
MIT	20.0341	20.1633	20.3757	20.6562	20.8762	20.9784	20.9968	20.9944	20.9338	20.6554	20.2984	20.0140	(87)
Th 2	20.1077	20.1104	20.1130	20.1254	20.1277	20.1386	20.1386	20.1406	20.1344	20.1277	20.1230	20.1181	(88)
util rest of house	0.9966	0.9928	0.9811	0.9363	0.8084	0.5865	0.4001	0.4484	0.7390	0.9541	0.9922	0.9974	(89)
MIT 2	18.8155	19.0056	19.3152	19.7209	20.0072	20.1242	20.1373	20.1382	20.0821	19.7278	19.2128	18.7939	(90)
Living area fraction	19.2257	19.3953	19.6722	20.0358	20.2998	20.4118	20.4266	20.4264	20.3688	20.0400	19.5783	19.2047	(91)
MIT	19.2257	19.3953	19.6722	20.0358	20.2998	20.4118	20.4266	20.4264	20.3688	20.0400	19.5783	19.2047	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.2257	19.3953	19.6722	20.0358	20.2998	20.4118	20.4266	20.4264	20.3688	20.0400	19.5783	19.2047	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9954	0.9909	0.9781	0.9343	0.8182	0.6124	0.4321	0.4816	0.7595	0.9523	0.9903	0.9965	(94)
Ext temp.	379.2274	420.9639	455.0843	473.8531	438.1882	321.3721	215.9895	226.0119	330.5139	376.7598	364.8692	361.5174	(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	878.9905	850.8273	770.6579	641.5573	494.0121	329.3294	216.8411	227.5814	357.1104	542.2824	721.0360	872.3285	(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	371.8237	288.8682	234.7867	120.7470	41.5330	0.0000	0.0000	0.0000	0.0000	123.1488	256.4401	380.0434	(98)
												1817.3910	(98)
												29.9603	(99)

8c. Space cooling requirement

Not applicable

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)
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FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF TARGET EMISSIONS 09 Jan 2014

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													1945.8148 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	371.8237	288.8682	234.7867	120.7470	41.5330	0.0000	0.0000	0.0000	0.0000	123.1488	256.4401	380.0434	(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)	398.0982	309.2808	251.3777	129.2794	44.4679	0.0000	0.0000	0.0000	0.0000	131.8509	274.5612	406.8987	(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	179.0835	156.4341	162.7595	144.3595	139.7654	123.0976	117.9369	131.4720	132.9239	151.3604	161.5742	174.8779	(64)
Efficiency of water heater	86.8490	86.5746	85.9728	84.6053	82.4093	80.3000	80.3000	80.3000	80.3000	84.5371	86.2088	86.9534	(217)
Fuel for water heating, kWh/month	206.2009	180.6927	189.3150	170.6269	169.5992	153.2971	146.8703	163.7260	165.5342	179.0460	187.4220	201.1169	(219)
Water heating fuel used												2113.4473	(219)
Annual totals kWh/year													
Space heating fuel - main system												1945.8148	(211)
Space heating fuel - secondary												0.0000	(215)
Electricity for pumps and fans:													
central heating pump												30.0000	(230c)
main heating flue fan												45.0000	(230e)
Total electricity for the above, kWh/year												75.0000	(231)
Electricity for lighting (calculated in Appendix L)												296.2500	(232)
Total delivered energy for all uses												4430.5121	(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	1945.8148	0.2160	420.2960 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2113.4473	0.2160	456.5046 (264)
Space and water heating			876.8006 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	296.2500	0.5190	153.7537 (268)
Total CO2, kg/m2/year			1069.4793 (272)
Emissions per m2 for space and water heating			14.4543 (272a)
Fuel factor (mains gas)			1.0000
Emissions per m2 for lighting			2.5347 (272b)
Emissions per m2 for pumps and fans			0.6417 (272c)
Target Carbon Dioxide Emission Rate (TER) = (14.4543 * 1.00) + 2.5347 + 0.6417, rounded to 2 d.p.			17.6300 (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	60.6600 (1b)	x 2.3800 (2b)	= 144.3708 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	60.6600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 144.3708 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					2 * 10 = 20.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(7a)+(7b)+(7c) =				Air changes per hour
Pressure test					20.0000 / (5) = 0.1385 (8)
Measured/design AP50					Yes
Infiltration rate					4.1900
Number of sides sheltered					0.3480 (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) =				0.3219 (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												
	0.4105	0.4024	0.3944	0.3541	0.3461	0.3058	0.3058	0.2978	0.3219	0.3461	0.3622	0.3783 (22b)
Effective ac	0.5842	0.5810	0.5778	0.5627	0.5599	0.5468	0.5468	0.5443	0.5518	0.5599	0.5656	0.5715 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Front Door			2.1200	1.1000	2.3320		(26)
Windows (Uw = 1.20)			8.3200	1.1450	9.5267		(27)
Ground Floor Walls	61.3700	8.3200	53.0500	0.2700	14.3235		(29a)
Wall to Corridor	6.4600	2.1200	4.3400	0.2041	0.8857		(29a)
Total net area of external elements Aum(A, m ²)			67.8300				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	27.0679	(33)
Party Wall 1			8.2500	0.0000	0.0000		(32)
Party Floor 1			60.5800				(32d)
Party Ceilings 1			51.1700				(32b)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							8.5491 (36)
Total fabric heat loss						(33) + (36) =	35.6170 (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	27.8345	27.6787	27.5259	26.8084	26.6742	26.0493	26.0493	25.9335	26.2900	26.6742	26.9458	27.2297 (38)
Heat transfer coeff	63.4516	63.2957	63.1430	62.4255	62.2912	61.6663	61.6663	61.5506	61.9070	62.2912	62.5628	62.8467 (39)
Average = Sum(39)m / 12 =												62.4248 (39)
HLP	1.0460	1.0435	1.0409	1.0291	1.0269	1.0166	1.0166	1.0147	1.0206	1.0269	1.0314	1.0360 (40)
HLP (average)												1.0291 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.0002 (42)
Average daily hot water use (litres/day)												81.7055 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	89.8761	86.6079	83.3396	80.0714	76.8032	73.5350	73.5350	76.8032	80.0714	83.3396	86.6079	89.8761 (44)
Energy conte	133.2836	116.5707	120.2905	104.8722	100.6274	86.8338	80.4643	92.3339	93.4367	108.8914	118.8635	129.0781 (45)
Energy content (annual)										Total = Sum(45)m =		1285.5460 (45)
Distribution loss (46)m = 0.15 x (45)m												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)

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cylinder contains dedicated solar storage												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Heat gains from water heating, kWh/month	28.3228	24.7713	25.5617	22.2853	21.3833	18.4522	17.0987	19.6210	19.8553	23.1394	25.2585	27.4291 (65)

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

Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	100.0116	100.0116	100.0116	100.0116	100.0116	100.0116	100.0116	100.0116	100.0116	100.0116	100.0116	100.0116 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	16.7749	14.8993	12.1169	9.1733	6.8572	5.7891	6.2553	8.1309	10.9133	13.8569	16.1731	17.2411 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	174.6084	176.4202	171.8543	162.1341	149.8640	138.3318	130.6277	128.8158	133.3817	143.1019	155.3720	166.9042 (68)
Pumps, fans	33.0012	33.0012	33.0012	33.0012	33.0012	33.0012	33.0012	33.0012	33.0012	33.0012	33.0012	33.0012 (69)
Losses e.g. evaporation (negative values) (Table 5)	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)
Water heating gains (Table 5)	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093 (71)
Total internal gains	38.0682	36.8620	34.3572	30.9519	28.7410	25.6280	22.9821	26.3723	27.5768	31.1014	35.0812	36.8671 (72)
	282.4550	281.1851	271.3319	255.2627	238.4657	222.7525	212.8685	216.3224	224.8752	241.0637	259.6298	274.0158 (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	
Southeast				3.8400	36.7938		0.6300		0.7000		0.7700	43.1795 (77)
Northwest				4.4800	11.2829		0.6300		0.7000		0.7700	15.4480 (81)

Solar gains	58.6275	104.9956	157.2889	217.7336	264.7315	271.9891	258.4096	221.9447	178.0001	119.7173	71.1567	49.5683 (83)
Total gains	341.0825	386.1807	428.6209	472.9963	503.1972	494.7416	471.2781	438.2672	402.8753	360.7811	330.7865	323.5841 (84)

7. Mean internal temperature (heating season)												

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
alpha	66.3892	66.5527	66.7137	67.4805	67.6259	68.3112	68.3112	68.4396	68.0456	67.6259	67.3324	67.0282
util living area	5.4259	5.4368	5.4476	5.4987	5.5084	5.5541	5.5541	5.5626	5.5364	5.5084	5.4888	5.4685
	0.9986	0.9968	0.9914	0.9701	0.8992	0.7382	0.5640	0.6247	0.8707	0.9820	0.9969	0.9989 (86)
MIT	19.8652	19.9988	20.2250	20.5306	20.7992	20.9533	20.9913	20.9852	20.8789	20.5351	20.1457	19.8417 (87)
Th 2	20.0452	20.0473	20.0494	20.0592	20.0610	20.0695	20.0695	20.0711	20.0662	20.0610	20.0573	20.0534 (88)
util rest of house	0.9981	0.9957	0.9883	0.9584	0.8605	0.6536	0.4509	0.5092	0.8079	0.9729	0.9957	0.9986 (89)
MIT 2	19.0058	19.1406	19.3671	19.6740	19.9219	20.0475	20.0672	20.0667	19.9967	19.6835	19.2957	18.9890 (90)
Living area fraction									fLA = Living area / (4) =			0.3366 (91)
MIT	19.2951	19.4295	19.6559	19.9624	20.2172	20.3524	20.3783	20.3759	20.2937	19.9702	19.5818	19.2761 (92)
Temperature adjustment												0.0000
adjusted MIT	19.2951	19.4295	19.6559	19.9624	20.2172	20.3524	20.3783	20.3759	20.2937	19.9702	19.5818	19.2761 (93)

8. Space heating requirement												

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9975	0.9948	0.9866	0.9570	0.8678	0.6809	0.4893	0.5485	0.8253	0.9718	0.9948	0.9981 (94)
Ext temp.	340.2445	384.1710	422.8982	452.6564	436.6915	336.8923	230.6137	240.3971	332.4942	350.6023	329.0712	322.9852 (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)
	951.4616	919.6573	830.7005	690.5739	530.5488	354.7279	232.9921	244.7177	383.4317	583.6806	780.8974	947.4810 (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	454.7455	359.8468	303.4050	171.3006	69.8298	0.0000	0.0000	0.0000	0.0000	173.4102	325.3149	464.6249 (98)
Space heating												2322.4776 (98)
Space heating per m2										(98) / (4) =		38.2868 (99)

8c. Space cooling requirement												

Calculated for June, July and August. See Table 10b												
Ext. temp.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	579.6633	456.3306	467.7844	0.0000	0.0000	0.0000	0.0000 (100)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.8933	0.9460	0.9260	0.0000	0.0000	0.0000	0.0000 (101)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	517.8266	431.6793	433.1724	0.0000	0.0000	0.0000	0.0000 (102)
Month fracti	0.0000	0.0000	0.0000	0.0000	0.0000	653.4819	624.6305	587.3841	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	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)
	0.0000	0.0000	0.0000	0.0000	0.0000	97.6718	143.5557	114.7335	0.0000	0.0000	0.0000	0.0000 (104)
Space cooling												355.9609 (104)

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Cooled fraction											FC = cooled area / (4) =	1.0000 (105)
Intermittency factor (Table 10b)	0.0000	0.0000	0.0000	0.0000	0.0000	0.2500	0.2500	0.2500	0.0000	0.0000	0.0000	0.0000 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	24.4179	35.8889	28.6834	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling												88.9902 (107)
Space cooling per m2												1.4670 (108)
Energy for space heating												38.2868 (99)
Energy for space cooling												1.4670 (108)
Total												39.7538 (109)
Dwelling Fabric Energy Efficiency (DFEE)												39.8 (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	60.6600 (1b)	x 2.3800 (2b)	= 144.3708 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	60.6600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 144.3708 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					2 * 10 = 20.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(7a)+(7b)+(7c) =				Air changes per hour
Pressure test					20.0000 / (5) = 0.1385 (8)
Measured/design AP50					Yes
Infiltration rate					5.0000
Number of sides sheltered					0.3885 (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) =				0.3594 (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												
	0.4582	0.4492	0.4403	0.3953	0.3863	0.3414	0.3414	0.3324	0.3594	0.3863	0.4043	0.4223 (22b)
Effective ac	0.6050	0.6009	0.5969	0.5781	0.5746	0.5583	0.5583	0.5553	0.5646	0.5746	0.5817	0.5892 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
TER Opaque door			2.1200	1.0000	2.1200		(26)
TER Opening Type (Uw = 1.40)			8.3200	1.3258	11.0303		(27)
Ground Floor Walls	61.3700	8.3200	53.0500	0.1800	9.5490		(29a)
Wall to Corridor	6.4600	2.1200	4.3400	0.1800	0.7812		(29a)
Total net area of external elements Aum(A, m ²)			67.8300				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	23.4805	(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)							6.5876 (36)
Total fabric heat loss						(33) + (36) =	30.0681 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)							
(38)m	28.8229	28.6287	28.4383	27.5441	27.3768	26.5980	26.5980
Heat transfer coeff	58.8910	58.6968	58.5064	57.6122	57.4449	56.6661	56.6661
Average = Sum(39)m / 12 =						56.5219	56.9661
	57.4449	57.7834	58.1372 (39)	57.6114 (39)			
HLP	0.9708	0.9676	0.9645	0.9498	0.9470	0.9342	0.9342
HLP (average)						0.9318	0.9391
Days in month	31	28	31	30	31	30	31
						30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.0002 (42)
Average daily hot water use (litres/day)												81.7055 (43)
Daily hot water use	89.8761	86.6079	83.3396	80.0714	76.8032	73.5350	73.5350	76.8032	80.0714	83.3396	86.6079	89.8761 (44)
Energy conte	133.2836	116.5707	120.2905	104.8722	100.6274	86.8338	80.4643	92.3339	93.4367	108.8914	118.8635	129.0781 (45)
Energy content (annual)										Total = Sum(45)m =		1285.5460 (45)
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)

FULL SAP CALCULATION PRINTOUT

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CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

Heat gains from water heating, kWh/month
28.3228 24.7713 25.5617 22.2853 21.3833 18.4522 17.0987 19.6210 19.8553 23.1394 25.2585 27.4291 (65)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	100.0116	100.0116	100.0116	100.0116	100.0116	100.0116	100.0116	100.0116	100.0116	100.0116	100.0116	100.0116	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	16.7749	14.8993	12.1169	9.1733	6.8572	5.7891	6.2553	8.1309	10.9133	13.8569	16.1731	17.2411	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	174.6084	176.4202	171.8543	162.1341	149.8640	138.3318	130.6277	128.8158	133.3817	143.1019	155.3720	166.9042	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.0012	33.0012	33.0012	33.0012	33.0012	33.0012	33.0012	33.0012	33.0012	33.0012	33.0012	33.0012	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093	(71)
Water heating gains (Table 5)	38.0682	36.8620	34.3572	30.9519	28.7410	25.6280	22.9821	26.3723	27.5768	31.1014	35.0812	36.8671	(72)
Total internal gains	282.4550	281.1851	271.3319	255.2627	238.4657	222.7525	212.8685	216.3224	224.8752	241.0637	259.6298	274.0158	(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
Southeast												3.8400	36.7938	0.6300	0.7000	0.7700	43.1795 (77)
Northwest												4.4800	11.2829	0.6300	0.7000	0.7700	15.4480 (81)

Solar gains	58.6275	104.9956	157.2889	217.7336	264.7315	271.9891	258.4096	221.9447	178.0001	119.7173	71.1567	49.5683 (83)					
Total gains	341.0825	386.1807	428.6209	472.9963	503.1972	494.7416	471.2781	438.2672	402.8753	360.7811	330.7865	323.5841 (84)					

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil/m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	71.5304	71.7671	72.0006	73.1182	73.3311	74.3390	74.3390	74.5287	73.9475	73.3311	72.9016	72.4579	
alpha	5.7687	5.7845	5.8000	5.8745	5.8887	5.9559	5.9559	5.9686	5.9298	5.8887	5.8601	5.8305	
util living area	0.9985	0.9967	0.9905	0.9646	0.8791	0.6982	0.5234	0.5823	0.8449	0.9790	0.9967	0.9989	(86)
MIT	19.9711	20.1030	20.3209	20.6130	20.8523	20.9723	20.9957	20.9922	20.9152	20.6074	20.2396	19.9517	(87)
Th 2	20.1077	20.1104	20.1130	20.1254	20.1277	20.1386	20.1386	20.1406	20.1344	20.1277	20.1230	20.1181	(88)
util rest of house	0.9981	0.9955	0.9871	0.9516	0.8378	0.6183	0.4240	0.4792	0.7800	0.9690	0.9954	0.9986	(89)
MIT 2	19.1626	19.2963	19.5148	19.8095	20.0272	20.1257	20.1374	20.1383	20.0869	19.8098	19.4433	19.1519	(90)
Living area fraction	19.4348	19.5679	19.7861	20.0800	20.3050	20.4107	20.4263	20.4257	20.3657	20.0783	19.7114	19.4211	(92)
MIT	19.4348	19.5679	19.7861	20.0800	20.3050	20.4107	20.4263	20.4257	20.3657	20.0783	19.7114	19.4211	(93)
Temperature adjustment												0.0000	
adjusted MIT	19.4348	19.5679	19.7861	20.0800	20.3050	20.4107	20.4263	20.4257	20.3657	20.0783	19.7114	19.4211	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9976	0.9946	0.9855	0.9508	0.8471	0.6446	0.4576	0.5141	0.7992	0.9682	0.9946	0.9982	(94)
Useful gains	340.2555	384.1101	422.4251	449.7270	426.2637	318.9159	215.6693	225.3326	321.9745	349.3233	329.0139	323.0016	(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	891.3020	860.9567	777.3245	644.1028	494.3108	329.2694	216.8234	227.5429	356.9335	544.4810	728.7280	884.9142	(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	409.9786	320.4409	264.0452	139.9506	50.6270	0.0000	0.0000	0.0000	0.0000	145.1973	287.7941	418.0630	(98)
Space heating												2036.0967	(98)
Space heating per m2												33.5657	(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	532.6614	419.3292	429.5663	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9279	0.9673	0.9532	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	494.2493	405.6333	409.4637	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	653.4819	624.6305	587.3841	0.0000	0.0000	0.0000	0.0000	(103)
Month fracti	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	(103a)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	114.6475	162.9339	132.3728	0.0000	0.0000	0.0000	0.0000	(104)
Space cooling												409.9541	(104)
Cooled fraction												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)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)



CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	28.6619	40.7335	33.0932	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling													102.4885 (107)
Space cooling per m2													1.6896 (108)
Energy for space heating													33.5657 (99)
Energy for space cooling													1.6896 (108)
Total													35.2553 (109)
Target Fabric Energy Efficiency (TFEE)													40.5 (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	60.6600 (1b)	x 2.3800 (2b)	= 144.3708 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	60.6600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 144.3708 (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					4.1900
Infiltration rate					0.2095 (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) =				0.1938 (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	0.2277	0.2132	0.2132	0.1938	0.1986	0.1889	0.1889	0.1841	0.1841	0.1986	0.1938	0.1986 (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			2.1200	1.1000	2.3320		(26)
Windows (Uw = 1.20)			8.3200	1.1450	9.5267		(27)
Ground Floor Walls	61.3700	8.3200	53.0500	0.2700	14.3235		(29a)
Wall to Corridor	6.4600	2.1200	4.3400	0.2041	0.8857		(29a)
Total net area of external elements Aum(A, m ²)					67.8300		(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	27.0679	(33)
Party Wall 1				8.2500	0.0000	0.0000	(32)
Party Floor 1				60.5800			(32d)
Party Ceilings 1				51.1700			(32b)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							8.5491 (36)
Total fabric heat loss							(33) + (36) = 35.6170 (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	23.8212	23.8212	23.8212	23.8212	23.8212	23.8212	23.8212	23.8212	23.8212	23.8212	23.8212	23.8212 (38)
Heat transfer coeff	59.4382	59.4382	59.4382	59.4382	59.4382	59.4382	59.4382	59.4382	59.4382	59.4382	59.4382	59.4382 (39)
Average = Sum(39)m / 12 =												59.4382 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.9799	0.9799	0.9799	0.9799	0.9799	0.9799	0.9799	0.9799	0.9799	0.9799	0.9799	0.9799 (40)
HLP (average)												0.9799 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.0002 (42)
Average daily hot water use (litres/day)												81.7055 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	89.8761	86.6079	83.3396	80.0714	76.8032	73.5350	73.5350	76.8032	80.0714	83.3396	86.6079	89.8761 (44)
Energy conte	133.2836	116.5707	120.2905	104.8722	100.6274	86.8338	80.4643	92.3339	93.4367	108.8914	118.8635	129.0781 (45)
Energy content (annual)												Total = Sum(45)m = 1285.5460 (45)
Distribution loss (46)m = 0.15 x (45)m	19.9925	17.4856	18.0436	15.7308	15.0941	13.0251	12.0696	13.8501	14.0155	16.3337	17.8295	19.3617 (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	(56)
If cylinder contains dedicated solar storage												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Combi loss	31.1777	28.1467	31.1406	30.1112	31.0969	30.0730	31.0625	31.0848	30.0939	31.1225	30.1473	(61)
Total heat required for water heating calculated for each month												
	164.4613	144.7175	151.4311	134.9834	131.7243	116.9068	111.5268	123.4187	123.5305	140.0139	149.0108	160.2486 (62)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63)
	Solar input (sum of months) = Sum(63)m = 0.0000 (63)											
Output from w/h												
	164.4613	144.7175	151.4311	134.9834	131.7243	116.9068	111.5268	123.4187	123.5305	140.0139	149.0108	160.2486 (64)
	Total per year (kWh/year) = Sum(64)m = 1651.9738 (64)											
RHI water heating demand												
Heat gains from water heating, kWh/month	52.1112	45.7964	47.7817	42.3978	41.2328	36.3905	34.5200	38.4722	38.5912	43.9870	47.0589	50.7111 (65)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	120.0140	120.0140	120.0140	120.0140	120.0140	120.0140	120.0140	120.0140	120.0140	120.0140	120.0140	120.0140 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	41.9372	37.2483	30.2923	22.9333	17.1429	14.4727	15.6383	20.3273	27.2832	34.6423	40.4327	43.1028 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	260.6095	263.3138	256.4990	241.9912	232.6776	206.4654	194.9667	192.2624	199.0771	213.5850	231.8985	249.1107 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	49.0016	49.0016	49.0016	49.0016	49.0016	49.0016	49.0016	49.0016	49.0016	49.0016	49.0016	49.0016 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093 (71)
Water heating gains (Table 5)	70.0420	68.1495	64.2228	58.8859	55.4205	50.5423	46.3978	51.7100	53.5988	59.1223	65.3596	68.1601 (72)
Total internal gains	464.5950	460.7178	443.0204	415.8166	388.2472	363.4868	349.0091	356.3059	371.9654	399.3559	429.6971	452.3799 (73)

[Jan]					Area	Solar flux	g		FF			Access	Gains
					m2	Table 6a	or Table 6b		or Table 6c			factor	W
						W/m2						Table 6d	
Southeast					3.8400	45.0642	0.6300		0.7000			0.7700	52.8852 (77)
Northwest					4.4800	14.6130	0.6300		0.7000			0.7700	20.0074 (81)
Solar gains	72.8926	111.5565	171.2448	239.4187	274.6473	312.3726	285.1022	255.1027	203.4129	137.5786	88.2765	58.2829 (83)	
Total gains	537.4876	572.2743	614.2652	655.2353	662.8946	675.8594	634.1113	611.4085	575.3783	536.9345	517.9737	510.6628 (84)	

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	70.8719	70.8719	70.8719	70.8719	70.8719	70.8719	70.8719	70.8719	70.8719	70.8719	70.8719	70.8719
alpha	5.7248	5.7248	5.7248	5.7248	5.7248	5.7248	5.7248	5.7248	5.7248	5.7248	5.7248	5.7248
util living area	0.9798	0.9702	0.9374	0.8464	0.6765	0.4460	0.3091	0.3108	0.5676	0.8449	0.9565	0.9835 (86)
MIT	20.3790	20.4626	20.6474	20.8510	20.9663	20.9973	20.9997	20.9997	20.9900	20.8796	20.6140	20.3495 (87)
Th 2	20.1002	20.1002	20.1002	20.1002	20.1002	20.1002	20.1002	20.1002	20.1002	20.1002	20.1002	20.1002 (88)
util rest of house	0.9737	0.9613	0.9192	0.8068	0.6107	0.3686	0.2249	0.2236	0.4815	0.7951	0.9414	0.9784 (89)
MIT 2	19.5593	19.6401	19.8152	19.9952	20.0822	20.0993	20.1001	20.1001	20.0965	20.0225	19.7871	19.5309 (90)
Living area fraction	19.8352	19.9170	20.0954	20.2833	20.3798	20.4016	20.4030	20.4030	fLA = Living area / (4) =	20.3972	20.3110	0.3366 (91)
MIT	19.8352	19.9170	20.0954	20.2833	20.3798	20.4016	20.4030	20.4030	20.3972	20.3110	20.0655	19.8064 (92)
Temperature adjustment	19.8352	19.9170	20.0954	20.2833	20.3798	20.4016	20.4030	20.4030	20.3972	20.3110	20.0655	0.0000
adjusted MIT	19.8352	19.9170	20.0954	20.2833	20.3798	20.4016	20.4030	20.4030	20.3972	20.3110	20.0655	19.8064 (93)

[illegible]

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	60.6600 (1b)	x 2.3800 (2b)	= 144.3708 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	60.6600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 144.3708 (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					4.1900
Infiltration rate					0.2095 (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) =				0.1938 (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	0.2471	0.2422	0.2374	0.2132	0.2083	0.1841	0.1841	0.1793	0.1938	0.2083	0.2180	0.2277 (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			2.1200	1.1000	2.3320		(26)
Windows (Uw = 1.20)			8.3200	1.1450	9.5267		(27)
Ground Floor Walls	61.3700	8.3200	53.0500	0.2700	14.3235		(29a)
Wall to Corridor	6.4600	2.1200	4.3400	0.2041	0.8857		(29a)
Total net area of external elements Aum(A, m ²)					67.8300		(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	27.0679		(33)
Party Wall 1				8.2500	0.0000		(32)
Party Floor 1				60.5800			(32d)
Party Ceilings 1				51.1700			(32b)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							8.5491 (36)
Total fabric heat loss							(33) + (36) = 35.6170 (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	23.8212	23.8212	23.8212	23.8212	23.8212	23.8212	23.8212	23.8212	23.8212	23.8212	23.8212	23.8212 (38)
Heat transfer coeff	59.4382	59.4382	59.4382	59.4382	59.4382	59.4382	59.4382	59.4382	59.4382	59.4382	59.4382	59.4382 (39)
Average = Sum(39)m / 12 =												59.4382 (39)
HLP	0.9799	0.9799	0.9799	0.9799	0.9799	0.9799	0.9799	0.9799	0.9799	0.9799	0.9799	0.9799 (40)
HLP (average)												0.9799 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.0002 (42)
Average daily hot water use (litres/day)												81.7055 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	89.8761	86.6079	83.3396	80.0714	76.8032	73.5350	73.5350	76.8032	80.0714	83.3396	86.6079	89.8761 (44)
Energy content (annual)	133.2836	116.5707	120.2905	104.8722	100.6274	86.8338	80.4643	92.3339	93.4367	108.8914	118.8635	129.0781 (45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 1285.5460 (45)
	19.9925	17.4856	18.0436	15.7308	15.0941	13.0251	12.0696	13.8501	14.0155	16.3337	17.8295	19.3617 (46)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF ENERGY RATINGS 09 Jan 2014

Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	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	31.1777	28.1467	31.1406	30.1112	31.0969	30.0730	31.0625	31.0848	30.0939	31.1225	30.1473	31.1705	(61)
Total heat required for water heating calculated for each month	164.4613	144.7175	151.4311	134.9834	131.7243	116.9068	111.5268	123.4187	123.5305	140.0139	149.0108	160.2486	(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	164.4613	144.7175	151.4311	134.9834	131.7243	116.9068	111.5268	123.4187	123.5305	140.0139	149.0108	160.2486	(64)
Heat gains from water heating, kWh/month	52.1112	45.7964	47.7817	42.3978	41.2328	36.3905	34.5200	38.4722	38.5912	43.9870	47.0589	50.7111	(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	120.0140	120.0140	120.0140	120.0140	120.0140	120.0140	120.0140	120.0140	120.0140	120.0140	120.0140	120.0140	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	41.9372	37.2483	30.2923	22.9333	17.1429	14.4727	15.6383	20.3273	27.2832	34.6423	40.4327	43.1028	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	260.6095	263.3138	256.4990	241.9912	223.6776	206.4654	194.9667	192.2624	199.0771	213.5850	231.8985	249.1107	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	49.0016	49.0016	49.0016	49.0016	49.0016	49.0016	49.0016	49.0016	49.0016	49.0016	49.0016	49.0016	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093	(71)
Water heating gains (Table 5)	70.0420	68.1495	64.2228	58.8859	55.4205	50.5423	46.3978	51.7100	53.5988	59.1223	65.3596	68.1601	(72)
Total internal gains	464.5950	460.7178	443.0204	415.8166	388.2472	363.4868	349.0091	356.3059	371.9654	399.3559	429.6971	452.3799	(73)

6. Solar gains

[Jan]				Area m ²	Solar flux Table 6a W/m ²	g Specific data or Table 6b	FF Specific data or Table 6c				Access factor Table 6d	Gains W
Southeast				3.8400	36.7938	0.6300	0.7000				0.7700	43.1795 (77)
Northwest				4.4800	11.2829	0.6300	0.7000				0.7700	15.4480 (81)
Solar gains	58.6275	104.9956	157.2889	217.7336	264.7315	271.9891	258.4096	221.9447	178.0001	119.7173	71.1567	49.5683 (83)
Total gains	523.2225	565.7134	600.3094	633.5501	652.9788	635.4759	607.4187	578.2506	549.9655	519.0732	500.8539	501.9482 (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	70.8719	70.8719	70.8719	70.8719	70.8719	70.8719	70.8719	70.8719	70.8719	70.8719	70.8719	70.8719		
alpha	5.7248	5.7248	5.7248	5.7248	5.7248	5.7248	5.7248	5.7248	5.7248	5.7248	5.7248	5.7248		
util living area	0.9877	0.9792	0.9580	0.8996	0.7723	0.5855	0.4286	0.4694	0.7047	0.9147	0.9768	0.9902	(86)	
MIT	20.2398	20.3561	20.5419	20.7615	20.9225	20.9866	20.9981	20.9968	20.9639	20.7709	20.4616	20.1987	(87)	
Th 2	20.1002	20.1002	20.1002	20.1002	20.1002	20.1002	20.1002	20.1002	20.1002	20.1002	20.1002	20.1002	(88)	
util rest of house	0.9841	0.9732	0.9458	0.8715	0.7183	0.5088	0.3420	0.3794	0.6283	0.8847	0.9689	0.9873	(89)	
MIT 2	19.4224	19.5363	19.7158	19.9187	20.0518	20.0944	20.0997	20.0993	20.0824	19.9316	19.6409	19.3820	(90)	
Living area fraction	19.6975	19.8123	19.9939	20.2024	20.3449	20.3948	20.4021	20.4014	20.3792	20.2142	19.9172	19.6569	(92)	
Temperature adjustment	19.6975	19.8123	19.9939	20.2024	20.3449	20.3948	20.4021	20.4014	20.3792	20.2142	19.9172	19.6569	(93)	
adjusted MIT	19.6975	19.8123	19.9939	20.2024	20.3449	20.3948	20.4021	20.4014	20.3792	20.2142	19.9172	19.6569	(93)	

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Useful gains	0.9821	0.9709	0.9441	0.8751	0.7338	0.5344	0.3712	0.4098	0.6530	0.8890	0.9670	0.9855	(94)	
Ext temp.	513.8790	549.2569	566.7814	554.3928	479.1422	339.6198	225.4958	236.9697	359.1490	461.4392	484.3200	494.6708	(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	915.2016	886.3589	802.0505	671.7954	513.8374	344.4317	225.9905	237.8376	373.2215	571.4491	761.8309	918.7299	(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 m ²	298.5840	226.5326	175.0402	84.5298	25.8132	0.0000	0.0000	0.0000	0.0000	81.8473	199.8079	315.4999	(98)	
												1407.6550	(98)	
												23.2057	(99)	

8c. Space cooling requirement

Not applicable

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF ENERGY RATINGS 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 %)													90.7000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													1551.9900 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	298.5840	226.5326	175.0402	84.5298	25.8132	0.0000	0.0000	0.0000	0.0000	81.8473	199.8079	315.4999	(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)	329.1996	249.7603	192.9881	93.1972	28.4600	0.0000	0.0000	0.0000	0.0000	90.2396	220.2954	347.8500	(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	164.4613	144.7175	151.4311	134.9834	131.7243	116.9068	111.5268	123.4187	123.5305	140.0139	149.0108	160.2486	(64)
Efficiency of water heater (217)m	89.3504	89.2209	88.9454	88.3885	87.5854	87.0000	87.0000	87.0000	87.0000	88.3293	89.0816	89.4191	(216)
Fuel for water heating, kWh/month	184.0634	162.2013	170.2517	152.7161	150.3952	134.3756	128.1917	141.8606	141.9891	158.5136	167.2745	179.2108	(219)
Water heating fuel used												1871.0437	(219)
Annual totals kWh/year													
Space heating fuel - main system												1551.9900	(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)													86.3049 (230a)
central heating pump													30.0000 (230c)
main heating flue fan													45.0000 (230e)
Total electricity for the above, kWh/year													161.3049 (231)
Electricity for lighting (calculated in Appendix L)													296.2500 (232)
Energy saving/generation technologies (Appendices M ,N and Q)													
Total delivered energy for all uses													3880.5886 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1551.9900	3.4800	54.0093 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1871.0437	3.4800	65.1123 (247)
Mechanical ventilation fans	86.3049	13.1900	11.3836 (249)
Pumps and fans for heating	75.0000	13.1900	9.8925 (249)
Energy for lighting	296.2500	13.1900	39.0754 (250)
Additional standing charges			120.0000 (251)
Energy saving/generation technologies			
PV Unit	0.0000	13.1900	0.0000 (252)
Total energy cost			299.4731 (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] =	1.1904 (257)
SAP value		83.3938
SAP rating (Section 12)		83 (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	1551.9900	0.2160	335.2298 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1871.0437	0.2160	404.1454 (264)
Space and water heating			739.3753 (265)
Pumps and fans	161.3049	0.5190	83.7172 (267)
Energy for lighting	296.2500	0.5190	153.7537 (268)
Energy saving/generation technologies			
PV Unit	-698.4100	0.5190	-362.4748 (269)
Total kg/year			614.3715 (272)
CO2 emissions per m2			10.1300 (273)
EI value			92.2084
EI rating			92 (274)
EI band			A

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

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Main heating environmental impact	$0.216 \times (1 + 0.29 \times 0.00) / 0.9070 = 0.2381$, stars = 4
Water heating energy efficiency	$3.48 / 0.8819 = 3.946$, stars = 4
Water heating environmental impact	$0.216 / 0.8819 = 0.2449$, 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	60.6600 (1b)	x 2.3800 (2b)	= 144.3708 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	60.6600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 144.3708 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					0 * 10 = 0.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(7a)+(7b)+(7c) =				0.0000 / (5) = 0.0000 (8)
Pressure test					Yes
Measured/design AP50					4.1900
Infiltration rate					0.2095 (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) =				0.1938 (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	0.2277	0.2132	0.2132	0.1938	0.1986	0.1889	0.1889	0.1841	0.1841	0.1986	0.1938	0.1986 (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			2.1200	1.1000	2.3320		(26)
Windows (Uw = 1.20)			8.3200	1.1450	9.5267		(27)
Ground Floor Walls	61.3700	8.3200	53.0500	0.2700	14.3235		(29a)
Wall to Corridor	6.4600	2.1200	4.3400	0.2041	0.8857		(29a)
Total net area of external elements Aum(A, m ²)					67.8300		(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	27.0679	(33)
Party Wall 1				8.2500	0.0000	0.0000	(32)
Party Floor 1				60.5800			(32d)
Party Ceilings 1				51.1700			(32b)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							8.5491 (36)
Total fabric heat loss							(33) + (36) = 35.6170 (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	23.8212	23.8212	23.8212	23.8212	23.8212	23.8212	23.8212	23.8212	23.8212	23.8212	23.8212	23.8212 (38)
Average = Sum(39)m / 12 =	59.4382	59.4382	59.4382	59.4382	59.4382	59.4382	59.4382	59.4382	59.4382	59.4382	59.4382	59.4382 (39)
HLP	0.9799	0.9799	0.9799	0.9799	0.9799	0.9799	0.9799	0.9799	0.9799	0.9799	0.9799	0.9799 (40)
HLP (average)												0.9799 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												
Average daily hot water use (litres/day)												2.0002 (42)
												81.7055 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	89.8761	86.6079	83.3396	80.0714	76.8032	73.5350	73.5350	76.8032	80.0714	83.3396	86.6079	89.8761 (44)
Energy content (annual)	133.2836	116.5707	120.2905	104.8722	100.6274	86.8338	80.4643	92.3339	93.4367	108.8914	118.8635	129.0781 (45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 1285.5460 (45)
	19.9925	17.4856	18.0436	15.7308	15.0941	13.0251	12.0696	13.8501	14.0155	16.3337	17.8295	19.3617 (46)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

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

Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	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	31.1777	28.1467	31.1406	30.1112	31.0969	30.0730	31.0625	31.0848	30.0939	31.1225	30.1473	31.1705	(61)
Total heat required for water heating calculated for each month	164.4613	144.7175	151.4311	134.9834	131.7243	116.9068	111.5268	123.4187	123.5305	140.0139	149.0108	160.2486	(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	164.4613	144.7175	151.4311	134.9834	131.7243	116.9068	111.5268	123.4187	123.5305	140.0139	149.0108	160.2486	(64)
Heat gains from water heating, kWh/month	52.1112	45.7964	47.7817	42.3978	41.2328	36.3905	34.5200	38.4722	38.5912	43.9870	47.0589	50.7111	(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	120.0140	120.0140	120.0140	120.0140	120.0140	120.0140	120.0140	120.0140	120.0140	120.0140	120.0140	120.0140	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	41.9372	37.2483	30.2923	22.9333	17.1429	14.4727	15.6383	20.3273	27.2832	34.6423	40.4327	43.1028	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	260.6095	263.3138	256.4990	241.9912	223.6776	206.4654	194.9667	192.2624	199.0771	213.5850	231.8985	249.1107	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	49.0016	49.0016	49.0016	49.0016	49.0016	49.0016	49.0016	49.0016	49.0016	49.0016	49.0016	49.0016	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093	-80.0093	(71)
Water heating gains (Table 5)	70.0420	68.1495	64.2228	58.8859	55.4205	50.5423	46.3978	51.7100	53.5988	59.1223	65.3596	68.1601	(72)
Total internal gains	464.5950	460.7178	443.0204	415.8166	388.2472	363.4868	349.0091	356.3059	371.9654	399.3559	429.6971	452.3799	(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
Southeast				3.8400	45.0642	0.6300	0.7000			0.7700			52.8852 (77)
Northwest				4.4800	14.6130	0.6300	0.7000			0.7700			20.0074 (81)

Solar gains	72.8926	111.5565	171.2448	239.4187	274.6473	312.3726	285.1022	255.1027	203.4129	137.5786	88.2765	58.2829	(83)
Total gains	537.4876	572.2743	614.2652	655.2353	662.8946	675.8594	634.1113	611.4085	575.3783	536.9345	517.9737	510.6628	(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	70.8719	70.8719	70.8719	70.8719	70.8719	70.8719	70.8719	70.8719	70.8719	70.8719	70.8719	70.8719		
alpha	5.7248	5.7248	5.7248	5.7248	5.7248	5.7248	5.7248	5.7248	5.7248	5.7248	5.7248	5.7248		
util living area	0.9798	0.9702	0.9374	0.8464	0.6765	0.4460	0.3091	0.3108	0.5676	0.8449	0.9565	0.9835	(86)	
MIT	20.3790	20.4626	20.6474	20.8510	20.9663	20.9973	20.9997	20.9997	20.9900	20.8796	20.6140	20.3495	(87)	
Th 2	20.1002	20.1002	20.1002	20.1002	20.1002	20.1002	20.1002	20.1002	20.1002	20.1002	20.1002	20.1002	(88)	
util rest of house	0.9737	0.9613	0.9192	0.8068	0.6107	0.3686	0.2249	0.2236	0.4815	0.7951	0.9414	0.9784	(89)	
MIT 2	19.5593	19.6401	19.8152	19.9952	20.0822	20.0993	20.1001	20.1001	20.0965	20.0225	19.7871	19.5309	(90)	
Living area fraction	19.8352	19.9170	20.0954	20.2833	20.3798	20.4016	20.4030	20.4030	20.3972	20.3110	20.0655	19.8064	(92)	
Temperature adjustment	19.8352	19.9170	20.0954	20.2833	20.3798	20.4016	20.4030	20.4030	20.3972	20.3110	20.0655	19.8064	(93)	
adjusted MIT	19.8352	19.9170	20.0954	20.2833	20.3798	20.4016	20.4030	20.4030	20.3972	20.3110	20.0655	19.8064	(93)	

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	522.1669	548.9137	564.5843	534.3729	418.8412	266.7620	160.6126	154.6709	293.7261	433.7425	487.2836	498.5516	(94)
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	846.1157	827.1992	742.7019	605.2747	432.6975	267.5666	160.6589	154.7152	297.0271	488.0482	681.4873	838.4612	(97)
Month fracti	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	1.0000	(97a)
Space heating kWh	241.0179	187.0079	132.5195	51.0493	10.3091	0.0000	0.0000	0.0000	0.0000	40.4035	139.8267	252.8928	(98)
Space heating												1055.0267	(98)
Space heating per m ²												17.3925	(99)

8c. Space cooling requirement

Not applicable

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY 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 %)												90.7000	(206)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
Space heating requirement												1163.2047	(211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	241.0179	187.0079	132.5195	51.0493	10.3091	0.0000	0.0000	0.0000	0.0000	40.4035	139.8267	252.8928	(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)	265.7309	206.1829	146.1075	56.2837	11.3662	0.0000	0.0000	0.0000	0.0000	44.5463	154.1639	278.8233	(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	164.4613	144.7175	151.4311	134.9834	131.7243	116.9068	111.5268	123.4187	123.5305	140.0139	149.0108	160.2486	(64)
Efficiency of water heater (217)m	89.1620	89.0479	88.6885	87.9849	87.2584	87.0000	87.0000	87.0000	87.0000	87.8021	88.7527	89.2281	(216)
Fuel for water heating, kWh/month	184.4523	162.5165	170.7449	153.4166	150.9589	134.3756	128.1917	141.8606	141.9891	159.4653	167.8944	179.5943	(219)
Water heating fuel used												1875.4602	(219)
Annual totals kWh/year													
Space heating fuel - main system												1163.2047	(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)												86.3049	(230a)
central heating pump												30.0000	(230c)
main heating flue fan												45.0000	(230e)
Total electricity for the above, kWh/year												161.3049	(231)
Electricity for lighting (calculated in Appendix L)												296.2500	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
Total delivered energy for all uses												3496.2197	(238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1163.2047	3.6300	42.2243 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1875.4602	3.6300	68.0792 (247)
Mechanical ventilation fans	86.3049	19.4400	16.7777 (249)
Pumps and fans for heating	75.0000	19.4400	14.5800 (249)
Energy for lighting	296.2500	19.4400	57.5910 (250)
Additional standing charges			95.0000 (251)
Energy saving/generation technologies			
PV Unit	0.0000	19.4400	0.0000 (252)
Total energy cost			294.2522 (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	1163.2047	0.2160	251.2522 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1875.4602	0.2160	405.0994 (264)
Space and water heating			656.3516 (265)
Pumps and fans	161.3049	0.5190	83.7172 (267)
Energy for lighting	296.2500	0.5190	153.7537 (268)
Energy saving/generation technologies			
PV Unit	-698.4100	0.5190	-362.4748 (269)
Total kg/year			531.3478 (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	1163.2047	1.2200	1419.1097 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1875.4602	1.2200	2288.0614 (264)
Space and water heating			3707.1712 (265)
Pumps and fans	161.3049	3.0700	495.2059 (267)
Energy for lighting	296.2500	3.0700	909.4874 (268)
Energy saving/generation technologies			
PV Unit	-698.4100	3.0700	-2144.1187 (269)
Primary energy kWh/year			2967.7458 (272)
Primary energy kWh/m2/year			48.9243 (273)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

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

SAP 2012 EPC IMPROVEMENTS

Current energy efficiency rating: B 83
Current environmental impact rating: A 92

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

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

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

Potential energy efficiency rating: B 83
Potential environmental impact rating: A 92

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	£89	£89	£0
Mains gas	£205	£205	£0
Space heating	£169	£169	£0
Water heating	£68	£68	£0
Lighting	£58	£58	£0
Total cost of fuels	£294	£294	£0
Total cost of uses	£295	£295	£0
Delivered energy	58 kWh/m²	58 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.5 tonnes	0.5 tonnes	0.0 tonnes
CO2 emissions per m²	9 kg/m²	9 kg/m²	0 kg/m²
Primary energy	49 kWh/m²	49 kWh/m²	0 kWh/m²

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF ENERGY RATINGS FOR IMPROVED DWELLING 09 Jan 2014

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

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 97	Issued on Date	02/08/2022
Assessment Reference	As Built	Prop Type Ref	J (HA-AR)
Project	12 Haines Crescent, WEST END, SO30 3LG		
Calculation Type	New Build (As Built)		

SAP Rating	83 B	DER	12.30	TER	17.63
Environmental	92 A	% DER<TER	30.24		
CO ₂ Emissions (t/year)	0.53	DFEE	39.75	TFEE	40.54
General Requirements Compliance	Pass	% DFEE<TFEE	1.95		

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

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 97	Issued on Date	02/08/2022
Assessment Reference	As Built	Prop Type Ref	J (HA-AR)
Project	12 Haines Crescent, WEST END, SO30 3LG		
Calculation Type	New Build (As Built)		

SAP Rating	83 B	DER	12.30	TER	17.63
Environmental	92 A	% DER<TER	30.24		
CO ₂ Emissions (t/year)	0.53	DFEE	39.75	TFEE	40.54
General Requirements Compliance	Pass	% DFEE<TFEE	1.95		

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

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Built)

Property Reference	SAP 0647 Flat 97	Issued on Date	02/08/2022
Assessment Reference	As Built	Prop Type Ref	J (HA-AR)
Property	12 Haines Crescent, WEST END, SO30 3LG		
SAP Rating	83 B	DER	12.30
Environmental	92 A	TER	17.63
CO ₂ Emissions (t/year)	0.53	% DER<TER	30.24
General Requirements Compliance	Pass	DFEE	39.75
		TFEE	40.54
		% DFEE<TFEE	1.95
Assessor Details	Mr. Tobias Whiting, Abacus Energy (UK) Ltd, Tel: 07798936079, toby@abacusenergyuk.com		Assessor ID
			E477-0001
Client	Foreman Homes, FORE		

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

Orientation	North 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				
	Ground Floor:	Heat Loss Perimeter 28.50 m	Internal Floor Area 60.66 m ²	Average Storey Height 2.38 m

7.0 Living Area	20.42	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			
Ground Floor Walls	Cavity Wall	0.27	61.37	53.05
Wall to Corridor	Cavity Wall	0.25	6.46	4.34

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	8.25

10.1 Party Ceilings		Area (m ²)
Description	Construction	

11.1 Party Floors		Area (m ²)
Description	Construction	

12.0 Opening Types

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Built)

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

13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width (m)	Height (m)	Count	Area (m²)	Curtain Closed
Flat Entrance Door	Solid Door	[2] Wall to Corridor	North East							2.12	
South East	Window	[1] Ground Floor Walls	South East	None	0.00					3.84	
North West	Window	[1] Ground Floor Walls	North West	None	0.00					4.48	

14.0 Conservatory

None

15.0 Draught Proofing

100

%

16.0 Draught Lobby

Yes

17.0 Thermal Bridging

Calculate Bridges

17.1 List of Bridges

Source Type	Bridge Type	Length	Psi	Imported
Table K1 - Approved	E2 Other lintels (including other steel lintels)	7.54	0.300	No
Table K1 - Approved	E3 Sill	6.63	0.040	No
Table K1 - Approved	E4 Jamb	19.20	0.050	No
Table K1 - Approved	E7 Party floor between dwellings (in blocks of flats)	57.00	0.070	No
Table K1 - Approved	E16 Corner (normal)	7.15	0.090	No
Table K1 - Approved	E18 Party wall between dwellings	2.38	0.060	No
Table K1 - Default	E25 Staggered party wall between dwellings	2.38	0.120	No
Table K1 - Default	P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	6.92	0.000	No

Y-value	0.126	W/m²K
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18.0 Pressure Testing

Yes

Designed AP ₅₀	5.00	m³/(h.m²) @ 50 Pa
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Property Tested ?	Yes	
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As Built AP ₅₀	4.19	m³/(h.m²) @ 50 Pa
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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

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Built)

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

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	
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	No

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Built)

Instantaneous System 2

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

698.41

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 %			