



SAP Report Submission for Building Regulations Compliance

Client: Foreman Homes

Project: 15 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 98	Issued on Date	02/08/2022
Assessment Reference	As Built	Prop Type Ref	J (HA-AR)
Property	15 Haines Crescent, WEST END, SO30 3LG		
SAP Rating	83 B	DER	12.49
Environmental	92 A	TER	18.12
CO ₂ Emissions (t/year)	0.58	% DER<TER	31.06
General Requirements Compliance	Fail	DfEE	41.07
		TfEE	43.41
		% DfEE<TfEE	5.38
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)	18.12	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	12.49	kgCO ₂ /m ²	Pass
	-5.63 (-31.1%)	kgCO ₂ /m ²	

1b TfEE and DfEE

Target Fabric Energy Efficiency (TfEE)	43.41	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DfEE)	41.07	kWh/m ² /yr	
	-2.3 (-5.3%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.25 (max. 0.30)	0.27 (max. 0.70)	Pass
Floor	0.37 (max. 0.25)	0.37 (max. 0.70)	Fail
Roof	0.14 (max. 0.20)	0.17 (max. 0.35)	Pass
Openings	1.24 (max. 2.00)	1.40 (max. 3.30)	Pass

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	4.35 (measured in this dwelling)	m ³ /(h.m ²) @ 50 Pa	
Maximum	10.0	m ³ /(h.m ²) @ 50 Pa	Pass

Limiting System Efficiencies

4 Heating efficiency

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

BUILDING REGULATION COMPLIANCE

Calculation Type: New Build (As Built)

Main heating system

Boiler system with radiators or underfloor - Mains gas
Data from database
Worcester Greenstar 30Si Compact ErP
Combi boiler
Efficiency: 89.8% SEDBUK2009
Minimum: 88.0%

Pass

Secondary heating system

None

5 Cylinder insulation

Hot water storage

No cylinder

6 Controls

Space heating controls

Programmer, room thermostat and TRVs

Pass

Hot water controls

No cylinder

Boiler interlock

Yes

Pass

7 Low energy lights

Percentage of fixed lights with low-energy fittings

100 %

Minimum

75 %

Pass

8 Mechanical ventilation

Continuous extract system

Specific fan power

0.35

Maximum

0.7

Pass

Criterion 3 – Limiting the effects of heat gains in summer

9 Summertime temperature

Overheating risk (Southern England)

Slight

Pass

Based on:

Overshading

Average

Windows facing North East

2.88 m², No overhang

Air change rate

3.00 ach

Blinds/curtains

None

Criterion 4 – Building performance consistent with DER and DFEE rate

Air permeability and pressure testing

3 Air permeability

Air permeability at 50 pascals

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

Maximum

10.0 m³/(h.m²) @ 50 Pa

Pass

10 Key features

Roof U-value

0.10 W/m²K

Door U-value

1.10 W/m²K

Photovoltaic array

756.44 kWh/Year

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THERMAL BRIDGING

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Environmental	92 A	TER	18.12
CO ₂ Emissions (t/year)	0.58	% DER<TER	31.06
General Requirements Compliance	Fail	DFEE	41.07
		TFEE	43.41
		% DFEE<TFEE	5.38
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	Junction detail	Source Type	Psi (W/mK)	Length (m)	Result	Reference
External wall	E2 Other lintels (including other steel lintels)	Table K1 - Approved	0.300	2.11	0.63	
External wall	E3 Sill	Table K1 - Approved	0.040	1.20	0.05	
External wall	E4 Jamb	Table K1 - Approved	0.050	7.20	0.36	
External wall	E20 Exposed floor (normal)	Table K1 - Default	0.320	3.57	1.14	
External wall	E21 Exposed floor (inverted)	Table K1 - Default	0.320	3.57	1.14	
External wall	E7 Party floor between dwellings (in blocks of flats)	Table K1 - Approved	0.070	31.53	2.21	
External wall	E11 Eaves (insulation at rafter level)	Table K1 - Approved	0.040	24.04	0.96	
External wall	E12 Gable (insulation at ceiling level)	Table K1 - Approved	0.240	5.11	1.23	
External wall	E13 Gable (insulation at rafter level)	Table K1 - Approved	0.040	3.00	0.12	
External wall	E16 Corner (normal)	Table K1 - Approved	0.090	8.36	0.75	
External wall	E17 Corner (inverted – internal area greater than external area)	Table K1 - Approved	-0.090	3.55	-0.32	
External roof	R1 Head of roof window	Table K1 - Default	0.080	3.48	0.28	
External roof	R2 Sill of roof window	Table K1 - Default	0.060	3.48	0.21	
External roof	R3 Jamb of roof window	Table K1 - Default	0.080	7.12	0.57	
External roof	R4 Ridge (vaulted ceiling)	Table K1 - Default	0.080	2.06	0.16	
External roof	R5 Ridge (inverted)	Table K1 - Default	0.040	2.06	0.08	
External roof	R6 Flat ceiling	Table K1 - Default	0.060	23.70	1.42	
External roof	R7 Flat ceiling (inverted)	Table K1 - Default	0.040	1.47	0.06	
External roof	R8 Roof to wall (rafter)	Table K1 - Default	0.060	5.41	0.32	

Total: **11.38** W/mK:
Y-Value: **0.090** W/m²K:

FULL SAP CALCULATION PRINTOUT

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CO ₂ Emissions (t/year)	0.58	DFEE	41.07	TFEE	43.41
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Calculation Type: New Build (As Built)

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

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DWELLING AS BUILT

Top-floor flat, total floor area 66 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) 18.12 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 12.49 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)43.4 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)41.1 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.25 (max. 0.30)	0.27 (max. 0.70)	OK
Floor	0.37 (max. 0.25)	0.37 (max. 0.70)	Fail
Roof	0.14 (max. 0.20)	0.17 (max. 0.35)	OK
Openings	1.24 (max. 2.00)	1.40 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals: 4.35 (measured in this dwelling)
Maximum 10.0 OK

4 Heating efficiency

Main heating system: Boiler system with radiators or underfloor - Mains gas
Data from database
Worcester Greenstar 30Si Compact ErP
Combi boiler
Efficiency: 89.8% SEDBUK2009
Minimum: 88.0% OK

Secondary heating system: None

5 Cylinder insulation

Hot water storage No cylinder

6 Controls

Space heating controls: Programmer, room thermostat and TRVs OK

Hot water controls: No cylinder

Boiler interlock Yes OK

7 Low energy lights

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

8 Mechanical ventilation

Continuous extract system
Specific fan power: 0.35
Maximum 0.7 OK

9 Summertime temperature

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

10 Key features

Roof U-value 0.10 W/m²K
Door U-value 1.10 W/m²K
Photovoltaic array 756.44 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	65.7000 (1b)	x 2.0900 (2b)	= 137.3130 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	65.7000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 137.3130 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					0 * 10 = 0.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					Air changes per hour 0.0000 / (5) = 0.0000 (8)
Pressure test					Yes
Measured/design AP50					4.3500
Infiltration rate					0.2175 (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) =	0.2012 (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				0.2213	0.2163	0.1911	0.1911	0.1861	0.2012	0.2163	0.2263	0.2364 (22b)
Mechanical extract ventilation - centralised												0.5000 (23a)
If mechanical ventilation:												0.5000 (23a)
Effective ac	0.5065	0.5015	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)			2.8800	1.1450	3.2977		(27)
Roof Windows (Uw = 1.40)			2.7000	1.3258	3.5795		(27a)
Corridor Below			3.1700	0.3679	1.1662		(28b)
Walls	29.6300	1.4400	28.1900	0.2700	7.6113		(29a)
Wall to Corridor	13.2000	2.1200	11.0800	0.2041	2.2612		(29a)
Dormers	3.7700	1.4400	2.3300	0.2100	0.4893		(29a)
Pitched Roof	35.9700		35.9700	0.1000	3.5970		(30)
Sloping Ceilings	41.2400	2.7000	38.5400	0.1700	6.5518		(30)
Total net area of external elements Aum(A, m ²)			126.9800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	30.8861		(33)
Party Floor 1			56.4300				(32d)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							11.3832 (36)
Total fabric heat loss						(33) + (36) =	42.2693 (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	22.9518	22.7239	22.6566	22.6566	22.6566	22.6566	22.6566	22.6566	22.6566	22.6566	22.6566	22.6566 (38)
Heat transfer coeff	65.2211	64.9932	64.9259	64.9259	64.9259	64.9259	64.9259	64.9259	64.9259	64.9259	64.9259	64.9259 (39)
Average = Sum(39)m / 12 =												64.9561 (39)
HLP	0.9927	0.9892	0.9882	0.9882	0.9882	0.9882	0.9882	0.9882	0.9882	0.9882	0.9882	0.9882 (40)
HLP (average)												0.9887 (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												2.1374 (42)
Average daily hot water use (litres/day)												84.9630 (43)
Daily hot water use	93.4593	90.0608	86.6623	83.2638	79.8652	76.4667	76.4667	79.8652	83.2638	86.6623	90.0608	93.4593 (44)
Energy conte	138.5975	121.2182	125.0864	109.0533	104.6393	90.2957	83.6723	96.0152	97.1619	113.2328	123.6025	134.2243 (45)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Energy content (annual)												Total = Sum(45)m = 1336.7992 (45)
Distribution loss (46)m = 0.15 x (45)m												
	20.7896	18.1827	18.7630	16.3580	15.6959	13.5444	12.5508	14.4023	14.5743	16.9849	18.5404	20.1336 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	31.1962	28.1623	31.1561	30.1242	31.1089	30.0829	31.0717	31.0958	30.1054	31.1365	30.1632	31.1884 (61)
Total heat required for water heating calculated for each month	169.7937	149.3806	156.2424	139.1776	135.7481	120.3786	114.7439	127.1109	127.2673	144.3693	153.7657	165.4127 (62)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63)
												Solar input (sum of months) = Sum(63)m = 0.0000 (63)
Output from w/h	169.7937	149.3806	156.2424	139.1776	135.7481	120.3786	114.7439	127.1109	127.2673	144.3693	153.7657	165.4127 (64)
												Total per year (kWh/year) = Sum(64)m = 1703.3908 (64)
Heat gains from water heating, kWh/month	53.8827	47.3457	49.3802	43.7913	42.5698	37.5441	35.5889	39.6990	39.8327	45.4340	48.6386	52.4267 (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	106.8695	106.8695	106.8695	106.8695	106.8695	106.8695	106.8695	106.8695	106.8695	106.8695	106.8695	106.8695	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	19.5333	17.3493	14.1094	10.6817	7.9847	6.7410	7.2839	9.4679	12.7078	16.1355	18.8325	20.0762	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	187.0609	189.0020	184.1105	173.6970	160.5519	148.1973	139.9437	138.0025	142.8941	153.3076	166.4527	178.8073	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.6870	33.6870	33.6870	33.6870	33.6870	33.6870	33.6870	33.6870	33.6870	33.6870	33.6870	33.6870	(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)	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	(71)
Water heating gains (Table 5)	72.4230	70.4548	66.3713	60.8212	57.2174	52.1445	47.8346	53.3588	55.3232	61.0673	67.5536	70.4660	(72)
Total internal gains	337.0780	334.8670	322.6520	303.2608	283.8149	265.1437	253.1230	258.8902	268.9859	288.5711	310.8997	327.4103	(73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W			
Northeast				2.8800	11.2829	0.6300	0.7000	0.7700	9.9309 (75)			
Southeast				1.3500	40.5020	0.6300	0.7000	1.0000	21.7016 (82)			
Southwest				1.3500	39.9751	0.6300	0.7000	1.0000	21.4193 (82)			
Solar gains	53.0517	99.1008	155.9964	222.9152	273.4194	280.9996	267.0014	179.3399	115.2987	65.2021	44.2914 (83)	
Total gains	390.1297	433.9678	478.6485	526.1760	557.2343	546.1433	520.1244	487.3361	448.3258	403.8699	376.1017	371.7017 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	69.9543	70.1996	70.2724	70.2724	70.2724	70.2724	70.2724	70.2724	70.2724	70.2724	70.2724	70.2724
alpha	5.6636	5.6800	5.6848	5.6848	5.6848	5.6848	5.6848	5.6848	5.6848	5.6848	5.6848	5.6848
util living area	0.9981	0.9960	0.9894	0.9637	0.8823	0.7150	0.5409	0.5976	0.8501	0.9776	0.9960	0.9985 (86)
MIT	19.9701	20.0956	20.3109	20.5898	20.8348	20.9631	20.9936	20.9891	20.9015	20.5870	20.2225	19.9401 (87)
Th 2	20.0894	20.0923	20.0932	20.0932	20.0932	20.0932	20.0932	20.0932	20.0932	20.0932	20.0932	20.0932 (88)
util rest of house	0.9975	0.9947	0.9856	0.9502	0.8408	0.6317	0.4338	0.4876	0.7842	0.9669	0.9944	0.9981 (89)
MIT 2	19.1466	19.2740	19.4881	19.7592	19.9806	20.0760	20.0915	20.0900	20.0379	19.7605	19.4015	19.1198 (90)
Living area fraction	19.4384	19.5651	19.7797	20.0535	20.2833	20.3903	20.4111	20.4085	20.3439	20.0534	19.6924	19.4104 (91)
MIT	19.4384	19.5651	19.7797	20.0535	20.2833	20.3903	20.4111	20.4085	20.3439	20.0534	19.6924	19.4104 (92)
Temperature adjustment												0.0000
adjusted MIT	19.4384	19.5651	19.7797	20.0535	20.2833	20.3903	20.4111	20.4085	20.3439	20.0534	19.6924	19.4104 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9968	0.9937	0.9840	0.9495	0.8504	0.6604	0.4721	0.5269	0.8045	0.9663	0.9934	0.9976	(94)
Ext temp.	388.8999	431.2448	470.9955	499.6242	473.8942	360.6634	245.5272	256.7774	360.6677	390.2471	373.6297	370.8036	(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	987.3436	953.1325	862.1956	724.1518	557.2766	375.9434	247.4412	260.2582	405.3911	613.7685	817.5734	987.5525	(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	445.2421	350.7086	291.0529	161.6599	62.0365	0.0000	0.0000	0.0000	0.0000	166.2999	319.6395	458.8612	(98)
Space heating per m2												2255.5006	(98)
												(98) / (4) = 34.3303	(99)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

8c. Space cooling requirement

Not applicable

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000	(201)
Fraction of space heat from main system(s)													1.0000	(202)
Efficiency of main space heating system 1 (in %)													90.7000	(206)
Efficiency of secondary/supplementary heating system, %													0.0000	(208)
Space heating requirement													2486.7702	(211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Space heating requirement	445.2421	350.7086	291.0529	161.6599	62.0365	0.0000	0.0000	0.0000	0.0000	166.2999	319.6395	458.8612	(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)	490.8954	386.6688	320.8963	178.2358	68.3975	0.0000	0.0000	0.0000	0.0000	183.3516	352.4140	505.9109	(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	169.7937	149.3806	156.2424	139.1776	135.7481	120.3786	114.7439	127.1109	127.2673	144.3693	153.7657	165.4127	(64)	
Efficiency of water heater (217)m	89.6475	89.5622	89.3723	88.9499	88.1276	87.0000	87.0000	87.0000	87.0000	88.9422	89.4642	89.6893	(216)	
Fuel for water heating, kWh/month	189.4016	166.7897	174.8219	156.4674	154.0359	138.3662	131.8896	146.1045	146.2842	162.3181	171.8740	184.4285	(219)	
Water heating fuel used												1922.7817	(219)	
Annual totals kWh/year														
Space heating fuel - main system													2486.7702	(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)													82.0857	(230a)
central heating pump													30.0000	(230c)
main heating flue fan													45.0000	(230e)
Total electricity for the above, kWh/year													157.0857	(231)
Electricity for lighting (calculated in Appendix L)													344.9636	(232)
Energy saving/generation technologies (Appendices M ,N and Q)														
Total delivered energy for all uses													4911.6012	(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	2486.7702	0.2160	537.1424 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1922.7817	0.2160	415.3208 (264)
Space and water heating			952.4632 (265)
Pumps and fans	157.0857	0.5190	81.5275 (267)
Energy for lighting	344.9636	0.5190	179.0361 (268)
Energy saving/generation technologies			
PV Unit	-756.4400	0.5190	-392.5924 (269)
Total CO2, kg/year			820.4345 (272)
Dwelling Carbon Dioxide Emission Rate (DER)			12.4900 (273)

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

DER			12.4900	ZC1
Total Floor Area		TFA	65.7000	
Assumed number of occupants		N	2.1374	
CO2 emission factor in Table 12 for electricity displaced from grid		EF	0.5190	
CO2 emissions from appliances, equation (L14)			16.8719	ZC2
CO2 emissions from cooking, equation (L16)			2.5920	ZC3
Total CO2 emissions			31.9539	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			31.9539	ZC8

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1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	65.7000 (1b)	x 2.0900 (2b)	= 137.3130 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	65.7000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 137.3130 (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) = 0.1457 (8)
Measured/design AP50					Yes
Infiltration rate					5.0000
Number of sides sheltered					0.3957 (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) = 0.3660 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate												
Effective ac	0.4666	0.4575	0.4483	0.4026	0.3934	0.3477	0.3477	0.3385	0.3660	0.3934	0.4117	0.4300 (22b)
	0.6089	0.6046	0.6005	0.5810	0.5774	0.5604	0.5604	0.5573	0.5670	0.5774	0.5848	0.5925 (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)			2.8800	1.3258	3.8182		(27)
TER Room Window (Uw = 1.70)			2.7000	1.5918	4.2978		(27a)
Corridor Below			3.1700	0.1300	0.4121		(28b)
Walls	29.6300	1.4400	28.1900	0.1800	5.0742		(29a)
Wall to Corridor	13.2000	2.1200	11.0800	0.1800	1.9944		(29a)
Dormers	3.7700	1.4400	2.3300	0.1800	0.4194		(29a)
Pitched Roof	35.9700		35.9700	0.1300	4.6761		(30)
Sloping Ceilings	41.2400	2.7000	38.5400	0.1300	5.0102		(30)
Total net area of external elements Aum(A, m ²)			126.9800				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 27.8223		(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)												10.0679 (36)
Total fabric heat loss												(33) + (36) = 37.8902 (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	27.5898	27.3983	27.2105	26.3286	26.1636	25.3954	25.3954	25.2532	25.6913	26.1636	26.4974	26.8463 (38)
Heat transfer coeff	65.4801	65.2885	65.1007	64.2188	64.0538	63.2856	63.2856	63.1434	63.5815	64.0538	64.3876	64.7366 (39)
Average = Sum(39)m / 12 =												64.2180 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.9967	0.9937	0.9909	0.9775	0.9749	0.9633	0.9633	0.9611	0.9678	0.9749	0.9800	0.9853 (40)
HLP (average)												0.9774 (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												2.1374 (42)
Average daily hot water use (litres/day)												84.9630 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	93.4593	90.0608	86.6623	83.2638	79.8652	76.4667	76.4667	79.8652	83.2638	86.6623	90.0608	93.4593 (44)
Energy conte	138.5975	121.2182	125.0864	109.0533	104.6393	90.2957	83.6723	96.0152	97.1619	113.2328	123.6025	134.2243 (45)
Energy content (annual)												Total = Sum(45)m = 1336.7992 (45)
Distribution loss (46)m = 0.15 x (45)m												
	20.7896	18.1827	18.7630	16.3580	15.6959	13.5444	12.5508	14.4023	14.5743	16.9849	18.5404	20.1336 (46)
Water storage loss:												

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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	47.6258	41.4526	44.1622	41.0616	40.6985	37.7096	38.9666	40.6985	41.0616	44.1622	44.4135	47.6258 (61)
Total heat required for water heating calculated for each month	186.2233	162.6709	169.2485	150.1149	145.3377	128.0053	122.6389	136.7136	138.2235	157.3949	168.0160	181.8501 (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	186.2233	162.6709	169.2485	150.1149	145.3377	128.0053	122.6389	136.7136	138.2235	157.3949	168.0160	181.8501 (64)
Heat gains from water heating, kWh/month	57.9901	50.6682	52.6318	46.5256	44.9672	39.4507	37.5627	42.0997	42.5717	48.6904	52.2012	56.5360 (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	106.8695	106.8695	106.8695	106.8695	106.8695	106.8695	106.8695	106.8695	106.8695	106.8695	106.8695	106.8695	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	19.5333	17.3493	14.1094	10.6817	7.9847	6.7410	7.2839	9.4679	12.7078	16.1355	18.8325	20.0762	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	187.0609	189.0020	184.1105	173.6970	160.5519	148.1973	139.9437	138.0025	142.8941	153.3076	166.4527	178.8073	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.6870	33.6870	33.6870	33.6870	33.6870	33.6870	33.6870	33.6870	33.6870	33.6870	33.6870	33.6870	(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)	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	(71)
Water heating gains (Table 5)	77.9437	75.3991	70.7416	64.6189	60.4397	54.7927	50.4875	56.5856	59.1274	65.4441	72.5017	75.9893	(72)
Total internal gains	342.5988	339.8113	327.0223	307.0585	287.0372	267.7918	255.7759	262.1169	272.7901	292.9480	315.8477	332.9336	(73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d			Gains W
Northeast					2.8800	11.2829	0.6300	0.7000			0.7700			9.9309 (75)
Southeast					1.3500	40.5020	0.6300	0.7000			1.0000			21.7016 (82)
Southwest					1.3500	39.9751	0.6300	0.7000			1.0000			21.4193 (82)
Solar gains	53.0517	99.1008	155.9964	222.9152	273.4194	280.9996	267.0014	228.4460	179.3399	115.2987	65.2021	44.2914	(83)	
Total gains	395.6504	438.9121	483.0188	529.9737	560.4566	548.7915	522.7773	490.5629	452.1300	408.2467	381.0498	377.2250	(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	69.6777	69.8821	70.0837	71.0462	71.2292	72.0938	72.0938	72.2562	71.7583	71.2292	70.8599	70.4779	
alpha	5.6452	5.6588	5.6722	5.7364	5.7486	5.8063	5.8063	5.8171	5.7839	5.7486	5.7240	5.6985	
util living area	0.9979	0.9958	0.9890	0.9617	0.8765	0.7001	0.5261	0.5803	0.8394	0.9759	0.9957	0.9984	(86)
MIT	19.9726	20.0965	20.3136	20.6054	20.8458	20.9692	20.9950	20.9914	20.9125	20.6047	20.2394	19.9523	(87)
Th 2	20.0861	20.0886	20.0909	20.1022	20.1043	20.1141	20.1141	20.1159	20.1103	20.1043	20.1000	20.0956	(88)
util rest of house	0.9973	0.9944	0.9851	0.9477	0.8341	0.6184	0.4237	0.4749	0.7725	0.9645	0.9939	0.9979	(89)
MIT 2	18.7096	18.8922	19.2091	19.6328	19.9511	20.0932	20.1121	20.1122	20.0391	19.6392	19.1098	18.6870	(90)
Living area fraction	19.1571	19.3189	19.6005	19.9774	20.2681	20.4036	20.4249	20.4238	20.3486	19.9813	19.5101	19.1354	(91)
MIT	19.1571	19.3189	19.6005	19.9774	20.2681	20.4036	20.4249	20.4238	20.3486	19.9813	19.5101	19.1354	(92)
Temperature adjustment	19.1571	19.3189	19.6005	19.9774	20.2681	20.4036	20.4249	20.4238	20.3486	19.9813	19.5101	19.1354	(93)
adjusted MIT	19.1571	19.3189	19.6005	19.9774	20.2681	20.4036	20.4249	20.4238	20.3486	19.9813	19.5101	19.1354	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9963	0.9928	0.9824	0.9454	0.8427	0.6463	0.4602	0.5124	0.7923	0.9625	0.9924	0.9971	(94)
Ext temp.	394.1851	435.7705	474.4984	501.0179	472.3182	354.6662	240.5693	251.3773	358.2361	392.9355	378.1539	376.1454	(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	972.8449	941.3892	852.8513	711.3794	548.8193	367.2859	242.0643	254.0742	397.2951	600.9088	799.0562	966.8646	(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	430.5229	339.7758	281.4945	151.4603	56.9168	0.0000	0.0000	0.0000	0.0000	154.7321	303.0496	439.4951	(98)
Space heating per m2												2157.4471	(98)
												32.8379	(99)

8c. Space cooling requirement

Not applicable

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF TARGET EMISSIONS 09 Jan 2014

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													93.4000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													2309.9006 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	430.5229	339.7758	281.4945	151.4603	56.9168	0.0000	0.0000	0.0000	0.0000	154.7321	303.0496	439.4951	(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)	460.9453	363.7856	301.3860	162.1631	60.9388	0.0000	0.0000	0.0000	0.0000	165.6661	324.4642	470.5515	(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	186.2233	162.6709	169.2485	150.1149	145.3377	128.0053	122.6389	136.7136	138.2235	157.3949	168.0160	181.8501	(64)
Efficiency of water heater (217)m	87.0924	86.8628	86.3231	85.0737	82.9067	80.3000	80.3000	80.3000	80.3000	85.0083	86.5186	87.1904	(216)
Fuel for water heating, kWh/month	213.8227	187.2734	196.0640	176.4529	175.3028	159.4089	152.7259	170.2536	172.1338	185.1525	194.1963	208.5667	(219)
Water heating fuel used												2191.3534	(219)
Annual totals kWh/year													
Space heating fuel - main system												2309.9006	(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)												344.9636	(232)
Total delivered energy for all uses												4921.2176	(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	2309.9006	0.2160	498.9385 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2191.3534	0.2160	473.3323 (264)
Space and water heating			972.2709 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	344.9636	0.5190	179.0361 (268)
Total CO2, kg/m2/year			1190.2320 (272)
Emissions per m2 for space and water heating			14.7986 (272a)
Fuel factor (mains gas)			1.0000
Emissions per m2 for lighting			2.7251 (272b)
Emissions per m2 for pumps and fans			0.5925 (272c)
Target Carbon Dioxide Emission Rate (TER) = (14.7986 * 1.00) + 2.7251 + 0.5925, rounded to 2 d.p.			18.1200 (273)

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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	65.7000 (1b)	x 2.0900 (2b)	= 137.3130 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	65.7000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 137.3130 (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					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) = 0.1457 (8)
Measured/design AP50					Yes
Infiltration rate					4.3500
Number of sides sheltered					0.3632 (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) =				0.3359 (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												
	0.4283	0.4199	0.4115	0.3695	0.3611	0.3191	0.3191	0.3107	0.3359	0.3611	0.3779	0.3947 (22b)
Effective ac	0.5917	0.5882	0.5847	0.5683	0.5652	0.5509	0.5509	0.5483	0.5564	0.5652	0.5714	0.5779 (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)			2.8800	1.1450	3.2977		(27)
Roof Windows (Uw = 1.40)			2.7000	1.3258	3.5795		(27a)
Corridor Below			3.1700	0.3679	1.1662		(28b)
Walls	29.6300	1.4400	28.1900	0.2700	7.6113		(29a)
Wall to Corridor	13.2000	2.1200	11.0800	0.2041	2.2612		(29a)
Dormers	3.7700	1.4400	2.3300	0.2100	0.4893		(29a)
Pitched Roof	35.9700		35.9700	0.1000	3.5970		(30)
Sloping Ceilings	41.2400	2.7000	38.5400	0.1700	6.5518		(30)
Total net area of external elements Aum(A, m ²)			126.9800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	30.8861		(33)
Party Floor 1			56.4300				(32d)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							11.3832 (36)
Total fabric heat loss						(33) + (36) =	42.2693 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	26.8127	26.6513	26.4931	25.7501	25.6111	24.9639	24.9639	24.8441	25.2132	25.6111	25.8923	26.1863 (38)
Heat transfer coeff	69.0820	68.9206	68.7624	68.0194	67.8804	67.2332	67.2332	67.1134	67.4825	67.8804	68.1616	68.4556 (39)
Average = Sum(39)m / 12 =												68.0187 (39)
HLP	1.0515	1.0490	1.0466	1.0353	1.0332	1.0233	1.0233	1.0215	1.0271	1.0332	1.0375	1.0419 (40)
HLP (average)												1.0353 (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												2.1374 (42)
Average daily hot water use (litres/day)												84.9630 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	93.4593	90.0608	86.6623	83.2638	79.8652	76.4667	76.4667	79.8652	83.2638	86.6623	90.0608	93.4593 (44)
Energy conte	138.5975	121.2182	125.0864	109.0533	104.6393	90.2957	83.6723	96.0152	97.1619	113.2328	123.6025	134.2243 (45)
Energy content (annual)										Total = Sum(45)m =		1336.7992 (45)
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

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Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Heat gains from water heating, kWh/month	29.4520	25.7589	26.5809	23.1738	22.2358	19.1878	17.7804	20.4032	20.6469	24.0620	26.2655	28.5227	(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	106.8695	106.8695	106.8695	106.8695	106.8695	106.8695	106.8695	106.8695	106.8695	106.8695	106.8695	106.8695	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	19.5333	17.3493	14.1094	10.6817	7.9847	6.7410	7.2839	9.4679	12.7078	16.1355	18.8325	20.0762	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	187.0609	189.0020	184.1105	173.6970	160.5519	148.1973	139.9437	138.0025	142.8941	153.3076	166.4527	178.8073	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.6870	33.6870	33.6870	33.6870	33.6870	33.6870	33.6870	33.6870	33.6870	33.6870	33.6870	33.6870	(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)	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	(71)
Water heating gains (Table 5)	39.5860	38.3317	35.7270	32.1859	29.8869	26.6498	23.8983	27.4237	28.6762	32.3414	36.4799	38.3369	(72)
Total internal gains	301.2410	299.7438	289.0077	271.6255	253.4843	236.6489	226.1868	229.9550	239.3390	256.8452	276.8259	292.2812	(73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d			Gains W
Northeast				2.8800	11.2829	0.6300	0.7000			0.7700			9.9309 (75)
Southeast				1.3500	40.5020	0.6300	0.7000			1.0000			21.7016 (82)
Southwest				1.3500	39.9751	0.6300	0.7000			1.0000			21.4193 (82)
Solar gains	53.0517	99.1008	155.9964	222.9152	273.4194	280.9996	267.0014	228.4460	179.3399	115.2987	65.2021	44.2914	(83)
Total gains	354.2927	398.8446	445.0041	494.5407	526.9037	517.6486	493.1881	458.4010	418.6789	372.1440	342.0280	336.5726	(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	66.0447	66.1994	66.3517	67.0765	67.2138	67.8608	67.8608	67.9819	67.6101	67.2138	66.9365	66.6490		
alpha	5.4030	5.4133	5.4234	5.4718	5.4809	5.5241	5.5241	5.5321	5.5073	5.4809	5.4624	5.4433		
util living area	0.9988	0.9975	0.9930	0.9745	0.9110	0.7591	0.5850	0.6468	0.8875	0.9856	0.9976	0.9991	(86)	
MIT	19.8358	19.9635	20.1912	20.5020	20.7791	20.9454	20.9893	20.9821	20.8625	20.5046	20.1152	19.8134	(87)	
Th 2	20.0407	20.0427	20.0447	20.0540	20.0558	20.0639	20.0639	20.0654	20.0608	20.0558	20.0522	20.0485	(88)	
util rest of house	0.9984	0.9966	0.9904	0.9643	0.8751	0.6750	0.4682	0.5286	0.8289	0.9782	0.9965	0.9988	(89)	
MIT 2	18.9727	19.1017	19.3299	19.6426	19.9008	20.0377	20.0611	20.0600	19.9801	19.6500	19.2612	18.9567	(90)	
Living area fraction									fLA = Living area / (4) =			0.3543	(91)	
MIT	19.2786	19.4071	19.6351	19.9471	20.2120	20.3593	20.3900	20.3867	20.2927	19.9528	19.5638	19.2603	(92)	
Temperature adjustment												0.0000		
adjusted MIT	19.2786	19.4071	19.6351	19.9471	20.2120	20.3593	20.3900	20.3867	20.2927	19.9528	19.5638	19.2603	(93)	

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9980	0.9958	0.9890	0.9629	0.8819	0.7034	0.5101	0.5709	0.8455	0.9771	0.9958	0.9985	(94)
Ext temp.	353.5801	397.1837	440.0952	476.1784	464.6643	364.1144	251.5611	261.7236	354.0097	363.6338	340.6051	336.0604	(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	1034.7492	999.8359	903.1984	751.4168	577.7975	387.2160	254.8127	267.5637	417.9015	634.8727	849.5559	1030.9602	(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	506.7898	404.9823	344.5488	198.1716	84.1711	0.0000	0.0000	0.0000	0.0000	201.8017	366.4446	517.0055	(98)
												2623.9154	(98)
												39.9378	(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	631.9925	497.5260	510.0619	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8601	0.9250	0.9008	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	543.6012	460.1879	459.4588	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	652.8728	624.2277	589.0152	0.0000	0.0000	0.0000	0.0000	(103)

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Month fraction	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000 (103a)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	78.6755	122.0456	96.3900	0.0000	0.0000	0.0000	0.0000 (104)
Space cooling												297.1111 (104)
Cooled fraction									fC = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)	0.0000	0.0000	0.0000	0.0000	0.0000	0.2500	0.2500	0.2500	0.0000	0.0000	0.0000	0.0000 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	19.6689	30.5114	24.0975	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling												74.2778 (107)
Space cooling per m2												1.1306 (108)
Energy for space heating												39.9378 (99)
Energy for space cooling												1.1306 (108)
Total												41.0684 (109)
Dwelling Fabric Energy Efficiency (DFEE)												41.1 (109)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

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

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	65.7000 (1b)	x 2.0900 (2b)	= 137.3130 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	65.7000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 137.3130 (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) = 0.1457 (8)
Measured/design AP50					Yes
Infiltration rate					5.0000
Number of sides sheltered					0.3957 (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) = 0.3660 (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												
	0.4666	0.4575	0.4483	0.4026	0.3934	0.3477	0.3477	0.3385	0.3660	0.3934	0.4117	0.4300 (22b)
Effective ac	0.6089	0.6046	0.6005	0.5810	0.5774	0.5604	0.5604	0.5573	0.5670	0.5774	0.5848	0.5925 (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)			2.8800	1.3258	3.8182		(27)
TER Room Window (Uw = 1.70)			2.7000	1.5918	4.2978		(27a)
Corridor Below			3.1700	0.1300	0.4121		(28b)
Walls	29.6300	1.4400	28.1900	0.1800	5.0742		(29a)
Wall to Corridor	13.2000	2.1200	11.0800	0.1800	1.9944		(29a)
Dormers	3.7700	1.4400	2.3300	0.1800	0.4194		(29a)
Pitched Roof	35.9700		35.9700	0.1300	4.6761		(30)
Sloping Ceilings	41.2400	2.7000	38.5400	0.1300	5.0102		(30)
Total net area of external elements Aum(A, m ²)			126.9800				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 27.8223		(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)	10.0679 (36)
Total fabric heat loss	(33) + (36) = 37.8902 (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	27.5898	27.3983	27.2105	26.3286	26.1636	25.3954	25.3954	25.2532	25.6913	26.1636	26.4974	26.8463 (38)
Heat transfer coeff	65.4801	65.2885	65.1007	64.2188	64.0538	63.2856	63.2856	63.1434	63.5815	64.0538	64.3876	64.7366 (39)
Average = Sum(39)m / 12 =												64.2180 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.9967	0.9937	0.9909	0.9775	0.9749	0.9633	0.9633	0.9611	0.9678	0.9749	0.9800	0.9853 (40)
HLP (average)												0.9774 (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	2.1374 (42)
Average daily hot water use (litres/day)	84.9630 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	93.4593	90.0608	86.6623	83.2638	79.8652	76.4667	76.4667	79.8652	83.2638	86.6623	90.0608	93.4593 (44)
Energy conte	138.5975	121.2182	125.0864	109.0533	104.6393	90.2957	83.6723	96.0152	97.1619	113.2328	123.6025	134.2243 (45)
Energy content (annual)										Total = Sum(45)m =		1336.7992 (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:												

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Heat gains from water heating, kWh/month	29.4520	25.7589	26.5809	23.1738	22.2358	19.1878	17.7804	20.4032	20.6469	24.0620	26.2655	28.5227 (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	106.8695	106.8695	106.8695	106.8695	106.8695	106.8695	106.8695	106.8695	106.8695	106.8695	106.8695	106.8695	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	19.5333	17.3493	14.1094	10.6817	7.9847	6.7410	7.2839	9.4679	12.7078	16.1355	18.8325	20.0762	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	187.0609	189.0020	184.1105	173.6970	160.5519	148.1973	139.9437	138.0025	142.8941	153.3076	166.4527	178.8073	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.6870	33.6870	33.6870	33.6870	33.6870	33.6870	33.6870	33.6870	33.6870	33.6870	33.6870	33.6870	(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)	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	(71)
Water heating gains (Table 5)	39.5860	38.3317	35.7270	32.1859	29.8869	26.6498	23.8983	27.4237	28.6762	32.3414	36.4799	38.3369	(72)
Total internal gains	301.2410	299.7438	289.0077	271.6255	253.4843	236.6489	226.1868	229.9550	239.3390	256.8452	276.8259	292.2812	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
Northeast	2.8800	11.2829	0.6300	0.7000	0.7700	9.9309 (75)
Southeast	1.3500	40.5020	0.6300	0.7000	1.0000	21.7016 (82)
Southwest	1.3500	39.9751	0.6300	0.7000	1.0000	21.4193 (82)

Solar gains	53.0517	99.1008	155.9964	222.9152	273.4194	280.9996	267.0014	228.4460	179.3399	115.2987	65.2021	44.2914	(83)
Total gains	354.2927	398.8446	445.0041	494.5407	526.9037	517.6486	493.1881	458.4010	418.6789	372.1440	342.0280	336.5726	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	69.6777	69.8821	70.0837	71.0462	71.2292	72.0938	72.0938	72.2562	71.7583	71.2292	70.8599	70.4779	
alpha	5.6452	5.6588	5.6722	5.7364	5.7486	5.8063	5.8063	5.8171	5.7839	5.7486	5.7240	5.6985	
util living area	0.9988	0.9974	0.9925	0.9714	0.8987	0.7320	0.5555	0.6165	0.8718	0.9842	0.9975	0.9991	(86)
MIT	19.9123	20.0387	20.2606	20.5622	20.8196	20.9613	20.9934	20.9884	20.8910	20.5572	20.1830	19.8928	(87)
Th 2	20.0861	20.0886	20.0909	20.1022	20.1043	20.1141	20.1141	20.1159	20.1103	20.1043	20.1000	20.0956	(88)
util rest of house	0.9984	0.9965	0.9898	0.9604	0.8608	0.6502	0.4485	0.5067	0.8110	0.9762	0.9965	0.9988	(89)
MIT 2	19.0862	19.2143	19.4369	19.7414	19.9791	20.0958	20.1123	20.1124	20.0473	19.7418	19.3680	19.0746	(90)
Living area fraction									fLA = Living area / (4) =			0.3543	(91)
MIT	19.3790	19.5064	19.7287	20.0323	20.2769	20.4025	20.4245	20.4228	20.3463	20.0307	19.6568	19.3645	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.3790	19.5064	19.7287	20.0323	20.2769	20.4025	20.4245	20.4228	20.3463	20.0307	19.6568	19.3645	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9980	0.9958	0.9884	0.9594	0.8690	0.6783	0.4867	0.5460	0.8292	0.9754	0.9958	0.9985	(94)
Useful gains	353.5944	397.1675	439.8586	474.4545	457.8869	351.1235	240.0431	250.2941	347.1559	362.9725	340.5894	336.0762	(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	987.3714	953.6326	861.2003	714.9004	549.3849	367.2135	242.0353	254.0134	397.1470	604.0718	808.5030	981.6983	(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	471.5301	373.9445	313.4783	173.1211	68.0745	0.0000	0.0000	0.0000	0.0000	179.3779	336.8978	480.3428	(98)
Space heating												2396.7671	(98)
Space heating per m2												(98) / (4) =	36.4805 (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	594.8850	468.3138	479.8898	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8897	0.9452	0.9253	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	529.2433	442.6307	444.0192	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	652.8728	624.2277	589.0152	0.0000	0.0000	0.0000	0.0000	(103)
Month fracti	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	(103a)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	89.0132	135.1082	107.8770	0.0000	0.0000	0.0000	0.0000 (104)
Space cooling												331.9984 (104)
Cooled fraction									fC = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)												
0.0000	0.0000	0.0000	0.0000	0.0000	0.2500	0.2500	0.2500	0.0000	0.0000	0.0000	0.0000 (106)	
Space cooling kWh												
0.0000	0.0000	0.0000	0.0000	0.0000	22.2533	33.7770	26.9693	0.0000	0.0000	0.0000	0.0000 (107)	
Space cooling												82.9996 (107)
Space cooling per m2												1.2633 (108)
Energy for space heating												36.4805 (99)
Energy for space cooling												1.2633 (108)
Total												37.7438 (109)
Target Fabric Energy Efficiency (TFEE)												43.4 (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	65.7000 (1b)	x 2.0900 (2b)	= 137.3130 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	65.7000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 137.3130 (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					4.3500
Infiltration rate					0.2175 (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) =				0.2012 (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	0.2364	0.2213	0.2213	0.2012	0.2062	0.1962	0.1962	0.1911	0.1911	0.2062	0.2012	0.2062 (22b)
Mechanical extract ventilation - centralised												0.5000 (23a)
If mechanical ventilation:												0.5000 (25)
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)			2.8800	1.1450	3.2977		(27)
Roof Windows (Uw = 1.40)			2.7000	1.3258	3.5795		(27a)
Corridor Below			3.1700	0.3679	1.1662		(28b)
Walls	29.6300	1.4400	28.1900	0.2700	7.6113		(29a)
Wall to Corridor	13.2000	2.1200	11.0800	0.2041	2.2612		(29a)
Dormers	3.7700	1.4400	2.3300	0.2100	0.4893		(29a)
Pitched Roof	35.9700		35.9700	0.1000	3.5970		(30)
Sloping Ceilings	41.2400	2.7000	38.5400	0.1700	6.5518		(30)
Total net area of external elements Aum(A, m ²)				126.9800			(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	30.8861		(33)
Party Floor 1				56.4300			(32d)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K
Thermal bridges (Sum(L x Psi) calculated using Appendix K)
Total fabric heat loss

250.0000 (35)
11.3832 (36)
(33) + (36) = 42.2693 (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	22.6566	22.6566	22.6566	22.6566	22.6566	22.6566	22.6566	22.6566	22.6566	22.6566	22.6566	22.6566 (38)
Heat transfer coeff	64.9259	64.9259	64.9259	64.9259	64.9259	64.9259	64.9259	64.9259	64.9259	64.9259	64.9259	64.9259 (39)
Average = Sum(39)m / 12 =												64.9259 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.9882	0.9882	0.9882	0.9882	0.9882	0.9882	0.9882	0.9882	0.9882	0.9882	0.9882	0.9882 (40)
HLP (average)												0.9882 (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)

2.1374 (42)
84.9630 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	93.4593	90.0608	86.6623	83.2638	79.8652	76.4667	76.4667	79.8652	83.2638	86.6623	90.0608	93.4593 (44)
Energy conte	138.5975	121.2182	125.0864	109.0533	104.6393	90.2957	83.6723	96.0152	97.1619	113.2328	123.6025	134.2243 (45)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF HEAT DEMAND 09 Jan 2014

Energy content (annual)												Total = Sum (45)m =	1336.7992 (45)
Distribution loss (46)m = 0.15 x (45)m													
	20.7896	18.1827	18.7630	16.3580	15.6959	13.5444	12.5508	14.4023	14.5743	16.9849	18.5404	20.1336	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Combi loss	31.1962	28.1623	31.1561	30.1242	31.1089	30.0829	31.0717	31.0958	30.1054	31.1365	30.1632	31.1884	(61)
Total heat required for water heating calculated for each month	169.7937	149.3806	156.2424	139.1776	135.7481	120.3786	114.7439	127.1109	127.2673	144.3693	153.7657	165.4127	(62)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63)
												Solar input (sum of months) = Sum (63)m =	0.0000 (63)
Output from w/h	169.7937	149.3806	156.2424	139.1776	135.7481	120.3786	114.7439	127.1109	127.2673	144.3693	153.7657	165.4127	(64)
												Total per year (kWh/year) = Sum (64)m =	1703.3908 (64)
RHI water heating demand													1703 (64)
Heat gains from water heating, kWh/month	53.8827	47.3457	49.3802	43.7913	42.5698	37.5441	35.5889	39.6990	39.8327	45.4340	48.6386	52.4267	(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	128.2434	128.2434	128.2434	128.2434	128.2434	128.2434	128.2434	128.2434	128.2434	128.2434	128.2434	128.2434	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	48.8332	43.3732	35.2735	26.7043	19.9618	16.8526	18.2098	23.6698	31.7695	40.3387	47.0812	50.1904	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	279.1954	282.0926	274.7918	259.2493	239.6296	221.1900	208.8711	205.9739	213.2747	228.8172	248.4369	266.8766	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	49.9617	49.9617	49.9617	49.9617	49.9617	49.9617	49.9617	49.9617	49.9617	49.9617	49.9617	49.9617	(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)	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	(71)
Water heating gains (Table 5)	72.4230	70.4548	66.3713	60.8212	57.2174	52.1445	47.8346	53.3588	55.3232	61.0673	67.5536	70.4660	(72)
Total internal gains	496.1611	491.6301	472.1461	442.4843	412.5184	385.8966	370.6250	378.7121	396.0769	425.9327	458.7812	483.2425	(73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d		Gains W			
Northeast				2.8800	14.6130	0.6300	0.7000	0.7700	12.8619 (75)				
Southeast				1.3500	50.6788	0.6300	0.7000	1.0000	27.1545 (82)				
Southwest				1.3500	50.1759	0.6300	0.7000	1.0000	26.8850 (82)				
Solar gains	66.9014	106.6696	171.4041	246.0620	283.7805	322.4975	294.5086	263.1561	206.3928	134.0779	82.0269	52.8266	(83)
Total gains	563.0625	598.2998	643.5502	688.5463	696.2988	708.3941	665.1337	641.8682	602.4697	560.0107	540.8081	536.0690	(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	70.2724	70.2724	70.2724	70.2724	70.2724	70.2724	70.2724	70.2724	70.2724	70.2724	70.2724	70.2724	
alpha	5.6848	5.6848	5.6848	5.6848	5.6848	5.6848	5.6848	5.6848	5.6848	5.6848	5.6848	5.6848	
util living area	0.9829	0.9749	0.9459	0.8618	0.6974	0.4641	0.3218	0.3233	0.5895	0.8634	0.9632	0.9860	(86)
MIT	20.3425	20.4247	20.6152	20.8317	20.9598	20.9965	20.9997	20.9997	20.9875	20.8611	20.5815	20.3154	(87)
Th 2	20.0932	20.0932	20.0932	20.0932	20.0932	20.0932	20.0932	20.0932	20.0932	20.0932	20.0932	20.0932	(88)
util rest of house	0.9776	0.9672	0.9296	0.8240	0.6309	0.3833	0.2336	0.2319	0.5005	0.8162	0.9500	0.9814	(89)
MIT 2	19.5180	19.5977	19.7796	19.9732	20.0715	20.0921	20.0931	20.0931	20.0885	20.0020	19.7508	19.4917	(90)
Living area fraction												fLA = Living area / (4) =	0.3543 (91)
MIT	19.8101	19.8907	20.0757	20.2774	20.3862	20.4126	20.4143	20.4143	20.4071	20.3064	20.0452	19.7836	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.8101	19.8907	20.0757	20.2774	20.3862	20.4126	20.4143	20.4143	20.4071	20.3064	20.0452	19.7836	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	0.9756	0.9651	0.9292	0.8324	0.6532	0.4120	0.2649	0.2643	0.5320	0.8284	0.9492	0.9795	(94)
Useful gains	549.3085	577.4190	597.9970	573.1153	454.8416	291.8438	176.1629	169.6737	320.5279	463.9350	513.3446	525.1045	(95)
Ext temp.	5.6000	6.0000	7.6000	10.1000	13.1000	15.9000	17.7000	17.8000	15.4000	12.1000	8.6000	5.7000	(96)
Heat loss rate W	922.6060	901.8699	809.9946	660.7765	473.0648	292.9827	176.2311	169.7387	325.0890	532.8096	743.0887	914.3882	(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	277.7334	218.0310	157.7263	63.1161	13.5581	0.0000	0.0000	0.0000	0.0000	51.2427	165.4157	289.6270	(98)
Space heating												1236.4502	(98)
RHI space heating demand												1236	(98)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF HEAT DEMAND 09 Jan 2014

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF ENERGY RATINGS 09 Jan 2014

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

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	65.7000 (1b)	x 2.0900 (2b)	= 137.3130 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	65.7000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 137.3130 (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					4.3500
Infiltration rate					0.2175 (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) =				0.2012 (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	0.2565	0.2515	0.2465	0.2213	0.2163	0.1911	0.1911	0.1861	0.2012	0.2163	0.2263	0.2364 (22b)
Mechanical extract ventilation - centralised												0.5000 (23a)
If mechanical ventilation:												0.5000 (25)
Effective ac	0.5065	0.5015	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)			2.8800	1.1450	3.2977		(27)
Roof Windows (Uw = 1.40)			2.7000	1.3258	3.5795		(27a)
Corridor Below			3.1700	0.3679	1.1662		(28b)
Walls	29.6300	1.4400	28.1900	0.2700	7.6113		(29a)
Wall to Corridor	13.2000	2.1200	11.0800	0.2041	2.2612		(29a)
Dormers	3.7700	1.4400	2.3300	0.2100	0.4893		(29a)
Pitched Roof	35.9700		35.9700	0.1000	3.5970		(30)
Sloping Ceilings	41.2400	2.7000	38.5400	0.1700	6.5518		(30)
Total net area of external elements Aum(A, m ²)				126.9800			(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	30.8861		(33)
Party Floor 1				56.4300			(32d)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							11.3832 (36)
Total fabric heat loss							(33) + (36) = 42.2693 (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	22.9518	22.7239	22.6566	22.6566	22.6566	22.6566	22.6566	22.6566	22.6566	22.6566	22.6566	22.6566 (38)
Heat transfer coeff	65.2211	64.9932	64.9259	64.9259	64.9259	64.9259	64.9259	64.9259	64.9259	64.9259	64.9259	64.9259 (39)
Average = Sum(39)m / 12 =												64.9561 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.9927	0.9892	0.9882	0.9882	0.9882	0.9882	0.9882	0.9882	0.9882	0.9882	0.9882	0.9882 (40)
HLP (average)												0.9887 (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	2.1374 (42)
Average daily hot water use (litres/day)	84.9630 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	93.4593	90.0608	86.6623	83.2638	79.8652	76.4667	76.4667	79.8652	83.2638	86.6623	90.0608	93.4593 (44)
Energy conte	138.5975	121.2182	125.0864	109.0533	104.6393	90.2957	83.6723	96.0152	97.1619	113.2328	123.6025	134.2243 (45)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF ENERGY RATINGS 09 Jan 2014

Energy content (annual)												Total = Sum(45)m =	1336.7992 (45)
Distribution loss (46)m = 0.15 x (45)m													
	20.7896	18.1827	18.7630	16.3580	15.6959	13.5444	12.5508	14.4023	14.5743	16.9849	18.5404	20.1336 (46)	
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)	
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)	
Combi loss	31.1962	28.1623	31.1561	30.1242	31.1089	30.0829	31.0717	31.0958	30.1054	31.1365	30.1632	31.1884 (61)	
Total heat required for water heating calculated for each month													
	169.7937	149.3806	156.2424	139.1776	135.7481	120.3786	114.7439	127.1109	127.2673	144.3693	153.7657	165.4127 (62)	
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63)	
	Solar input (sum of months) = Sum(63)m =											0.0000 (63)	
Output from w/h													
	169.7937	149.3806	156.2424	139.1776	135.7481	120.3786	114.7439	127.1109	127.2673	144.3693	153.7657	165.4127 (64)	
	Total per year (kWh/year) = Sum(64)m =											1703.3908 (64)	
Heat gains from water heating, kWh/month													
	53.8827	47.3457	49.3802	43.7913	42.5698	37.5441	35.5889	39.6990	39.8327	45.4340	48.6386	52.4267 (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	128.2434	128.2434	128.2434	128.2434	128.2434	128.2434	128.2434	128.2434	128.2434	128.2434	128.2434	128.2434	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	48.8332	43.3732	35.2735	26.7043	19.9618	16.8526	18.2098	23.6698	31.7695	40.3387	47.0812	50.1904	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	279.1954	282.0926	274.7918	259.2493	239.6296	221.1900	208.8711	205.9739	213.2747	228.8172	248.4369	266.8766	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	49.9617	49.9617	49.9617	49.9617	49.9617	49.9617	49.9617	49.9617	49.9617	49.9617	49.9617	49.9617	(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)	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	(71)
Water heating gains (Table 5)	72.4230	70.4548	66.3713	60.8212	57.2174	52.1445	47.8346	53.3588	55.3232	61.0673	67.5536	70.4660	(72)
Total internal gains	496.1611	491.6301	472.1461	442.4843	412.5184	385.8966	370.6250	378.7121	396.0769	425.9327	458.7812	483.2425	(73)

6. Solar gains

[Jan]												
				Area m2	Solar flux Table 6a W/m2		g Specific data or Table 6b	FF Specific data or Table 6c		Access factor Table 6d		Gains W
Northeast				2.8800	11.2829		0.6300	0.7000		0.7700		9.9309 (75)
Southeast				1.3500	40.5020		0.6300	0.7000		1.0000		21.7016 (82)
Southwest				1.3500	39.9751		0.6300	0.7000		1.0000		21.4193 (82)
Solar gains	53.0517	99.1008	155.9964	222.9152	273.4194	280.9996	267.0014	228.4460	179.3399	115.2987	65.2021	44.2914 (83)
Total gains	549.2128	590.7310	628.1425	665.3995	685.9378	666.8962	637.6264	607.1581	575.4169	541.2314	523.9833	527.5339 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	69.9543	70.1996	70.2724	70.2724	70.2724	70.2724	70.2724	70.2724	70.2724	70.2724	70.2724	70.2724
alpha	5.6636	5.6800	5.6848	5.6848	5.6848	5.6848	5.6848	5.6848	5.6848	5.6848	5.6848	5.6848
util living area	0.9896	0.9827	0.9643	0.9112	0.7913	0.6064	0.4454	0.4874	0.7274	0.9269	0.9804	0.9916 (86)
MIT	20.1970	20.3139	20.5055	20.7359	20.9101	20.9836	20.9976	20.9960	20.9567	20.7444	20.4274	20.1639 (87)
Th 2	20.0894	20.0923	20.0932	20.0932	20.0932	20.0932	20.0932	20.0932	20.0932	20.0932	20.0932	20.0932 (88)
util rest of house	0.9865	0.9776	0.9535	0.8852	0.7382	0.5276	0.3550	0.3937	0.6507	0.8997	0.9736	0.9891 (89)
MIT 2	19.3713	19.4887	19.6754	19.8903	20.0364	20.0861	20.0926	20.0921	20.0715	19.9026	19.6021	19.3419 (90)
Living area fraction	19.6638	19.7811	19.9696	20.1900	20.3460	20.4041	20.4132	20.4124	20.3851	20.2009	19.8945	19.6332 (91)
MIT	19.6638	19.7811	19.9696	20.1900	20.3460	20.4041	20.4132	20.4124	20.3851	20.2009	19.8945	19.6332 (92)
Temperature adjustment												0.0000
adjusted MIT	19.6638	19.7811	19.9696	20.1900	20.3460	20.4041	20.4132	20.4124	20.3851	20.2009	19.8945	19.6332 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9847	0.9754	0.9518	0.8883	0.7539	0.5553	0.3872	0.4271	0.6767	0.9034	0.9718	0.9875	(94)
Ext temp.	540.8236	576.2146	597.8552	591.0713	517.1486	370.3076	246.8776	259.2912	389.3654	488.9595	509.2141	520.9319	(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	1002.0475	967.1700	874.5239	733.0113	561.3474	376.8384	247.5781	260.5070	408.0693	623.3450	830.6964	1002.0120	(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	343.1506	262.7220	205.8415	102.1968	32.8839	0.0000	0.0000	0.0000	0.0000	99.9828	231.4672	357.9236	(98)
Space heating per m2												1636.1685	(98)
												24.9036	(99)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF ENERGY RATINGS 09 Jan 2014

8c. Space cooling requirement

Not applicable

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)											
Fraction of space heat from main system(s)	1.0000 (202)											
Efficiency of main space heating system 1 (in %)	90.7000 (206)											
Efficiency of secondary/supplementary heating system, %	0.0000 (208)											
Space heating requirement	1803.9344 (211)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	343.1506	262.7220	205.8415	102.1968	32.8839	0.0000	0.0000	0.0000	0.0000	99.9828	231.4672	357.9236 (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)	378.3358	289.6604	226.9476	112.6756	36.2557	0.0000	0.0000	0.0000	0.0000	110.2347	255.2009	394.6236 (211)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	169.7937	149.3806	156.2424	139.1776	135.7481	120.3786	114.7439	127.1109	127.2673	144.3693	153.7657	165.4127 (64)
Efficiency of water heater (217)m	89.4409	89.3230	89.0655	88.5291	87.6976	87.0000	87.0000	87.0000	87.0000	88.4768	89.1860	87.0000 (216)
Fuel for water heating, kWh/month	189.8390	167.2364	175.4242	157.2111	154.7911	138.3662	131.8896	146.1045	146.2842	163.1719	172.4100	184.8249 (219)
Water heating fuel used	1927.5533 (219)											
Annual totals kWh/year												
Space heating fuel - main system	1803.9344 (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)	82.0857 (230a)											
central heating pump	30.0000 (230c)											
main heating flue fan	45.0000 (230e)											
Total electricity for the above, kWh/year	157.0857 (231)											
Electricity for lighting (calculated in Appendix L)	344.9636 (232)											
Energy saving/generation technologies (Appendices M ,N and Q)												
Total delivered energy for all uses	4233.5370 (238)											

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1803.9344	3.4800	62.7769 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1927.5533	3.4800	67.0789 (247)
Mechanical ventilation fans	82.0857	13.1900	10.8271 (249)
Pumps and fans for heating	75.0000	13.1900	9.8925 (249)
Energy for lighting	344.9636	13.1900	45.5007 (250)
Additional standing charges			120.0000 (251)
Energy saving/generation technologies			
PV Unit	0.0000	13.1900	0.0000 (252)
Total energy cost			316.0761 (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] = 1.1992 (257)
SAP value	83.2711
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	1803.9344	0.2160	389.6498 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1927.5533	0.2160	416.3515 (264)
Space and water heating			806.0013 (265)
Pumps and fans	157.0857	0.5190	81.5275 (267)
Energy for lighting	344.9636	0.5190	179.0361 (268)
Energy saving/generation technologies			
PV Unit	-756.4400	0.5190	-392.5924 (269)
Total kg/year			673.9726 (272)
CO2 emissions per m2			10.2600 (273)
EI value			91.8417
EI rating			92 (274)
EI band			A

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Calculation Type: New Build (As Built)



CALCULATION OF ENERGY RATINGS 09 Jan 2014

Calculation of stars for heating and DHW	

Main heating energy efficiency	$3.48 \times (1 + 0.29 \times 0.00) / 0.9070 = 3.837$, stars = 4
Main heating environmental impact	$0.216 \times (1 + 0.29 \times 0.00) / 0.9070 = 0.2381$, stars = 4
Water heating energy efficiency	$3.48 / 0.8827 = 3.943$, stars = 4
Water heating environmental impact	$0.216 / 0.8827 = 0.2447$, stars = 4

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

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

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

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	65.7000 (1b)	x 2.0900 (2b)	= 137.3130 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	65.7000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 137.3130 (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)
					Air changes per hour
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					0.0000 / (5) = 0.0000 (8)
Pressure test					Yes
Measured/design AP50					4.3500
Infiltration rate					0.2175 (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) =	0.2012 (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	0.2364	0.2213	0.2213	0.2012	0.2062	0.1962	0.1962	0.1911	0.1911	0.2062	0.2012	0.2062 (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)			2.8800	1.1450	3.2977		(27)
Roof Windows (Uw = 1.40)			2.7000	1.3258	3.5795		(27a)
Corridor Below			3.1700	0.3679	1.1662		(28b)
Walls	29.6300	1.4400	28.1900	0.2700	7.6113		(29a)
Wall to Corridor	13.2000	2.1200	11.0800	0.2041	2.2612		(29a)
Dormers	3.7700	1.4400	2.3300	0.2100	0.4893		(29a)
Pitched Roof	35.9700		35.9700	0.1000	3.5970		(30)
Sloping Ceilings	41.2400	2.7000	38.5400	0.1700	6.5518		(30)
Total net area of external elements Aum(A, m ²)			126.9800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	30.8861		(33)
Party Floor 1			56.4300				(32d)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							11.3832 (36)
Total fabric heat loss						(33) + (36) =	42.2693 (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	22.6566	22.6566	22.6566	22.6566	22.6566	22.6566	22.6566	22.6566	22.6566	22.6566	22.6566	22.6566 (38)
Heat transfer coeff	64.9259	64.9259	64.9259	64.9259	64.9259	64.9259	64.9259	64.9259	64.9259	64.9259	64.9259	64.9259 (39)
Average = Sum(39)m / 12 =												64.9259 (39)
HLP	0.9882	0.9882	0.9882	0.9882	0.9882	0.9882	0.9882	0.9882	0.9882	0.9882	0.9882	0.9882 (40)
HLP (average)												0.9882 (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												2.1374 (42)
Average daily hot water use (litres/day)												84.9630 (43)
Daily hot water use	93.4593	90.0608	86.6623	83.2638	79.8652	76.4667	76.4667	79.8652	83.2638	86.6623	90.0608	93.4593 (44)
Energy conte	138.5975	121.2182	125.0864	109.0533	104.6393	90.2957	83.6723	96.0152	97.1619	113.2328	123.6025	134.2243 (45)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

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

Energy content (annual)												Total = Sum(45)m = 1336.7992 (45)
Distribution loss (46)m = 0.15 x (45)m												
	20.7896	18.1827	18.7630	16.3580	15.6959	13.5444	12.5508	14.4023	14.5743	16.9849	18.5404	20.1336 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	31.1962	28.1623	31.1561	30.1242	31.1089	30.0829	31.0717	31.0958	30.1054	31.1365	30.1632	31.1884 (61)
Total heat required for water heating calculated for each month	169.7937	149.3806	156.2424	139.1776	135.7481	120.3786	114.7439	127.1109	127.2673	144.3693	153.7657	165.4127 (62)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63)
												Solar input (sum of months) = Sum(63)m = 0.0000 (63)
Output from w/h	169.7937	149.3806	156.2424	139.1776	135.7481	120.3786	114.7439	127.1109	127.2673	144.3693	153.7657	165.4127 (64)
												Total per year (kWh/year) = Sum(64)m = 1703.3908 (64)
Heat gains from water heating, kWh/month	53.8827	47.3457	49.3802	43.7913	42.5698	37.5441	35.5889	39.6990	39.8327	45.4340	48.6386	52.4267 (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	128.2434	128.2434	128.2434	128.2434	128.2434	128.2434	128.2434	128.2434	128.2434	128.2434	128.2434	128.2434	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	48.8332	43.3732	35.2735	26.7043	19.9618	16.8526	18.2098	23.6698	31.7695	40.3387	47.0812	50.1904	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	279.1954	282.0926	274.7918	259.2493	239.6296	221.1900	208.8711	205.9739	213.2747	228.8172	248.4369	266.8766	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	49.9617	49.9617	49.9617	49.9617	49.9617	49.9617	49.9617	49.9617	49.9617	49.9617	49.9617	49.9617	(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)	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	-85.4956	(71)
Water heating gains (Table 5)	72.4230	70.4548	66.3713	60.8212	57.2174	52.1445	47.8346	53.3588	55.3232	61.0673	67.5536	70.4660	(72)
Total internal gains	496.1611	491.6301	472.1461	442.4843	412.5184	385.8966	370.6250	378.7121	396.0769	425.9327	458.7812	483.2425	(73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d			Gains W
Northeast				2.8800	14.6130	0.6300	0.7000			0.7700			12.8619 (75)
Southeast				1.3500	50.6788	0.6300	0.7000			1.0000			27.1545 (82)
Southwest				1.3500	50.1759	0.6300	0.7000			1.0000			26.8850 (82)
Solar gains	66.9014	106.6696	171.4041	246.0620	283.7805	322.4975	294.5086	263.1561	206.3928	134.0779	82.0269	52.8266	(83)
Total gains	563.0625	598.2998	643.5502	688.5463	696.2988	708.3941	665.1337	641.8682	602.4697	560.0107	540.8081	536.0690	(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	70.2724	70.2724	70.2724	70.2724	70.2724	70.2724	70.2724	70.2724	70.2724	70.2724	70.2724	70.2724
alpha	5.6848	5.6848	5.6848	5.6848	5.6848	5.6848	5.6848	5.6848	5.6848	5.6848	5.6848	5.6848
util living area	0.9829	0.9749	0.9459	0.8618	0.6974	0.4641	0.3218	0.3233	0.5895	0.8634	0.9632	0.9860 (86)
MIT	20.3425	20.4247	20.6152	20.8317	20.9598	20.9965	20.9997	20.9997	20.9875	20.8611	20.5815	20.3154 (87)
Th 2	20.0932	20.0932	20.0932	20.0932	20.0932	20.0932	20.0932	20.0932	20.0932	20.0932	20.0932	20.0932 (88)
util rest of house	0.9776	0.9672	0.9296	0.8240	0.6309	0.3833	0.2336	0.2319	0.5005	0.8162	0.9500	0.9814 (89)
MIT 2	19.5180	19.5977	19.7796	19.9732	20.0715	20.0921	20.0931	20.0931	20.0885	20.0020	19.7508	19.4917 (90)
Living area fraction	19.8101	19.8907	20.0757	20.2774	20.3862	20.4126	20.4143	20.4143	20.4071	20.3064	20.0452	19.7836 (92)
MIT	19.8101	19.8907	20.0757	20.2774	20.3862	20.4126	20.4143	20.4143	20.4071	20.3064	20.0452	19.7836 (93)
Temperature adjustment												0.0000
adjusted MIT	19.8101	19.8907	20.0757	20.2774	20.3862	20.4126	20.4143	20.4143	20.4071	20.3064	20.0452	19.7836 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9756	0.9651	0.9292	0.8324	0.6532	0.4120	0.2649	0.2643	0.5320	0.8284	0.9492	0.9795	(94)
Ext temp.	549.3085	577.4190	597.9970	573.1153	454.8416	291.8438	176.1629	169.6737	320.5279	463.9350	513.3446	525.1045	(95)
Heat loss rate W	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)
Month fracti	922.6060	901.8699	809.9946	660.7765	473.0648	292.9827	176.2311	169.7387	325.0890	532.8096	743.0887	914.3882	(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	277.7334	218.0310	157.7263	63.1161	13.5581	0.0000	0.0000	0.0000	0.0000	51.2427	165.4157	289.6270	(98)
Space heating per m2												1236.4502	(98)
												(98) / (4) =	18.8196 (99)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

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

8c. Space cooling requirement

Not applicable

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000	(201)
Fraction of space heat from main system(s)													1.0000	(202)
Efficiency of main space heating system 1 (in %)													90.7000	(206)
Efficiency of secondary/supplementary heating system, %													0.0000	(208)
Space heating requirement													1363.2306	(211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Space heating requirement	277.7334	218.0310	157.7263	63.1161	13.5581	0.0000	0.0000	0.0000	0.0000	51.2427	165.4157	289.6270	(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)	306.2110	240.3870	173.8989	69.5877	14.9483	0.0000	0.0000	0.0000	0.0000	56.4969	182.3767	319.3242	(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	169.7937	149.3806	156.2424	139.1776	135.7481	120.3786	114.7439	127.1109	127.2673	144.3693	153.7657	165.4127	(64)	
Efficiency of water heater (217)m	89.2597	89.1583	88.8202	88.1216	87.3235	87.0000	87.0000	87.0000	87.0000	87.9398	88.8790	89.3191	(217)	
Fuel for water heating, kWh/month	190.2243	167.5453	175.9086	157.9381	155.4543	138.3662	131.8896	146.1045	146.2842	164.1684	173.0056	185.1929	(219)	
Water heating fuel used												1932.0820	(219)	
Annual totals kWh/year														
Space heating fuel - main system												1363.2306	(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)													82.0857	(230a)
central heating pump													30.0000	(230c)
main heating flue fan													45.0000	(230e)
Total electricity for the above, kWh/year													157.0857	(231)
Electricity for lighting (calculated in Appendix L)													344.9636	(232)
Energy saving/generation technologies (Appendices M ,N and Q)														
Total delivered energy for all uses													3797.3620	(238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1363.2306	3.6300	49.4853 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1932.0820	3.6300	70.1346 (247)
Mechanical ventilation fans	82.0857	19.4400	15.9575 (249)
Pumps and fans for heating	75.0000	19.4400	14.5800 (249)
Energy for lighting	344.9636	19.4400	67.0609 (250)
Additional standing charges			95.0000 (251)
Energy saving/generation technologies			
PV Unit	0.0000	19.4400	0.0000 (252)
Total energy cost			312.2182 (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	1363.2306	0.2160	294.4578 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1932.0820	0.2160	417.3297 (264)
Space and water heating			711.7875 (265)
Pumps and fans	157.0857	0.5190	81.5275 (267)
Energy for lighting	344.9636	0.5190	179.0361 (268)
Energy saving/generation technologies			
PV Unit	-756.4400	0.5190	-392.5924 (269)
Total kg/year			579.7588 (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	1363.2306	1.2200	1663.1413 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1932.0820	1.2200	2357.1400 (264)
Space and water heating			4020.2814 (265)
Pumps and fans	157.0857	3.0700	482.2531 (267)
Energy for lighting	344.9636	3.0700	1059.0384 (268)
Energy saving/generation technologies			
PV Unit	-756.4400	3.0700	-2322.2708 (269)
Primary energy kWh/year			3239.3021 (272)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

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

Primary energy kWh/m²/year

49.3044 (273)

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

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

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

Potential energy efficiency rating: B 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	£98	£98	£0
Mains gas	£215	£215	£0
Space heating	£175	£175	£0
Water heating	£70	£70	£0
Lighting	£67	£67	£0
Total cost of fuels	£313	£313	£0
Total cost of uses	£312	£312	£0
Delivered energy	58 kWh/m ²	58 kWh/m ²	0 kWh/m ²
Carbon dioxide emissions	0.6 tonnes	0.6 tonnes	0.0 tonnes
CO2 emissions per m ²	9 kg/m ²	9 kg/m ²	0 kg/m ²
Primary energy	49 kWh/m ²	49 kWh/m ²	0 kWh/m ²

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF ENERGY RATINGS FOR IMPROVED DWELLING 09 Jan 2014

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

No improvements selected / applicable

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

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

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

No improvements selected / applicable

U-VALUE CALCULATOR REPORT

Property Reference	SAP 0647 Flat 98	Issued on Date	02/08/2022
Assessment Reference	As Built	Prop Type Ref	J (HA-AR)
Project	15 Haines Crescent, WEST END, SO30 3LG		
Calculation Type	New Build (As Built)		

SAP Rating	83 B	DER	12.49	TER	18.12
Environmental	92 A	% DER<TER	31.06		
CO ₂ Emissions (t/year)	0.58	DFEE	41.07	TTEE	43.41
General Requirements Compliance	Fail	% DFEE<TFEE	5.38		

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

Building Elements

Roof 000006 - Mineral Wool between and above

Roof Type: Pitched Roof, insulated flat ceiling

Layer	Description	Thickness (mm)	Conductivity (W/m ² K)	Resistance (m ² K/W)	Fraction (%)	Density (kg/m ³)	Heat Cap. (J/kgK)
Ext surface				0.0400			
Layer 1	Earthwool Loft Roll 40						
	Main construction	150	0.0400	3.7500	100.00		
	Corrections - Air Gap: Level 1, Fasteners: None or plastic						
Layer 2	Earthwool Loft Roll 40						
	Main construction	200	0.0400	5.0000	100.00		
	Corrections - Air Gap: Level 1, Fasteners: None or plastic						
Layer 3	Earthwool Loft Roll 40						
	Main construction	100	0.0400	2.5000	87.50		
	Main construction	100	0.1300	0.7692	12.50		
	Corrections - Air Gap: Level 1, Fasteners: None or plastic						
Layer 4	Plasterboard, standard						
	Main construction	12.5	0.2100	0.0595	100.00	700	1000
Int surface				0.1000			

Total resistance:	Upper limit = 11.200 m ² K/W	Lower limit = 10.901 m ² K/W	Average = 11.050 m ² K/W
	Total correction = 0.0065 m ² K/W	U-value (unrounded) = 0.1 W/m ² K	

Unheated space: None

Total thickness: 463 mm

U-value: 0.10 W/m² K

Kappa: 9.10 kJ/m² K

U-VALUE CALCULATOR REPORT

Property Reference	SAP 0647 Flat 98	Issued on Date	02/08/2022
Assessment Reference	As Built	Prop Type Ref	J (HA-AR)
Project	15 Haines Crescent, WEST END, SO30 3LG		
Calculation Type	New Build (As Built)		

SAP Rating	83 B	DER	12.49	TER	18.12
Environmental	92 A	% DER<TER	31.06		
CO ₂ Emissions (t/year)	0.58	DFEE	41.07	TFEE	43.41
General Requirements Compliance	Fail	% DFEE<TFEE	5.38		

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

Building Elements

Roof 000007 - Pitched roof- insulated slope, flat ceiling

Roof Type: Pitched Roof, insulated slope, flat ceiling

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

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

Unheated space: None

Total thickness: 265 mm

U-value: 0.17 W/m² K

Kappa: n/a

U-VALUE CALCULATOR REPORT

Property Reference	SAP 0647 Flat 98	Issued on Date	02/08/2022
Assessment Reference	As Built	Prop Type Ref	J (HA-AR)
Project	15 Haines Crescent, WEST END, SO30 3LG		
Calculation Type	New Build (As Built)		

SAP Rating	83 B	DER	12.49	TER	18.12
Environmental	92 A	% DER<TER	31.06		
CO ₂ Emissions (t/year)	0.58	DFEE	41.07	TFEE	43.41
General Requirements Compliance	Fail	% DFEE<TFEE	5.38		

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

Wall Ground Floor Flats

Wall Type: Standard Wall

Layer	Description	Thickness (mm)	Conductivity (W/m ² K)	Resistance (m ² K/W)	Fraction (%)	Density (kg/m ³)	Heat Cap. (J/kgK)
Ext surface				0.0400			
Layer 1	Brick, outer leaf						
	Main construction	102.5	0.7700	0.1331	82.81		
	Main construction	102.5	0.9407	0.1090	17.19		
Layer 2	Supafil 34						
	Main construction	100	0.0340	2.9412	100.00		
	Corrections - Air Gap: Level 1, Fasteners: None or plastic						
Layer 3	Hemelite standard solid *7.3N						
	Main construction	140	0.4700	0.2979	93.43	1450	1000
	Main construction	140	0.8803	0.1590	6.57	1450	1000
	Corrections - Air Gap: Level 1, Fasteners: None or plastic						
Layer 4	airspace/plaster dabs						
	Main construction	15	0.0882	0.1700	80.00		
	Main construction	15	0.0882	0.1700	20.00		
	Corrections - Cavity Unventilated, Emissivity: Normal						
Layer 5	Plasterboard, standard						
	Main construction	12.5	0.2100	0.0595	100.00	700	1000
Int surface				0.1300			

Total resistance:	Upper limit = 3.758 m ² K/W	Lower limit = 3.751 m ² K/W	Average = 3.754 m ² K/W
	Total correction = 0.0062 m ² K/W	U-value (unrounded) = 0.27 W/m ² K	

Unheated space: None

Total thickness: 370 mm

U-value: 0.27 W/m² K

Kappa: 113.50 kJ/m² K

U-VALUE CALCULATOR REPORT

Property Reference	SAP 0647 Flat 98	Issued on Date	02/08/2022
Assessment Reference	As Built	Prop Type Ref	J (HA-AR)
Project	15 Haines Crescent, WEST END, SO30 3LG		
Calculation Type	New Build (As Built)		

SAP Rating	83 B	DER	12.49	TER	18.12
Environmental	92 A	% DER<TER	31.06		
CO ₂ Emissions (t/year)	0.58	DFEE	41.07	TFEE	43.41
General Requirements Compliance	Fail	% DFEE<TFEE	5.38		

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

Wall Wall to Corridor

Wall Type: Standard Wall

Layer	Description	Thickness (mm)	Conductivity (W/m ² K)	Resistance (m ² K/W)	Fraction (%)	Density (kg/m ³)	Heat Cap. (J/kgK)
Ext surface				0.0400			
Layer 1	Plasterboard, standard						
	Main construction	12.5	0.2100	0.0595	100.00		
Layer 2	airspace/plaster dabs						
	Main construction	15	0.0882	0.1700	80.00		
	Main construction	15	0.0882	0.1700	20.00		
	Corrections - Cavity Unventilated, Emissivity: Normal						
Layer 3	Hemelite standard solid *7.3N						
	Main construction	100	0.4700	0.2128	93.43		
	Main construction	100	0.8803	0.1136	6.57		
	Corrections - Air Gap: Level 1, Fasteners: None or plastic						
Layer 4	Supafil 34						
	Main construction	100	0.0340	2.9412	100.00		
	Corrections - Air Gap: Level 1, Fasteners: None or plastic						
Layer 5	Hemelite standard solid *7.3N						
	Main construction	100	0.4700	0.2128	93.43	1450	1000
	Main construction	100	0.8803	0.1136	6.57	1450	1000
	Corrections - Air Gap: Level 1, Fasteners: None or plastic						
Layer 6	airspace/plaster dabs						
	Main construction	15	0.0882	0.1700	80.00		
	Main construction	15	0.0882	0.1700	20.00		
	Corrections - Cavity Unventilated, Emissivity: Normal						
Layer 7	Plasterboard, standard						
	Main construction	12.5	0.2100	0.0595	100.00	700	1000
Int surface				0.1300			

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

U-VALUE CALCULATOR REPORT

Unheated space: None

Total thickness: 355 mm

U-value: 0.25 W/m² K

Kappa: 113.50 kJ/m² K

U-VALUE CALCULATOR REPORT

Property Reference	SAP 0647 Flat 98	Issued on Date	02/08/2022
Assessment Reference	As Built	Prop Type Ref	J (HA-AR)
Project	15 Haines Crescent, WEST END, SO30 3LG		
Calculation Type	New Build (As Built)		

SAP Rating	83 B	DER	12.49	TER	18.12
Environmental	92 A	% DER<TER	31.06		
CO ₂ Emissions (t/year)	0.58	DFEE	41.07	TFEE	43.41
General Requirements Compliance	Fail	% DFEE<TFEE	5.38		

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

Wall 000008

Wall Type: Standard Wall

Layer	Description	Thickness (mm)	Conductivity (W/m ² K)	Resistance (m ² K/W)	Fraction (%)	Density (kg/m ³)	Heat Cap. (J/kgK)
Ext surface				0.1300			
Layer 1	Tiling, clay						
	Main construction	30	1.0000	0.0000	100.00		
Layer 2	Standard cavity						
	Main construction	25	0.0000	0.0000	90.50		
	Main construction	25	0.1300	0.0000	9.50		
	Corrections - Cavity Ventilated, Emissivity: Normal						
Layer 3	Breather membrane						
	Main construction	0.5	0.0000	0.0000	100.00		
Layer 4	Plywood						
	Main construction	18	0.1300	0.1385	100.00		
Layer 5	Celotex XR4000						
	Main construction	120	0.0220	5.4545	87.50		
	Main construction	120	0.1300	0.9231	12.50		
	Corrections - Air Gap: Level 1, Fasteners: None or plastic						
Layer 6	Celotex PL3015 [27.5mm]						
	Main construction	27.5	0.0393	0.7000	100.00		
	Corrections - Air Gap: Level 1, Fasteners: None or plastic						
Int surface				0.1300			

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

Unheated space: None

Total thickness: 221 mm

U-value: 0.21 W/m² K

Kappa: 0.00 kJ/m² K

U-VALUE CALCULATOR REPORT

Property Reference	SAP 0647 Flat 98	Issued on Date	02/08/2022
Assessment Reference	As Built	Prop Type Ref	J (HA-AR)
Project	15 Haines Crescent, WEST END, SO30 3LG		
Calculation Type	New Build (As Built)		

SAP Rating	83 B	DER	12.49	TER	18.12
Environmental	92 A	% DER<TER	31.06		
CO ₂ Emissions (t/year)	0.58	DFEE	41.07	TFEE	43.41
General Requirements Compliance	Fail	% DFEE<TFEE	5.38		

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

Floor To EFC 14

Floor Type: Suspended Floor

Area = 3.17 m², Perimeter = 35.10 m, Wall thickness = 275.00 mm, Soil: Unknown

Depth of underfloor space below ground: 0.200 m Floor wind shielding: Average (suburban)

Floor height above ground: h = 0.200 m

U-value of walls above ground: U_w = 1.500 m

Ventilation openings per perimeter length: e = 0.0015 %

Mean wind speed: v = 5.000 m/s

Resistance on solum: R_g = 0.000 m²K/W

U-VALUE CALCULATOR REPORT

Layer	Description	Thickness (mm)	Conductivity (W/m²K)	Resistance (m²K/W)	Fraction (%)
Ext surface				0.1700	
Layer 1	Plasterboard, standard				
	Main construction	15	0.2100	0.0714	100.00
Layer 2	Standard cavity				
	Main construction	15	0.0882	0.1700	87.50
	Main construction	15	50.0000	0.0003	12.50
	Corrections - Cavity Unventilated, Emissivity: Normal				
Layer 3	Mineral wool batt				
	Main construction	40	0.0380	1.0526	96.77
	Main construction	40	50.0000	0.0008	0.75
	Main construction	40	0.4000	0.1000	2.48
	Corrections - Air Gap: Level 1, Fasteners: None or plastic				
Layer 4	Mineral wool batt				
	Main construction	10	0.0380	0.2632	97.52
	Main construction	10	0.1000	0.1000	2.48
	Corrections - Air Gap: Level 1, Fasteners: None or plastic				
Layer 5	Standard cavity				
	Main construction	50	0.2381	0.2100	97.52
	Main construction	50	50.0000	0.0010	2.48
	Corrections - Cavity Unventilated, Emissivity: Normal				
Layer 6	Concrete, reinforced (1% steel)				
	Main construction	35	2.3000	0.0152	100.00
Layer 7	Standard cavity				
	Main construction	130	0.5869	0.2215	70.00
	Main construction	130	1.3000	0.1000	30.00
	Corrections - Cavity Unventilated, Emissivity: Normal				
Layer 8	Concrete, reinforced (1% steel)				
	Main construction	35	2.3000	0.0152	100.00
Layer 9	Rubber flooring				
	Main construction	6	0.3000	0.0200	100.00
Layer 10	Screed				
	Main construction	65	1.1500	0.0565	100.00
Int surface				0.1700	

Total resistance: Upper limit = 2.312 m² K/W Lower limit = 1.065 m² K/W Average = 1.689 m² K/W
Total correction = 0.0003 m² K/W U-value (unrounded) = 0.55 W/m² K

Unheated space: None

Total thickness: 401 mm

U-value: 0.55 W/m² K

Kappa: n/a

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Built)

Property Reference	SAP 0647 Flat 98				Issued on Date	02/08/2022	
Assessment Reference	As Built		Prop Type Ref	J (HA-AR)			
Property	15 Haines Crescent, WEST END, SO30 3LG						
SAP Rating			83 B	DER	12.49	TER	18.12
Environmental			92 A	% DER<TER	31.06		
CO ₂ Emissions (t/year)			0.58	DFEE	41.07	TFEE	43.41
General Requirements Compliance			Fail	% DFEE<TFEE	5.38		
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 West
Property Tenure	Unknown
Transaction Type	New dwelling
Terrain Type	Suburban
1.0 Property Type	Flat, 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	Internal Floor Area	Average Storey Height
		35.10 m	65.70 m ²	2.09 m

7.0 Living Area	23.28	m ²
8.0 Thermal Mass Parameter	Simple calculation - Medium	
Thermal Mass	250.00	kJ/m ² K

9.0 External Walls				
Description	Type	U-Value (W/m ² K)	Gross Area (m ²)	Nett Area (m ²)
Walls	Cavity Wall	0.27	29.63	28.19
Wall to Corridor	Cavity Wall	0.25	13.20	11.08
Dormers	Timber Frame	0.21	3.77	2.33

10.0 External Roofs				
Description	Type	U-Value (W/m ² K)	Gross Area (m ²)	Nett Area (m ²)
Pitched Roof	External Plane Roof	0.10	35.97	35.97
Sloping Ceilings	External Slope Roof	0.17	41.24	38.54

11.0 Heat Loss Floors				
Description	Type	Construction	U-Value (W/m ² K)	Area (m ²)
Corridor Below	Exposed Floor - Solid		0.55	3.17

11.1 Party Floors				
Description	Construction			Area (m ²)

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Built)

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Front Door	Manufacturer	Solid Door							1.10
Windows	Manufacturer	Window	Double Low-E Soft 0.1			0.63		0.70	1.20
Roof Windows	Manufacturer	Roof Window	Double Low-E Soft 0.1			0.63		0.70	1.40

13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width (m)	Height (m)	Count	Area (m²)	Curtain Closed
Flat Entrance Door	Solid Door	[2] Wall to Corridor	North West							2.12	
North East	Window	[1] Walls	North East	None	0.00					1.44	
Dormer	Window	[3] Dormers	North East	None	0.00					1.44	
Roof Windows	Roof Window	[2] Sloping Ceilings	South East	None						1.35	
Roof Windows	Roof Window	[2] Sloping Ceilings	South West	None						1.35	

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)	2.11	0.300	No
Table K1 - Approved	E3 Sill	1.20	0.040	No
Table K1 - Approved	E4 Jamb	7.20	0.050	No
Table K1 - Default	E20 Exposed floor (normal)	3.57	0.320	No
Table K1 - Default	E21 Exposed floor (inverted)	3.57	0.320	No
Table K1 - Approved	E7 Party floor between dwellings (in blocks of flats)	31.53	0.070	No
Table K1 - Approved	E11 Eaves (insulation at rafter level)	24.04	0.040	No
Table K1 - Approved	E12 Gable (insulation at ceiling level)	5.11	0.240	No
Table K1 - Approved	E13 Gable (insulation at rafter level)	3.00	0.040	No
Table K1 - Approved	E16 Corner (normal)	8.36	0.090	No
Table K1 - Approved	E17 Corner (inverted – internal area greater than external area)	3.55	-0.090	No
Table K1 - Default	R1 Head of roof window	3.48	0.080	No
Table K1 - Default	R2 Sill of roof window	3.48	0.060	No
Table K1 - Default	R3 Jamb of roof window	7.12	0.080	No
Table K1 - Default	R4 Ridge (vaulted ceiling)	2.06	0.080	No
Table K1 - Default	R5 Ridge (inverted)	2.06	0.040	No
Table K1 - Default	R6 Flat ceiling	23.70	0.060	No
Table K1 - Default	R7 Flat ceiling (inverted)	1.47	0.040	No
Table K1 - Default	R8 Roof to wall (rafter)	5.41	0.060	No

Y-value 0.090

W/m²K

18.0 Pressure Testing

Yes

Designed AP₅₀ 5.00

m³/(h.m²) @ 50 Pa

Property Tested ? Yes

As Built AP₅₀ 4.35

m³/(h.m²) @ 50 Pa

19.0 Mechanical Ventilation

Summer Overheating

Windows open in hot weather Windows half open

Cross ventilation possible Yes

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Built)

Night Ventilation	Yes
Air change rate	3.00

Mechanical Ventilation

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

20.0 Fans, Open Fireplaces, Flues

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

21.0 Fixed Cooling System

No

22.0 Lighting

Internal

Total number of light fittings	9	
Total number of L.E.L. fittings	9	
Percentage of L.E.L. fittings	100.00	%

External

External lights fitted	No
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23.0 Electricity Tariff

Standard

24.0 Main Heating 1

Description	Database	
Percentage of Heat	Gas Combi	%
Database Ref. No.	100	
Fuel Type	17503	
Main Heating	Mains gas	
SAP Code	BGW	
In Winter	104	
In Summer	90.7	
Controls	87.0	
PCDF Controls	CBE Programmer, room thermostat and TRVs	
Delayed Start Stat	0	
Sap Code	No	
Flue Type	2106	
Fan Assisted Flue	Balanced	
Is MHS Pumped	Yes	
Heat Emitter	Pump in heated space	
Flow Temperature	Radiators	
Combi boiler type	Normal (> 45°C)	
	Standard Combi	

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Built)

Combi keep hot type	Gas/Oil, time clock
25.0 Main Heating 2	None
Community Heating	None
28.0 Water Heating	HWP From main heating 1
Water Heating	Main Heating 1
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
SAP Code	901
29.0 Hot Water Cylinder	None
32.0 Photovoltaic Unit	More Dwellings, One Block
Apportioned	756.44 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 %			