



SAP Report Submission for Building Regulations Compliance

Client: Foreman Homes

Project: 26, Shaw Crescent
West End, Southampton, SO30 3LH

Contact: Tobias Whiting
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Report Issue Date: 29/05/2024

EXCELLENCE
IN ENERGY
ASSESSMENT

BUILDING REGULATION COMPLIANCE

Calculation Type: New Build (As Built)

Property Reference	SAP 0943 Plot 26			Issued on Date	29/05/2024
Assessment Reference	As Built	Prop Type Ref	Block J Mid Terrace		
Property	26, Shaw Crescent, West End, Southampton, SO30 3LH				
SAP Rating	89 B	DER	11.71	TER	16.78
Environmental	91 B	% DER<TER	30.23		
CO ₂ Emissions (t/year)	0.68	DFEE	36.70	TFEE	44.30
General Requirements Compliance	Pass	% DFEE<TFEE	17.16		
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)	16.78	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	11.71	kgCO ₂ /m ²	Pass
	-5.07 (-30.2%)	kgCO ₂ /m ²	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	44.30	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	36.70	kWh/m ² /yr	
	-7.6 (-17.2%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.24 (max. 0.30)	0.24 (max. 0.70)	Pass
Party wall	0.00 (max. 0.20)	-	Pass
Floor	0.12 (max. 0.25)	0.12 (max. 0.70)	Pass
Roof	0.10 (max. 0.20)	0.10 (max. 0.35)	Pass
Openings	1.18 (max. 2.00)	1.20 (max. 3.30)	Pass

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	3.95 (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

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Main heating system

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

Pass

Secondary heating system

None

5 Cylinder insulation

Hot water storage

No cylinder

6 Controls

Space heating controls

Programmer, room thermostat and TRVs

Pass

Hot water controls

No cylinder

Boiler interlock

Yes

Pass

7 Low energy lights

Percentage of fixed lights with low-energy fittings

100 %

Minimum

75 %

Pass

8 Mechanical ventilation

Continuous extract system

Specific fan power

0.17

Maximum

0.7

Pass

Criterion 3 – Limiting the effects of heat gains in summer

9 Summertime temperature

Overheating risk (Southern England)

Slight

Pass

Based on:

Overshading

Average

Windows facing East

4.31 m², No overhang

Windows facing West

7.00 m², No overhang

Air change rate

4.00 ach

Blinds/curtains

None

Criterion 4 – Building performance consistent with DER and DFEE rate

Party Walls

Type

U-value

Filled Cavity with Edge Sealing

0.00

W/m²K

Pass

Filled Cavity with Edge Sealing

0.00

W/m²K

Pass

Air permeability and pressure testing

3 Air permeability

Air permeability at 50 pascals

3.95 (measured in this dwelling)

m³/(h.m²) @ 50 Pa

Maximum

10.0

m³/(h.m²) @ 50 Pa

Pass

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BUILDING REGULATION COMPLIANCE

Calculation Type: New Build (As Built)

10 Key features

Party wall U-value	0.00	W/m ² K
Party wall U-value	0.00	W/m ² K
Roof U-value	0.10	W/m ² K
Floor U-value	0.12	W/m ² K
Door U-value	1.10	W/m ² K
Air permeability	4.0	m ³ /m ² h
Photovoltaic array	0.80	kW

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THERMAL BRIDGING

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SAP Rating	89 B	DER	11.71
Environmental	91 B	TER	16.78
CO ₂ Emissions (t/year)	0.68	% DER<TER	30.23
General Requirements Compliance	Pass	DFEE	36.70
		TFEE	44.30
		% DFEE<TFEE	17.16
Assessor Details	Mr. Tobias Whiting, Abacus Energy (UK) Ltd, Tel: 07798936079, toby@abacusenergyuk.com		Assessor ID
			E477-0001
Client	Foreman Homes, FORE		

	Junction detail	Source Type	Psi (W/mK)	Length (m)	Result	Reference
External wall	E2 Other lintels (including other steel lintels)	Independently assessed	0.071	1.02	0.07	Birtley Supatherm
External wall	E2 Other lintels (including other steel lintels)	Independently assessed	0.064	4.99	0.32	Birtley Supatherm
External wall	E2 Other lintels (including other steel lintels)	Independently assessed	0.067	1.59	0.11	Birtley Supatherm
External wall	E2 Other lintels (including other steel lintels)	Independently assessed	0.061	1.81	0.11	Birtley Supatherm
External wall	E3 Sill	Independently assessed	0.021	6.80	0.14	Knauf P5
External wall	E4 Jamb	Independently assessed	0.016	20.10	0.32	Knauf P6
External wall	E5 Ground floor (normal)	Table K1 - Default	0.320	9.73	3.11	
External wall	E6 Intermediate floor within a dwelling	Independently assessed	0.000	9.73	0.00	CD0029
External wall	E10 Eaves (insulation at ceiling level)	Table K1 - Approved	0.060	9.73	0.58	
External wall	E18 Party wall between dwellings	Independently assessed	0.036	10.00	0.36	Knauf P25 Halved
External wall	E18 Party wall between dwellings	Independently assessed	0.024	2.39	0.06	Knauf P25 Divided by 3
External wall	E25 Staggered party wall between dwellings	Independently assessed	0.055	10.00	0.55	Knauf P27 Halved
Party wall	P1 Party wall - Ground floor	Table K1 - Default	0.160	17.54	2.81	
Party wall	P2 Party wall - Intermediate floor within a dwelling	Table K1 - Default	0.000	17.54	0.00	
Party wall	P4 Party wall - Roof (insulation at ceiling level)	Independently assessed	0.035	17.54	0.61	Knauf P29 Halved

Total: **9.16** W/mK:
Y-Value: **0.068** W/m²K:

FULL SAP CALCULATION PRINTOUT

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FULL SAP CALCULATION PRINTOUT

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

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DWELLING AS BUILT

Mid-Terrace House, total floor area 85 m²

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

1a TER and DER

Fuel for main heating:Mains gas

Fuel factor:1.00 (mains gas)

Target Carbon Dioxide Emission Rate (TER) 16.78 kgCO₂/m²

Dwelling Carbon Dioxide Emission Rate (DER) 11.71 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 44.3 kWh/m²/yr

Dwelling Fabric Energy Efficiency (DFEE) 36.7 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.24 (max. 0.30)	0.24 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.12 (max. 0.25)	0.12 (max. 0.70)	OK
Roof	0.10 (max. 0.20)	0.10 (max. 0.35)	OK
Openings	1.18 (max. 2.00)	1.20 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals: 3.95 (measured in this dwelling)
Maximum 10.0 OK

4 Heating efficiency

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

Data from database

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

Combi boiler

Efficiency: 89.3% SEDBUK2009

Minimum: 88.0% OK

Secondary heating system:

None

5 Cylinder insulation

Hot water storage No cylinder

6 Controls

Space heating controls: Programmer, room thermostat and TRVs OK

Hot water controls:

No cylinder

Boiler interlock

Yes

OK

7 Low energy lights

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

8 Mechanical ventilation

Continuous extract system

Specific fan power: 0.17
Maximum 0.7 OK

9 Summertime temperature

Overheating risk (Southern England): Slight OK

Based on:

Overshading: Average

Windows facing East: 4.31 m², No overhang

Windows facing West: 7.00 m², No overhang

Air change rate: 4.00 ach

Blinds/curtains: None

10 Key features

Party wall U-value 0.00 W/m²K

Party wall U-value 0.00 W/m²K

Roof U-value 0.10 W/m²K

Floor U-value 0.12 W/m²K

Door U-value 1.10 W/m²K

Air permeability 4.0 m³/m²h

Photovoltaic array 0.80 kW

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

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

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	42.5400 (1b)	x 2.3900 (2b)	= 101.6706 (1b) - (3b)
First floor	42.5400 (1c)	x 2.6100 (2c)	= 111.0294 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	85.0800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 212.7000 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					0 * 10 = 0.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c)					0.0000 / (5) = 0.0000 (8)
Pressure test					Yes
Measured/design AP50					3.9500
Infiltration rate					0.1975 (18)
Number of sides sheltered					2 (19)
Shelter factor			(20) = 1 - [0.075 x (19)]	=	0.8500 (20)
Infiltration rate adjusted to include shelter factor			(21) = (18) x (20)	=	0.1679 (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	0.2140	0.2098	0.2056	0.1847	0.1805	0.1595	0.1595	0.1553	0.1679	0.1805	0.1889	0.1973 (22b)
Mechanical extract ventilation - centralised												
If mechanical ventilation:												0.5000 (23a)
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K					
Front Door			2.1500	1.1000	2.3650		(26)					
Windows (Uw = 1.20)			11.3100	1.1450	12.9504		(27)					
Ground Floor			42.5400	0.1200	5.1048	84.0000	3573.3600 (28a)					
Brick and Block	48.6500	13.4600	35.1900	0.2400	8.4456	42.2200	1485.7218 (29a)					
Pitched Roof	42.5400		42.5400	0.1000	4.2540	9.1000	387.1140 (30)					
Total net area of external elements Aum(A, m2)			133.7300				(31)					
Fabric heat loss, W/K = Sum (A x U)				(26) ... (30) + (32) =	33.1198		(33)					
Party Wall 1			44.0500	0.0000	0.0000	110.0000	4845.5000 (32)					
Party Wall 2			44.0500	0.0000	0.0000	110.0000	4845.5000 (32)					
Ground Floor Stud			72.3100			9.0000	650.7900 (32c)					
First Floor Stud			108.0200			9.0000	972.1800 (32c)					
Internal Floor 1			42.5400			18.0000	765.7200 (32d)					
Internal Ceiling 1			42.5400			18.0000	765.7200 (32e)					
Heat capacity Cm = Sum(A x k)					(28) ... (30) + (32) + (32a) ... (32e) =		18291.6058 (34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							214.9930 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							9.1582 (36)					
Total fabric heat loss						(33) + (36) =	42.2780 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 35.0955	Feb 35.0955	Mar 35.0955	Apr 35.0955	May 35.0955	Jun 35.0955	Jul 35.0955	Aug 35.0955	Sep 35.0955	Oct 35.0955	Nov 35.0955	Dec 35.0955 (38)
Heat transfer coeff	77.3735	77.3735	77.3735	77.3735	77.3735	77.3735	77.3735	77.3735	77.3735	77.3735	77.3735	77.3735 (39)
Average = Sum(39)m / 12 =												77.3735 (39)
HLP	Jan 0.9094	Feb 0.9094	Mar 0.9094	Apr 0.9094	May 0.9094	Jun 0.9094	Jul 0.9094	Aug 0.9094	Sep 0.9094	Oct 0.9094	Nov 0.9094	Dec 0.9094 (40)
HLP (average)												0.9094 (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												2.5522 (42)
Average daily hot water use (litres/day)												94.8152 (43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Daily hot water use	104.2967	100.5041	96.7115	92.9189	89.1263	85.3337	85.3337	89.1263	92.9189	96.7115	100.5041	104.2967 (44)
Energy conte	154.6691	135.2746	139.5912	121.6990	116.7731	100.7663	93.3748	107.1489	108.4286	126.3631	137.9352	149.7887 (45)
Energy content (annual)										Total = Sum (45)m =		1491.8127 (45)
Distribution loss (46)m = 0.15 x (45)m	23.2004	20.2912	20.9387	18.2549	17.5160	15.1149	14.0062	16.0723	16.2643	18.9545	20.6903	22.4683 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	0.6707	0.6071	0.6075	0.5089	0.4683	0.3869	0.3586	0.4297	0.4534	0.5499	0.6190	0.6495 (61)
Total heat required for water heating calculated for each month	155.3397	135.8816	140.1987	122.2079	117.2414	101.1532	93.7334	107.5787	108.8820	126.9131	138.5543	150.4382 (62)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63)
Output from w/h	155.3397	135.8816	140.1987	122.2079	117.2414	101.1532	93.7334	107.5787	108.8820	126.9131	138.5543	150.4382 (64)
Heat gains from water heating, kWh/month	51.5951	45.1306	46.5660	40.5921	38.9441	33.6015	31.1368	35.7345	36.1659	42.1532	46.0182	49.9671 (65)
										Total per year (kWh/year) = Sum (64)m =		1498.1223 (64)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	127.6110	127.6110	127.6110	127.6110	127.6110	127.6110	127.6110	127.6110	127.6110	127.6110	127.6110	127.6110 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	22.2229	19.7382	16.0522	12.1525	9.0842	7.6692	8.2869	10.7716	14.4576	18.3572	21.4256	22.8405 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	229.7298	232.1137	226.1064	213.3176	197.1740	182.0013	171.8650	169.4811	175.4884	188.2773	204.4208	219.5935 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.7611	35.7611	35.7611	35.7611	35.7611	35.7611	35.7611	35.7611	35.7611	35.7611	35.7611	35.7611 (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)	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888 (71)
Water heating gains (Table 5)	69.3483	67.1586	62.5887	56.3780	52.3443	46.6688	41.8505	48.0302	50.2304	56.6576	63.9142	67.1601 (72)
Total internal gains	385.5843	383.2937	369.0305	346.1314	322.8857	300.6226	286.2857	292.5662	304.4597	327.5753	354.0439	373.8775 (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	
East				4.3100	19.6403	0.6300	0.7000			0.7700	25.8700 (76)	
West				7.0000	19.6403	0.6300	0.7000			0.7700	42.0162 (80)	

Solar gains	67.8862	132.7999	218.7025	318.9645	390.9030	400.1588	380.9675	327.2454	254.3600	157.5783	84.6462	55.8263 (83)
Total gains	453.4705	516.0936	587.7330	665.0959	713.7887	700.7814	667.2532	619.8117	558.8198	485.1536	438.6901	429.7038 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	65.6685	65.6685	65.6685	65.6685	65.6685	65.6685	65.6685	65.6685	65.6685	65.6685	65.6685	65.6685
alpha	5.3779	5.3779	5.3779	5.3779	5.3779	5.3779	5.3779	5.3779	5.3779	5.3779	5.3779	5.3779
util living area	0.9977	0.9949	0.9850	0.9481	0.8466	0.6707	0.5034	0.5615	0.8233	0.9728	0.9952	0.9983 (86)
MIT	19.9037	20.0440	20.2911	20.6009	20.8495	20.9671	20.9941	20.9897	20.9037	20.5656	20.1659	19.8629 (87)
Th 2	20.1595	20.1595	20.1595	20.1595	20.1595	20.1595	20.1595	20.1595	20.1595	20.1595	20.1595	20.1595 (88)
util rest of house	0.9970	0.9934	0.9806	0.9325	0.8045	0.5958	0.4107	0.4650	0.7610	0.9618	0.9936	0.9978 (89)
MIT 2	19.1477	19.2874	19.5321	19.8319	20.0547	20.1431	20.1577	20.1560	20.1026	19.8030	19.4093	19.1071 (90)
Living area fraction	19.3180	19.4578	19.7031	20.0051	20.2338	20.3287	20.3461	20.3439	20.2831	19.9748	19.5798	19.2774 (92)
MIT	19.3180	19.4578	19.7031	20.0051	20.2338	20.3287	20.3461	20.3439	20.2831	19.9748	19.5798	19.2774 (92)
Temperature adjustment												0.0000
adjusted MIT	19.3180	19.4578	19.7031	20.0051	20.2338	20.3287	20.3461	20.3439	20.2831	19.9748	19.5798	19.2774 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	451.7123	511.8602	574.5796	617.9938	577.1638	428.5925	287.9922	301.6843	430.9282	465.1424	435.2287	428.4398 (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	1161.9960	1126.3907	1021.5719	859.2432	660.2861	443.2513	289.8517	305.1503	478.4065	725.3641	965.6051	1166.5888 (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	528.4511	412.9644	332.5622	173.6996	61.8430	0.0000	0.0000	0.0000	0.0000	193.6049	381.8710	549.1828 (98)
Space heating												2634.1790 (98)
Space heating per m2										(98) / (4) =		30.9612 (99)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

8c. Space cooling requirement

Not applicable

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)											
Fraction of space heat from main system(s)	1.0000 (202)											
Efficiency of main space heating system 1 (in %)	90.2000 (206)											
Efficiency of secondary/supplementary heating system, %	0.0000 (208)											
Space heating requirement	2920.3758 (211)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	528.4511	412.9644	332.5622	173.6996	61.8430	0.0000	0.0000	0.0000	0.0000	193.6049	381.8710	549.1828 (98)
Space heating efficiency (main heating system 1)	90.2000	90.2000	90.2000	90.2000	90.2000	0.0000	0.0000	0.0000	0.0000	90.2000	90.2000	90.2000 (210)
Space heating fuel (main heating system)	585.8659	457.8320	368.6943	192.5716	68.5620	0.0000	0.0000	0.0000	0.0000	214.6396	423.3603	608.8501 (211)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating requirement	155.3397	135.8816	140.1987	122.2079	117.2414	101.1532	93.7334	107.5787	108.8820	126.9131	138.5543	150.4382 (64)
Efficiency of water heater (217)m	86.6446	86.3390	85.6140	83.9383	80.6616	76.4000	76.4000	76.4000	76.4000	84.1793	86.0614	76.4000 (216)
Fuel for water heating, kWh/month	179.2838	157.3816	163.7568	145.5924	145.3498	132.3995	122.6876	140.8098	142.5157	150.7651	160.9947	173.2608 (219)
Water heating fuel used												1814.7977 (219)
Annual totals kWh/year												
Space heating fuel - main system												2920.3758 (211)
Space heating fuel - secondary												0.0000 (215)
Electricity for pumps and fans:												
(MEV)Centralised, Database: in-use factor = 1.4000, SFP = 0.2380)												
mechanical ventilation fans (SFP = 0.2380)												61.7596 (230a)
central heating pump												30.0000 (230c)
main heating flue fan												45.0000 (230e)
Total electricity for the above, kWh/year												136.7596 (231)
Electricity for lighting (calculated in Appendix L)												392.4632 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV Unit 0 (0.80 + 0.80 + 908 + 1.00) =												-581.0267 (233)
Total delivered energy for all uses												4683.3695 (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	2920.3758	0.2160	630.8012 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1814.7977	0.2160	391.9963 (264)
Space and water heating			1022.7975 (265)
Pumps and fans	136.7596	0.5190	70.9782 (267)
Energy for lighting	392.4632	0.5190	203.6884 (268)
Energy saving/generation technologies			
PV Unit	-581.0267	0.5190	-301.5529 (269)
Total CO2, kg/year			995.9112 (272)
Dwelling Carbon Dioxide Emission Rate (DER)			11.7100 (273)

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

DER		11.7100 ZC1
Total Floor Area	TFA	85.0800
Assumed number of occupants	N	2.5522
CO2 emission factor in Table 12 for electricity displaced from grid	EF	0.5190
CO2 emissions from appliances, equation (L14)		16.0006 ZC2
CO2 emissions from cooking, equation (L16)		2.1186 ZC3
Total CO2 emissions		29.8292 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		29.8292 ZC8

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF TARGET EMISSIONS 09 Jan 2014

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

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	42.5400 (1b)	x 2.3900 (2b)	= 101.6706 (1b) - (3b)
First floor	42.5400 (1c)	x 2.6100 (2c)	= 111.0294 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	85.0800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 212.7000 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					3 * 10 = 30.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c)					30.0000 / (5) = 0.1410 (8)
Pressure test					Yes
Measured/design AP50					5.0000
Infiltration rate					0.3910 (18)
Number of sides sheltered					2 (19)
Shelter factor			(20) = 1 - [0.075 x (19)]	=	0.8500 (20)
Infiltration rate adjusted to include shelter factor			(21) = (18) x (20)	=	0.3324 (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	0.4238	0.4155	0.4072	0.3656	0.3573	0.3158	0.3158	0.3075	0.3324	0.3573	0.3739	0.3906 (22b)
Effective ac	0.5898	0.5863	0.5829	0.5668	0.5638	0.5499	0.5499	0.5473	0.5552	0.5638	0.5699	0.5763 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
TER Opaque door			2.1500	1.0000	2.1500		(26)
TER Opening Type (Uw = 1.40)			11.3100	1.3258	14.9943		(27)
Ground Floor			42.5400	0.1300	5.5302		(28a)
Brick and Block	48.6500	13.4600	35.1900	0.1800	6.3342		(29a)
Pitched Roof	42.5400		42.5400	0.1300	5.5302		(30)
Total net area of external elements Aum(A, m ²)			133.7300				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32)	=	34.5389		(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)							8.8075 (36)
Total fabric heat loss						(33) + (36)	= 43.3464 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	41.3987	41.1539	40.9140	39.7871	39.5763	38.5948	38.5948	38.4131	38.9729	39.5763	40.0028	40.4487 (38)
Heat transfer coeff	84.7451	84.5003	84.2604	83.1336	82.9227	81.9413	81.9413	81.7595	82.3193	82.9227	83.3492	83.7951 (39)
Average = Sum(39)m / 12 =												83.1326 (39)
HLP	0.9961	0.9932	0.9904	0.9771	0.9746	0.9631	0.9631	0.9610	0.9676	0.9746	0.9797	0.9849 (40)
HLP (average)												0.9771 (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												2.5522 (42)
Average daily hot water use (litres/day)												94.8152 (43)
Daily hot water use	104.2967	100.5041	96.7115	92.9189	89.1263	85.3337	85.3337	89.1263	92.9189	96.7115	100.5041	104.2967 (44)
Energy conte	154.6691	135.2746	139.5912	121.6990	116.7731	100.7663	93.3748	107.1489	108.4286	126.3631	137.9352	149.7887 (45)
Energy content (annual)										Total = Sum(45)m =		1491.8127 (45)
Distribution loss (46)m = 0.15 x (45)m	23.2004	20.2912	20.9387	18.2549	17.5160	15.1149	14.0062	16.0723	16.2643	18.9545	20.6903	22.4683 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF TARGET EMISSIONS 09 Jan 2014

Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Total heat required for water heating calculated for each month	50.9589	46.0274	49.2831	45.8230	45.4178	42.0824	43.4851	45.4178	45.8230	49.2831	49.3151	50.9589 (61)
Solar input	205.6280	181.3020	188.8744	167.5220	162.1909	142.8487	136.8599	152.5667	154.2517	175.6463	187.2503	200.7476 (62)
Output from w/h	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)
Heat gains from water heating, kWh/month	205.6280	181.3020	188.8744	167.5220	162.1909	142.8487	136.8599	152.5667	154.2517	175.6463	187.2503	200.7476 (64)
	64.1672	56.4856	58.7349	51.9207	50.1815	44.0254	41.9184	46.9815	47.5083	54.3365	58.1922	62.5445 (65)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	127.6110	127.6110	127.6110	127.6110	127.6110	127.6110	127.6110	127.6110	127.6110	127.6110	127.6110	127.6110	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	22.2229	19.7382	16.0522	12.1525	9.0842	7.6692	8.2869	10.7716	14.4576	18.3572	21.4256	22.8405	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	229.7298	232.1137	226.1064	213.3176	197.1740	182.0013	171.8650	169.4811	175.4884	188.2773	204.4208	219.5935	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.7611	35.7611	35.7611	35.7611	35.7611	35.7611	35.7611	35.7611	35.7611	35.7611	35.7611	35.7611	(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)	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	(71)
Water heating gains (Table 5)	86.2462	84.0560	78.9447	72.1121	67.4483	61.1464	56.3419	63.1471	65.9837	73.0330	80.8225	84.0652	(72)
Total internal gains	402.4822	400.1912	385.3866	361.8655	337.9897	315.1002	300.7771	307.6832	320.2131	343.9507	370.9523	390.7825	(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		
East												4.3100	19.6403		0.6300		0.7000		0.7700		25.8700		(76)	
West												7.0000	19.6403		0.6300		0.7000		0.7700		42.0162		(80)	
Solar gains	67.8862	132.7999	218.7025	318.9645	390.9030	400.1588	380.9675	327.2454	254.3600	157.5783	84.6462	55.8263	(83)											
Total gains	470.3685	532.9911	604.0891	680.8300	728.8927	715.2590	681.7446	634.9286	574.5731	501.5290	455.5984	446.6089	(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	69.7189	69.9208	70.1199	71.0704	71.2511	72.1045	72.1045	72.2648	71.7734	71.2511	70.8865	70.5093	
alpha	5.6479	5.6614	5.6747	5.7380	5.7501	5.8070	5.8070	5.8177	5.7849	5.7501	5.7258	5.7006	
util living area	0.9987	0.9970	0.9906	0.9629	0.8748	0.6965	0.5226	0.5805	0.8477	0.9810	0.9971	0.9990	(86)
MIT	19.9262	20.0579	20.2913	20.6007	20.8477	20.9700	20.9951	20.9914	20.9076	20.5776	20.1977	19.9056	(87)
Th 2	20.0866	20.0890	20.0914	20.1024	20.1045	20.1142	20.1142	20.1160	20.1105	20.1045	20.1003	20.0959	(88)
util rest of house	0.9982	0.9960	0.9873	0.9493	0.8321	0.6148	0.4207	0.4751	0.7821	0.9716	0.9959	0.9987	(89)
MIT 2	18.6423	18.8364	19.1775	19.6267	19.9535	20.0940	20.1123	20.1123	20.0346	19.6021	19.0494	18.6191	(90)
Living area fraction	18.9316	19.1116	19.4285	19.8462	20.1550	20.2913	20.3112	20.3104	20.2313	19.8219	19.3082	18.9090	(91)
MIT	18.9316	19.1116	19.4285	19.8462	20.1550	20.2913	20.3112	20.3104	20.2313	19.8219	19.3082	18.9090	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.9316	19.1116	19.4285	19.8462	20.1550	20.2913	20.3112	20.3104	20.2313	19.8219	19.3082	18.9090	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9974	0.9944	0.9840	0.9445	0.8348	0.6320	0.4438	0.4989	0.7922	0.9677	0.9944	0.9980	(94)
Ext temp.	469.1427	529.9944	594.4203	643.0328	608.4832	452.0356	302.5458	316.7524	455.1669	485.3259	453.0600	445.7344	(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	1239.9541	1200.8870	1089.3585	909.9932	701.1104	466.3562	304.1030	319.7121	504.7207	764.7041	1017.5410	1232.5419	(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	573.4836	450.8398	368.2341	192.2115	68.9146	0.0000	0.0000	0.0000	0.0000	207.8574	406.4263	585.3848	(98)
												2853.3520	(98)
												33.5373	(99)

8c. Space cooling requirement

Not applicable

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

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF TARGET EMISSIONS 09 Jan 2014

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													3054.9808 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	573.4836	450.8398	368.2341	192.2115	68.9146	0.0000	0.0000	0.0000	0.0000	207.8574	406.4263	585.3848	(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)	614.0082	482.6979	394.2549	205.7938	73.7844	0.0000	0.0000	0.0000	0.0000	222.5454	435.1459	626.7503	(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	205.6280	181.3020	188.8744	167.5220	162.1909	142.8487	136.8599	152.5667	154.2517	175.6463	187.2503	200.7476	(64)
Efficiency of water heater (217)m	87.4955	87.2525	86.7028	85.3980	83.0675	80.3000	80.3000	80.3000	80.3000	85.4760	86.9505	87.5868	(216)
Fuel for water heating, kWh/month	235.0155	207.7901	217.8411	196.1663	195.2520	177.8937	170.4358	189.9959	192.0942	205.4919	215.3527	229.1985	(219)
Water heating fuel used												2432.5277	(219)
Annual totals kWh/year													
Space heating fuel - main system												3054.9808	(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)												392.4632	(232)
Total delivered energy for all uses												5954.9716	(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	3054.9808	0.2160	659.8758 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2432.5277	0.2160	525.4260 (264)
Space and water heating			1185.3018 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	392.4632	0.5190	203.6884 (268)
Total CO2, kg/m2/year			1427.9152 (272)
Emissions per m2 for space and water heating			13.9316 (272a)
Fuel factor (mains gas)			1.0000
Emissions per m2 for lighting			2.3941 (272b)
Emissions per m2 for pumps and fans			0.4575 (272c)
Target Carbon Dioxide Emission Rate (TER) = (13.9316 * 1.00) + 2.3941 + 0.4575, rounded to 2 d.p.			16.7800 (273)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

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

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	42.5400 (1b)	x 2.3900 (2b)	= 101.6706 (1b) - (3b)
First floor	42.5400 (1c)	x 2.6100 (2c)	= 111.0294 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	85.0800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 212.7000 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					3 * 10 = 30.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					30.0000 / (5) = 0.1410 (8)
Pressure test					Yes
Measured/design AP50					3.9500
Infiltration rate					0.3385 (18)
Number of sides sheltered					2 (19)
Shelter factor				(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor				(21) = (18) x (20) =	0.2878 (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	0.3669	0.3597	0.3525	0.3165	0.3093	0.2734	0.2734	0.2662	0.2878	0.3093	0.3237	0.3381 (22b)
Effective ac	0.5673	0.5647	0.5621	0.5501	0.5478	0.5374	0.5374	0.5354	0.5414	0.5478	0.5524	0.5572 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Front Door			2.1500	1.1000	2.3650		(26)
Windows (Uw = 1.20)			11.3100	1.1450	12.9504		(27)
Ground Floor			42.5400	0.1200	5.1048	84.0000	3573.3600 (28a)
Brick and Block	48.6500	13.4600	35.1900	0.2400	8.4456	42.2200	1485.7218 (29a)
Pitched Roof	42.5400		42.5400	0.1000	4.2540	9.1000	387.1140 (30)
Total net area of external elements Aum(A, m ²)			133.7300				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	33.1198		(33)
Party Wall 1			44.0500	0.0000	0.0000	110.0000	4845.5000 (32)
Party Wall 2			44.0500	0.0000	0.0000	110.0000	4845.5000 (32)
Ground Floor Stud			72.3100			9.0000	650.7900 (32c)
First Floor Stud			108.0200			9.0000	972.1800 (32c)
Internal Floor 1			42.5400			18.0000	765.7200 (32d)
Internal Ceiling 1			42.5400			9.0000	382.8600 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	17908.7458 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							210.4930 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							9.1582 (36)
Total fabric heat loss						(33) + (36) =	42.2780 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	39.8198	39.6364	39.4565	38.6119	38.4539	37.7183	37.7183	37.5821	38.0017	38.4539	38.7736	39.1078 (38)
Heat transfer coeff	82.0978	81.9143	81.7345	80.8899	80.7319	79.9963	79.9963	79.8600	80.2796	80.7319	81.0516	81.3858 (39)
Average = Sum(39)m / 12 =												80.8892 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.9649	0.9628	0.9607	0.9508	0.9489	0.9402	0.9402	0.9386	0.9436	0.9489	0.9527	0.9566 (40)
HLP (average)												0.9507 (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	2.5522 (42)
Average daily hot water use (litres/day)	94.8152 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	104.2967	100.5041	96.7115	92.9189	89.1263	85.3337	85.3337	89.1263	92.9189	96.7115	100.5041	104.2967 (44)
Energy conte	154.6691	135.2746	139.5912	121.6990	116.7731	100.7663	93.3748	107.1489	108.4286	126.3631	137.9352	149.7887 (45)

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Calculation Type: New Build (As Built)

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Energy content (annual)	Total = Sum(45)m = 1491.8127 (45)											
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Heat gains from water heating, kWh/month	32.8672	28.7458	29.6631	25.8610	24.8143	21.4128	19.8421	22.7691	23.0411	26.8522	29.3112	31.8301 (65)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	127.6110	127.6110	127.6110	127.6110	127.6110	127.6110	127.6110	127.6110	127.6110	127.6110	127.6110	127.6110	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	22.2229	19.7382	16.0522	12.1525	9.0842	7.6692	8.2869	10.7716	14.4576	18.3572	21.4256	22.8405	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	229.7298	232.1137	226.1064	213.3176	197.1740	182.0013	171.8650	169.4811	175.4884	188.2773	204.4208	219.5935	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.7611	35.7611	35.7611	35.7611	35.7611	35.7611	35.7611	35.7611	35.7611	35.7611	35.7611	35.7611	(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)	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	(71)
Water heating gains (Table 5)	44.1763	42.7766	39.8698	35.9181	33.3525	29.7401	26.6695	30.6037	32.0015	36.0916	40.7101	42.7824	(72)
Total internal gains	357.4123	355.9117	343.3117	322.6715	300.8940	280.6939	268.1047	272.1397	283.2308	304.0094	327.8398	346.4998	(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	
East					4.3100	19.6403	0.6300	0.7000	0.7700		25.8700	
West					7.0000	19.6403	0.6300	0.7000	0.7700		42.0162 (80)	

Solar gains	67.8862	132.7999	218.7025	318.9645	390.9030	400.1588	380.9675	327.2454	254.3600	157.5783	84.6462	55.8263 (83)
Total gains	425.2985	488.7116	562.0142	641.6361	691.7970	680.8527	649.0722	599.3852	537.5909	461.5877	412.4859	402.3261 (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	60.5942	60.7299	60.8635	61.4990	61.6194	62.1860	62.1860	62.2921	61.9666	61.6194	61.3764	61.1243
alpha	5.0396	5.0487	5.0576	5.0999	5.1080	5.1457	5.1457	5.1528	5.1311	5.1080	5.0918	5.0750
util living area	0.9981	0.9958	0.9878	0.9567	0.8685	0.6999	0.5314	0.5929	0.8492	0.9782	0.9962	0.9986 (86)
MIT	19.7582	19.9077	20.1727	20.5198	20.8025	20.9533	20.9907	20.9842	20.8716	20.4891	20.0585	19.7310 (87)
Th 2	20.1126	20.1145	20.1162	20.1246	20.1261	20.1334	20.1334	20.1348	20.1306	20.1261	20.1230	20.1197 (88)
util rest of house	0.9976	0.9946	0.9841	0.9432	0.8292	0.6234	0.4321	0.4907	0.7901	0.9692	0.9949	0.9982 (89)
MIT 2	18.9661	19.1166	19.3811	19.7262	19.9857	20.1094	20.1305	20.1293	20.0524	19.7026	19.2743	18.9446 (90)
Living area fraction	19.1446	19.2949	19.5594	19.9050	20.1698	20.2996	20.3243	20.3219	20.2370	19.8798	19.4510	19.1218 (91)
MIT	19.1446	19.2949	19.5594	19.9050	20.1698	20.2996	20.3243	20.3219	20.2370	19.8798	19.4510	19.1218 (92)
Temperature adjustment												0.0000
adjusted MIT	19.1446	19.2949	19.5594	19.9050	20.1698	20.2996	20.3243	20.3219	20.2370	19.8798	19.4510	19.1218 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	423.9216	485.3423	551.4190	602.6072	575.1375	435.0323	294.9737	307.8281	429.1726	445.8391	409.8184	401.3366	(94)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1218.7048	1179.1452	1067.4065	890.1919	683.7812	455.9440	297.9301	313.2030	492.6726	749.1761	1001.0669	1214.4193	(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	(98)
Space heating kWh	591.3187	466.2355	383.8947	207.0610	80.8309	0.0000	0.0000	0.0000	0.0000	225.6827	425.6989	604.9335	(98)
Space heating													
Space heating per m2	(98) / (4) = 35.0923 (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	751.9649	591.9724	606.9363	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8997	0.9478	0.9279	0.0000	0.0000	0.0000	0.0000	(101)

FULL SAP CALCULATION PRINTOUT

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Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	676.5777	561.0605	563.1765	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	892.1849	853.0983	796.8942	0.0000	0.0000	0.0000	0.0000 (103)
Month fracti	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000 (103a)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	155.2371	217.2761	173.8860	0.0000	0.0000	0.0000	0.0000 (104)
Space cooling												546.3992 (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	38.8093	54.3190	43.4715	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling												136.5998 (107)
Space cooling per m2												1.6055 (108)
Energy for space heating												35.0923 (99)
Energy for space cooling												1.6055 (108)
Total												36.6979 (109)
Dwelling Fabric Energy Efficiency (DFEE)												36.7 (109)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

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

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	42.5400 (1b)	x 2.3900 (2b)	= 101.6706 (1b) - (3b)
First floor	42.5400 (1c)	x 2.6100 (2c)	= 111.0294 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	85.0800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 212.7000 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					3 * 10 = 30.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					30.0000 / (5) = 0.1410 (8)
Pressure test					Yes
Measured/design AP50					5.0000
Infiltration rate					0.3910 (18)
Number of sides sheltered					2 (19)
Shelter factor				(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor				(21) = (18) x (20) =	0.3324 (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	0.4238	0.4155	0.4072	0.3656	0.3573	0.3158	0.3158	0.3075	0.3324	0.3573	0.3739	0.3906 (22b)
Effective ac	0.5898	0.5863	0.5829	0.5668	0.5638	0.5499	0.5499	0.5473	0.5552	0.5638	0.5699	0.5763 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K					
TER Opaque door			2.1500	1.0000	2.1500		(26)					
TER Opening Type (Uw = 1.40)			11.3100	1.3258	14.9943		(27)					
Ground Floor			42.5400	0.1300	5.5302		(28a)					
Brick and Block	48.6500	13.4600	35.1900	0.1800	6.3342		(29a)					
Pitched Roof	42.5400		42.5400	0.1300	5.5302		(30)					
Total net area of external elements Aum(A, m2)			133.7300				(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	34.5389		(33)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							8.8075 (36)					
Total fabric heat loss						(33) + (36) =	43.3464 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 41.3987	Feb 41.1539	Mar 40.9140	Apr 39.7871	May 39.5763	Jun 38.5948	Jul 38.5948	Aug 38.4131	Sep 38.9729	Oct 39.5763	Nov 40.0028	Dec 40.4487 (38)
Heat transfer coeff	84.7451	84.5003	84.2604	83.1336	82.9227	81.9413	81.9413	81.7595	82.3193	82.9227	83.3492	83.7951 (39)
Average = Sum(39)m / 12 =												83.1326 (39)
HLP	Jan 0.9961	Feb 0.9932	Mar 0.9904	Apr 0.9771	May 0.9746	Jun 0.9631	Jul 0.9631	Aug 0.9610	Sep 0.9676	Oct 0.9746	Nov 0.9797	Dec 0.9849 (40)
HLP (average)												0.9771 (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												2.5522 (42)
Average daily hot water use (litres/day)												94.8152 (43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	104.2967	100.5041	96.7115	92.9189	89.1263	85.3337	85.3337	89.1263	92.9189	96.7115	100.5041	104.2967 (44)
Energy conte	154.6691	135.2746	139.5912	121.6990	116.7731	100.7663	93.3748	107.1489	108.4286	126.3631	137.9352	149.7887 (45)
Energy content (annual)										Total = Sum(45)m =		1491.8127 (45)
Distribution loss (46)m = 0.15 x (45)m												
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage												

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Calculation Type: New Build (As Built)

CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Heat gains from water heating, kWh/month	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
	32.8672	28.7458	29.6631	25.8610	24.8143	21.4128	19.8421	22.7691	23.0411	26.8522	29.3112	31.8301 (65)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	127.6110	127.6110	127.6110	127.6110	127.6110	127.6110	127.6110	127.6110	127.6110	127.6110	127.6110	127.6110 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	22.2229	19.7382	16.0522	12.1525	9.0842	7.6692	8.2869	10.7716	14.4576	18.3572	21.4256	22.8405 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	229.7298	232.1137	226.1064	213.3176	197.1740	182.0013	171.8650	169.4811	175.4884	188.2773	204.4208	219.5935 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.7611	35.7611	35.7611	35.7611	35.7611	35.7611	35.7611	35.7611	35.7611	35.7611	35.7611	35.7611 (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)	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888 (71)
Water heating gains (Table 5)	44.1763	42.7766	39.8698	35.9181	33.3525	29.7401	26.6695	30.6037	32.0015	36.0916	40.7101	42.7824 (72)
Total internal gains	357.4123	355.9117	343.3117	322.6715	300.8940	280.6939	268.1047	272.1397	283.2308	304.0094	327.8398	346.4998 (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
East				4.3100	19.6403			0.6300	0.7000	0.7700		25.8700 (76)
West				7.0000	19.6403			0.6300	0.7000	0.7700		42.0162 (80)

Solar gains	67.8862	132.7999	218.7025	318.9645	390.9030	400.1588	380.9675	327.2454	254.3600	157.5783	84.6462	55.8263 (83)
Total gains	425.2985	488.7116	562.0142	641.6361	691.7970	680.8527	649.0722	599.3852	537.5909	461.5877	412.4859	402.3261 (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	69.7189	69.9208	70.1199	71.0704	71.2511	72.1045	72.1045	72.2648	71.7734	71.2511	70.8865	70.5093
alpha	5.6479	5.6614	5.6747	5.7380	5.7501	5.8070	5.8070	5.8177	5.7849	5.7501	5.7258	5.7006
util living area	0.9992	0.9981	0.9934	0.9712	0.8939	0.7235	0.5472	0.6113	0.8750	0.9870	0.9983	0.9994 (86)
MIT	19.8753	20.0083	20.2457	20.5637	20.8258	20.9636	20.9939	20.9889	20.8886	20.5361	20.1493	19.8555 (87)
Th 2	20.0866	20.0890	20.0914	20.1024	20.1045	20.1142	20.1142	20.1160	20.1105	20.1045	20.1003	20.0959 (88)
util rest of house	0.9989	0.9974	0.9910	0.9601	0.8550	0.6416	0.4414	0.5020	0.8150	0.9804	0.9975	0.9992 (89)
MIT 2	19.0497	19.1845	19.4225	19.7431	19.9843	20.0971	20.1126	20.1127	20.0458	19.7218	19.3347	19.0375 (90)
Living area fraction									fLA = Living area / (4) =			0.2253 (91)
MIT	19.2358	19.3701	19.6080	19.9280	20.1739	20.2923	20.3111	20.3101	20.2357	19.9053	19.5182	19.2218 (92)
Temperature adjustment												0.0000
adjusted MIT	19.2358	19.3701	19.6080	19.9280	20.1739	20.2923	20.3111	20.3101	20.2357	19.9053	19.5182	19.2218 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9986	0.9967	0.9893	0.9574	0.8584	0.6591	0.4654	0.5268	0.8248	0.9784	0.9969	0.9990 (94)
Useful gains	424.7015	487.0763	555.9781	614.3211	593.8506	448.7533	302.1042	315.7823	443.3823	451.6133	411.2042	401.9153 (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	1265.7325	1222.7280	1104.4864	916.7975	702.6777	466.4363	304.0943	319.6873	505.0859	771.6208	1035.0484	1258.7572 (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	625.7271	494.3579	408.0902	217.7831	80.9674	0.0000	0.0000	0.0000	0.0000	238.0856	449.1678	637.4904 (98)
Space heating												3151.6694 (98)
Space heating per m2										(98) / (4) =		37.0436 (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	770.2479	606.3654	621.3723	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9079	0.9558	0.9366	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	699.3236	579.5898	581.9561	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	892.1849	853.0983	796.8942	0.0000	0.0000	0.0000	0.0000 (103)
Month fracti	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000 (103a)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	138.8601	203.4903	159.9139	0.0000	0.0000	0.0000	0.0000 (104)
Space cooling												502.2643 (104)
Cooled fraction									fC = cooled area / (4) =			1.0000 (105)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)



CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

Intermittency factor (Table 10b)	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	34.7150	50.8726	39.9785	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling											125.5661 (107)
Space cooling per m2											1.4759 (108)
Energy for space heating											37.0436 (99)
Energy for space cooling											1.4759 (108)
Total											38.5195 (109)
Target Fabric Energy Efficiency (TFEE)											44.3 (109)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF HEAT DEMAND 09 Jan 2014

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

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	42.5400 (1b)	x 2.3900 (2b)	= 101.6706 (1b) - (3b)
First floor	42.5400 (1c)	x 2.6100 (2c)	= 111.0294 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	85.0800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 212.7000 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					0 * 10 = 0.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c)					0.0000 / (5) = 0.0000 (8)
Pressure test					Yes
Measured/design AP50					3.9500
Infiltration rate					0.1975 (18)
Number of sides sheltered					2 (19)
Shelter factor			(20) = 1 - [0.075 x (19)]	=	0.8500 (20)
Infiltration rate adjusted to include shelter factor			(21) = (18) x (20)	=	0.1679 (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	0.1973	0.1847	0.1847	0.1679	0.1721	0.1637	0.1637	0.1595	0.1595	0.1721	0.1679	0.1721 (22b)
Mechanical extract ventilation - centralised												
If mechanical ventilation:												0.5000 (23a)
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K					
Front Door			2.1500	1.1000	2.3650		(26)					
Windows (Uw = 1.20)			11.3100	1.1450	12.9504		(27)					
Ground Floor			42.5400	0.1200	5.1048	84.0000	3573.3600 (28a)					
Brick and Block	48.6500	13.4600	35.1900	0.2400	8.4456	42.2200	1485.7218 (29a)					
Pitched Roof	42.5400		42.5400	0.1000	4.2540	9.1000	387.1140 (30)					
Total net area of external elements Aum(A, m2)			133.7300				(31)					
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		33.1198		(33)					
Party Wall 1			44.0500	0.0000	0.0000	110.0000	4845.5000 (32)					
Party Wall 2			44.0500	0.0000	0.0000	110.0000	4845.5000 (32)					
Ground Floor Stud			72.3100			9.0000	650.7900 (32c)					
First Floor Stud			108.0200			9.0000	972.1800 (32c)					
Internal Floor 1			42.5400			18.0000	765.7200 (32d)					
Internal Ceiling 1			42.5400			18.0000	765.7200 (32e)					
Heat capacity Cm = Sum(A x k)					(28) ... (30) + (32) + (32a) ... (32e) =		18291.6058 (34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							214.9930 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							9.1582 (36)					
Total fabric heat loss						(33) + (36) =	42.2780 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 35.0955	Feb 35.0955	Mar 35.0955	Apr 35.0955	May 35.0955	Jun 35.0955	Jul 35.0955	Aug 35.0955	Sep 35.0955	Oct 35.0955	Nov 35.0955	Dec 35.0955 (38)
Heat transfer coeff	77.3735	77.3735	77.3735	77.3735	77.3735	77.3735	77.3735	77.3735	77.3735	77.3735	77.3735	77.3735 (39)
Average = Sum(39)m / 12 =												77.3735 (39)
HLP	Jan 0.9094	Feb 0.9094	Mar 0.9094	Apr 0.9094	May 0.9094	Jun 0.9094	Jul 0.9094	Aug 0.9094	Sep 0.9094	Oct 0.9094	Nov 0.9094	Dec 0.9094 (40)
HLP (average)												0.9094 (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												2.5522 (42)
Average daily hot water use (litres/day)												94.8152 (43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF HEAT DEMAND 09 Jan 2014

Daily hot water use	104.2967	100.5041	96.7115	92.9189	89.1263	85.3337	85.3337	89.1263	92.9189	96.7115	100.5041	104.2967 (44)
Energy conte	154.6691	135.2746	139.5912	121.6990	116.7731	100.7663	93.3748	107.1489	108.4286	126.3631	137.9352	149.7887 (45)
Energy content (annual)										Total =	Sum (45)m =	1491.8127 (45)
Distribution loss (46)m = 0.15 x (45)m	23.2004	20.2912	20.9387	18.2549	17.5160	15.1149	14.0062	16.0723	16.2643	18.9545	20.6903	22.4683 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	0.6707	0.6071	0.6075	0.5089	0.4683	0.3869	0.3586	0.4297	0.4534	0.5499	0.6190	0.6495 (61)
Total heat required for water heating calculated for each month	155.3397	135.8816	140.1987	122.2079	117.2414	101.1532	93.7334	107.5787	108.8820	126.9131	138.5543	150.4382 (62)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63)
Output from w/h	155.3397	135.8816	140.1987	122.2079	117.2414	101.1532	93.7334	107.5787	108.8820	126.9131	138.5543	150.4382 (64)
RHI water heating demand												
Heat gains from water heating, kWh/month	51.5951	45.1306	46.5660	40.5921	38.9441	33.6015	31.1368	35.7345	36.1659	42.1532	46.0182	49.9671 (65)
												1498 (64)

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

Metabolic gains (Table 5), Watts												
(66)m	153.1332	153.1332	153.1332	153.1332	153.1332	153.1332	153.1332	153.1332	153.1332	153.1332	153.1332	153.1332 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	55.5572	49.3454	40.1304	30.3813	22.7104	19.1731	20.7172	26.9290	36.1440	45.8931	53.5640	57.1013 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	342.8803	346.4383	337.4722	318.3844	294.2896	271.6437	256.5150	252.9569	261.9230	281.0108	305.1057	327.7515 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	52.8655	52.8655	52.8655	52.8655	52.8655	52.8655	52.8655	52.8655	52.8655	52.8655	52.8655	52.8655 (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)	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888 (71)
Water heating gains (Table 5)	69.3483	67.1586	62.5887	56.3780	52.3443	46.6688	41.8505	48.0302	50.2304	56.6576	63.9142	67.1601 (72)
Total internal gains	574.6958	569.8523	547.1012	512.0537	476.2541	444.3955	425.9925	434.8260	455.2073	490.4714	529.4939	558.9229 (73)

6. Solar gains

[Jan]												
	Area	Solar flux	g	Specific data	FF	Access	Gains					
	m2	Table 6a	W/m2	or Table 6b	Specific data	factor	W					
					or Table 6c	Table 6d						
East	4.3100	25.1733	0.6300	0.7000	0.7700	33.1580 (76)						
West	7.0000	25.1733	0.6300	0.7000	0.7700	53.8529 (80)						
Solar gains	87.0109	144.7926	241.9891	352.4466	404.8311	457.8381	419.0655	376.7535	294.0280	185.2275	108.1372	67.7282 (83)
Total gains	661.7067	714.6449	789.0903	864.5002	881.0853	902.2336	845.0581	811.5795	749.2353	675.6990	637.6311	626.6511 (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	65.6685	65.6685	65.6685	65.6685	65.6685	65.6685	65.6685	65.6685	65.6685	65.6685	65.6685	65.6685
alpha	5.3779	5.3779	5.3779	5.3779	5.3779	5.3779	5.3779	5.3779	5.3779	5.3779	5.3779	5.3779
util living area	0.9807	0.9703	0.9333	0.8326	0.6608	0.4345	0.3018	0.3047	0.5651	0.8511	0.9598	0.9843 (86)
MIT	20.2916	20.3901	20.6078	20.8386	20.9621	20.9966	20.9996	20.9871	20.8518	20.5464	20.2598	20.2598 (87)
Th 2	20.1595	20.1595	20.1595	20.1595	20.1595	20.1595	20.1595	20.1595	20.1595	20.1595	20.1595	20.1595 (88)
util rest of house	0.9756	0.9626	0.9165	0.7958	0.6010	0.3643	0.2251	0.2249	0.4860	0.8075	0.9474	0.9800 (89)
MIT 2	19.5316	19.6273	19.8350	20.0415	20.1378	20.1583	20.1594	20.1594	20.1541	20.0577	19.7805	19.5006 (90)
Living area fraction									fLA = Living area / (4) =			0.2253 (91)
MIT	19.7028	19.7992	20.0091	20.2211	20.3235	20.3472	20.3487	20.3487	20.3418	20.2366	19.9530	19.6717 (92)
Temperature adjustment												0.0000
adjusted MIT	19.7028	19.7992	20.0091	20.2211	20.3235	20.3472	20.3487	20.3487	20.3418	20.2366	19.9530	19.6717 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9721	0.9586	0.9131	0.7987	0.6131	0.3801	0.2424	0.2429	0.5035	0.8119	0.9438	0.9769 (94)
Useful gains	643.2688	685.0827	720.5330	690.4936	540.2077	342.8972	204.8664	197.1313	377.2653	548.6163	601.7771	612.1746 (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	1091.1828	1067.6883	960.1385	783.1064	558.9070	344.0929	204.9427	197.2054	382.3614	629.5587	878.4245	1081.0373 (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	333.2480	257.1110	178.2665	66.6812	13.9123	0.0000	0.0000	0.0000	0.0000	60.2212	199.1861	348.8338 (98)
Space heating												1457.4601 (98)
RHI space heating demand												1457 (98)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF HEAT DEMAND 09 Jan 2014

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF ENERGY RATINGS 09 Jan 2014

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

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	42.5400 (1b)	x 2.3900 (2b)	= 101.6706 (1b) - (3b)
First floor	42.5400 (1c)	x 2.6100 (2c)	= 111.0294 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	85.0800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 212.7000 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					0 * 10 = 0.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c)					0.0000 / (5) = 0.0000 (8)
Pressure test					Yes
Measured/design AP50					3.9500
Infiltration rate					0.1975 (18)
Number of sides sheltered					2 (19)
Shelter factor			(20) = 1 - [0.075 x (19)]	=	0.8500 (20)
Infiltration rate adjusted to include shelter factor			(21) = (18) x (20)	=	0.1679 (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	0.2140	0.2098	0.2056	0.1847	0.1805	0.1595	0.1595	0.1553	0.1679	0.1805	0.1889	0.1973 (22b)
Mechanical extract ventilation - centralised												
If mechanical ventilation:												0.5000 (23a)
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K					
Front Door			2.1500	1.1000	2.3650		(26)					
Windows (Uw = 1.20)			11.3100	1.1450	12.9504		(27)					
Ground Floor			42.5400	0.1200	5.1048	84.0000	3573.3600 (28a)					
Brick and Block	48.6500	13.4600	35.1900	0.2400	8.4456	42.2200	1485.7218 (29a)					
Pitched Roof	42.5400		42.5400	0.1000	4.2540	9.1000	387.1140 (30)					
Total net area of external elements Aum(A, m2)			133.7300				(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	33.1198		(33)					
Party Wall 1			44.0500	0.0000	0.0000	110.0000	4845.5000 (32)					
Party Wall 2			44.0500	0.0000	0.0000	110.0000	4845.5000 (32)					
Ground Floor Stud			72.3100			9.0000	650.7900 (32c)					
First Floor Stud			108.0200			9.0000	972.1800 (32c)					
Internal Floor 1			42.5400			18.0000	765.7200 (32d)					
Internal Ceiling 1			42.5400			18.0000	765.7200 (32e)					
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		18291.6058 (34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							214.9930 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							9.1582 (36)					
Total fabric heat loss						(33) + (36) =	42.2780 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 35.0955	Feb 35.0955	Mar 35.0955	Apr 35.0955	May 35.0955	Jun 35.0955	Jul 35.0955	Aug 35.0955	Sep 35.0955	Oct 35.0955	Nov 35.0955	Dec 35.0955 (38)
Heat transfer coeff	77.3735	77.3735	77.3735	77.3735	77.3735	77.3735	77.3735	77.3735	77.3735	77.3735	77.3735	77.3735 (39)
Average = Sum(39)m / 12 =												77.3735 (39)
HLP	Jan 0.9094	Feb 0.9094	Mar 0.9094	Apr 0.9094	May 0.9094	Jun 0.9094	Jul 0.9094	Aug 0.9094	Sep 0.9094	Oct 0.9094	Nov 0.9094	Dec 0.9094 (40)
HLP (average)												0.9094 (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												2.5522 (42)
Average daily hot water use (litres/day)												94.8152 (43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF ENERGY RATINGS 09 Jan 2014

Daily hot water use	104.2967	100.5041	96.7115	92.9189	89.1263	85.3337	85.3337	89.1263	92.9189	96.7115	100.5041	104.2967 (44)
Energy conte	154.6691	135.2746	139.5912	121.6990	116.7731	100.7663	93.3748	107.1489	108.4286	126.3631	137.9352	149.7887 (45)
Energy content (annual)										Total = Sum (45)m =		1491.8127 (45)
Distribution loss (46)m = 0.15 x (45)m	23.2004	20.2912	20.9387	18.2549	17.5160	15.1149	14.0062	16.0723	16.2643	18.9545	20.6903	22.4683 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	0.6707	0.6071	0.6075	0.5089	0.4683	0.3869	0.3586	0.4297	0.4534	0.5499	0.6190	0.6495 (61)
Total heat required for water heating calculated for each month												
Solar input	155.3397	135.8816	140.1987	122.2079	117.2414	101.1532	93.7334	107.5787	108.8820	126.9131	138.5543	150.4382 (62)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63)
Output from w/h	155.3397	135.8816	140.1987	122.2079	117.2414	101.1532	93.7334	107.5787	108.8820	126.9131	138.5543	150.4382 (64)
Heat gains from water heating, kWh/month	51.5951	45.1306	46.5660	40.5921	38.9441	33.6015	31.1368	35.7345	36.1659	42.1532	46.0182	49.9671 (65)
										Total per year (kWh/year) = Sum (64)m =		1498.1223 (64)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	153.1332	153.1332	153.1332	153.1332	153.1332	153.1332	153.1332	153.1332	153.1332	153.1332	153.1332	153.1332 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	55.5572	49.3454	40.1304	30.3813	22.7104	19.1731	20.7172	26.9290	36.1440	45.8931	53.5640	57.1013 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	342.8803	346.4383	337.4722	318.3844	294.2896	271.6437	256.5150	252.9569	261.9230	281.0108	305.1057	327.7515 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	52.8655	52.8655	52.8655	52.8655	52.8655	52.8655	52.8655	52.8655	52.8655	52.8655	52.8655	52.8655 (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)	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888 (71)
Water heating gains (Table 5)	69.3483	67.1586	62.5887	56.3780	52.3443	46.6688	41.8505	48.0302	50.2304	56.6576	63.9142	67.1601 (72)
Total internal gains	574.6958	569.8523	547.1012	512.0537	476.2541	444.3955	425.9925	434.8260	455.2073	490.4714	529.4939	558.9229 (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
East				4.3100	19.6403	0.6300	0.7000			0.7700			25.8700 (76)
West				7.0000	19.6403	0.6300	0.7000			0.7700			42.0162 (80)

Solar gains	67.8862	132.7999	218.7025	318.9645	390.9030	400.1588	380.9675	327.2454	254.3600	157.5783	84.6462	55.8263	(83)
Total gains	642.5820	702.6522	765.8037	831.0182	867.1572	844.5543	806.9600	762.0715	709.5674	648.0497	614.1400	614.7493	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	65.6685	65.6685	65.6685	65.6685	65.6685	65.6685	65.6685	65.6685	65.6685	65.6685	65.6685	65.6685
alpha	5.3779	5.3779	5.3779	5.3779	5.3779	5.3779	5.3779	5.3779	5.3779	5.3779	5.3779	5.3779
util living area	0.9881	0.9794	0.9554	0.8888	0.7554	0.5721	0.4195	0.4629	0.7042	0.9188	0.9783	0.9905 (86)
MIT	20.1420	20.2721	20.4905	20.7420	20.9157	20.9843	20.9975	20.9958	20.9554	20.7268	20.3803	20.0979 (87)
Th 2	20.1595	20.1595	20.1595	20.1595	20.1595	20.1595	20.1595	20.1595	20.1595	20.1595	20.1595	20.1595 (88)
util rest of house	0.9851	0.9742	0.9441	0.8624	0.7059	0.5026	0.3406	0.3804	0.6348	0.8932	0.9719	0.9881 (89)
MIT 2	19.3838	19.5117	19.7236	19.9578	20.1041	20.1521	20.1588	20.1582	20.1354	19.9496	19.6195	19.3403 (90)
Living area fraction	19.5547	19.6831	19.8964	20.1345	20.2870	20.3396	20.3478	20.3469	fLA = Living area / (4) =	20.1247	19.7909	0.2253 (91)
MIT	19.5547	19.6831	19.8964	20.1345	20.2870	20.3396	20.3478	20.3469	20.3202	20.1247	19.7909	19.5110 (92)
Temperature adjustment												0.0000
adjusted MIT	19.5547	19.6831	19.8964	20.1345	20.2870	20.3396	20.3478	20.3469	20.3202	20.1247	19.7909	19.5110 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	631.2200	682.0081	719.8700	715.9504	619.0104	437.3412	289.2194	304.0440	460.3194	578.0666	594.7305	605.9301 (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	1180.3053	1143.8166	1036.5257	869.2507	664.4060	444.0928	289.9766	305.3865	481.2760	736.9588	981.9413	1184.6670 (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	408.5194	310.3354	235.5919	110.3762	33.7743	0.0000	0.0000	0.0000	0.0000	118.2158	278.7918	430.5803 (98)
Space heating												1926.1850 (98)
Space heating per m2										(98) / (4) =		22.6397 (99)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF ENERGY RATINGS 09 Jan 2014

8c. Space cooling requirement

Not applicable

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)											
Fraction of space heat from main system(s)	1.0000 (202)											
Efficiency of main space heating system 1 (in %)	90.2000 (206)											
Efficiency of secondary/supplementary heating system, %	0.0000 (208)											
Space heating requirement	2135.4601 (211)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	408.5194	310.3354	235.5919	110.3762	33.7743	0.0000	0.0000	0.0000	0.0000	118.2158	278.7918	430.5803 (98)
Space heating efficiency (main heating system 1)	90.2000	90.2000	90.2000	90.2000	90.2000	0.0000	0.0000	0.0000	0.0000	90.2000	90.2000	90.2000 (210)
Space heating fuel (main heating system)	452.9040	344.0525	261.1883	122.3683	37.4438	0.0000	0.0000	0.0000	0.0000	131.0596	309.0818	477.3617 (211)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating requirement	155.3397	135.8816	140.1987	122.2079	117.2414	101.1532	93.7334	107.5787	108.8820	126.9131	138.5543	150.4382 (64)
Efficiency of water heater (217)m	85.9242	85.4972	84.5053	82.3813	79.1068	76.4000	76.4000	76.4000	76.4000	82.4860	85.0970	76.4000 (216)
Fuel for water heating, kWh/month	180.7869	158.9310	165.9052	148.3442	148.2066	132.3995	122.6876	140.8098	142.5157	153.8601	162.8192	174.5832 (219)
Water heating fuel used												1831.8489 (219)
Annual totals kWh/year												
Space heating fuel - main system												2135.4601 (211)
Space heating fuel - secondary												0.0000 (215)
Electricity for pumps and fans:												
(MEV)Centralised, Database: in-use factor = 1.4000, SFP = 0.2380)												
mechanical ventilation fans (SFP = 0.2380)												61.7596 (230a)
central heating pump												30.0000 (230c)
main heating flue fan												45.0000 (230e)
Total electricity for the above, kWh/year												136.7596 (231)
Electricity for lighting (calculated in Appendix L)												392.4632 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV Unit 0 (0.80 + 0.80 + 908 + 1.00) =												-581.0267 (233)
Total delivered energy for all uses												3915.5051 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2135.4601	3.4800	74.3140 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1831.8489	3.4800	63.7483 (247)
Mechanical ventilation fans	61.7596	13.1900	8.1461 (249)
Pumps and fans for heating	75.0000	13.1900	9.8925 (249)
Energy for lighting	392.4632	13.1900	51.7659 (250)
Additional standing charges			120.0000 (251)
Energy saving/generation technologies			
PV Unit	-581.0267	13.1900	-76.6374 (252)
Total energy cost			251.2294 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):			0.4200 (256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =		0.8112 (257)
SAP value			88.6842
SAP rating (Section 12)			89 (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	2135.4601	0.2160	461.2594 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1831.8489	0.2160	395.6794 (264)
Space and water heating			856.9387 (265)
Pumps and fans	136.7596	0.5190	70.9782 (267)
Energy for lighting	392.4632	0.5190	203.6884 (268)
Energy saving/generation technologies			
PV Unit	-581.0267	0.5190	-301.5529 (269)
Total kg/year			830.0525 (272)
CO2 emissions per m2			9.7600 (273)
EI value			91.4493
EI rating			91 (274)
EI band			B

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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	$3.48 \times (1 + 0.29 \times 0.00) / 0.9020 = 3.858$, stars = 4
Main heating environmental impact	$0.216 \times (1 + 0.29 \times 0.00) / 0.9020 = 0.2395$, stars = 4
Water heating energy efficiency	$3.48 / 0.8140 = 4.275$, stars = 4
Water heating environmental impact	$0.216 / 0.8140 = 0.2654$, stars = 4

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

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

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

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	42.5400 (1b)	x 2.3900 (2b)	= 101.6706 (1b) - (3b)
First floor	42.5400 (1c)	x 2.6100 (2c)	= 111.0294 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	85.0800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 212.7000 (5)

2. Ventilation rate

					main heating	+	secondary heating	+	other	=	total	m3 per hour	
Number of chimneys					0	+	0	+	0	=	0 * 40 =	0.0000 (6a)	
Number of open flues					0	+	0	+	0	=	0 * 20 =	0.0000 (6b)	
Number of intermittent fans											0 * 10 =	0.0000 (7a)	
Number of passive vents											0 * 10 =	0.0000 (7b)	
Number of flueless gas fires											0 * 40 =	0.0000 (7c)	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =												0.0000 / (5) =	0.0000 (8)
Pressure test											Yes		
Measured/design AP50											3.9500		
Infiltration rate											0.1975	(18)	
Number of sides sheltered											2	(19)	
Shelter factor									(20) = 1 - [0.075 x (19)] =		0.8500	(20)	
Infiltration rate adjusted to include shelter factor									(21) = (18) x (20) =		0.1679	(21)	
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind factor	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)	
Adj infilt rate	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)	
Mechanical extract ventilation - centralised	0.1973	0.1847	0.1847	0.1679	0.1721	0.1637	0.1637	0.1595	0.1595	0.1721	0.1679	0.1721 (22b)	
If mechanical ventilation:												0.5000 (23a)	
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (25)	

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K					
Front Door			2.1500	1.1000	2.3650		(26)					
Windows (Uw = 1.20)			11.3100	1.1450	12.9504		(27)					
Ground Floor			42.5400	0.1200	5.1048	84.0000	3573.3600 (28a)					
Brick and Block	48.6500	13.4600	35.1900	0.2400	8.4456	42.2200	1485.7218 (29a)					
Pitched Roof	42.5400		42.5400	0.1000	4.2540	9.1000	387.1140 (30)					
Total net area of external elements Aum(A, m2)			133.7300				(31)					
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		33.1198		(33)					
Party Wall 1			44.0500	0.0000	0.0000	110.0000	4845.5000 (32)					
Party Wall 2			44.0500	0.0000	0.0000	110.0000	4845.5000 (32)					
Ground Floor Stud			72.3100			9.0000	650.7900 (32c)					
First Floor Stud			108.0200			9.0000	972.1800 (32c)					
Internal Floor 1			42.5400			18.0000	765.7200 (32d)					
Internal Ceiling 1			42.5400			18.0000	765.7200 (32e)					
Heat capacity Cm = Sum(A x k)					(28) ... (30) + (32) + (32a) ... (32e) =		18291.6058 (34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							214.9930 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							9.1582 (36)					
Total fabric heat loss						(33) + (36) =	42.2780 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 35.0955	Feb 35.0955	Mar 35.0955	Apr 35.0955	May 35.0955	Jun 35.0955	Jul 35.0955	Aug 35.0955	Sep 35.0955	Oct 35.0955	Nov 35.0955	Dec 35.0955 (38)
Heat transfer coeff	77.3735	77.3735	77.3735	77.3735	77.3735	77.3735	77.3735	77.3735	77.3735	77.3735	77.3735	77.3735 (39)
Average = Sum(39)m / 12 =												77.3735 (39)
HLP	Jan 0.9094	Feb 0.9094	Mar 0.9094	Apr 0.9094	May 0.9094	Jun 0.9094	Jul 0.9094	Aug 0.9094	Sep 0.9094	Oct 0.9094	Nov 0.9094	Dec 0.9094 (40)
HLP (average)												0.9094 (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												2.5522 (42)
Average daily hot water use (litres/day)												94.8152 (43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

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

Daily hot water use	104.2967	100.5041	96.7115	92.9189	89.1263	85.3337	85.3337	89.1263	92.9189	96.7115	100.5041	104.2967 (44)
Energy conte	154.6691	135.2746	139.5912	121.6990	116.7731	100.7663	93.3748	107.1489	108.4286	126.3631	137.9352	149.7887 (45)
Energy content (annual)										Total = Sum (45)m =		1491.8127 (45)
Distribution loss (46)m = 0.15 x (45)m	23.2004	20.2912	20.9387	18.2549	17.5160	15.1149	14.0062	16.0723	16.2643	18.9545	20.6903	22.4683 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	0.6707	0.6071	0.6075	0.5089	0.4683	0.3869	0.3586	0.4297	0.4534	0.5499	0.6190	0.6495 (61)
Total heat required for water heating calculated for each month												
Solar input	155.3397	135.8816	140.1987	122.2079	117.2414	101.1532	93.7334	107.5787	108.8820	126.9131	138.5543	150.4382 (62)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63)
Output from w/h	155.3397	135.8816	140.1987	122.2079	117.2414	101.1532	93.7334	107.5787	108.8820	126.9131	138.5543	150.4382 (64)
Heat gains from water heating, kWh/month	51.5951	45.1306	46.5660	40.5921	38.9441	33.6015	31.1368	35.7345	36.1659	42.1532	46.0182	49.9671 (65)
										Total per year (kWh/year) = Sum (64)m =		1498.1223 (64)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	153.1332	153.1332	153.1332	153.1332	153.1332	153.1332	153.1332	153.1332	153.1332	153.1332	153.1332	153.1332 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	55.5572	49.3454	40.1304	30.3813	22.7104	19.1731	20.7172	26.9290	36.1440	45.8931	53.5640	57.1013 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	342.8803	346.4383	337.4722	318.3844	294.2896	271.6437	256.5150	252.9569	261.9230	281.0108	305.1057	327.7515 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	52.8655	52.8655	52.8655	52.8655	52.8655	52.8655	52.8655	52.8655	52.8655	52.8655	52.8655	52.8655 (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)	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888 (71)
Water heating gains (Table 5)	69.3483	67.1586	62.5887	56.3780	52.3443	46.6688	41.8505	48.0302	50.2304	56.6576	63.9142	67.1601 (72)
Total internal gains	574.6958	569.8523	547.1012	512.0537	476.2541	444.3955	425.9925	434.8260	455.2073	490.4714	529.4939	558.9229 (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	
East				4.3100	25.1733	0.6300	0.7000			0.7700	33.1580 (76)	
West				7.0000	25.1733	0.6300	0.7000			0.7700	53.8529 (80)	
Solar gains	87.0109	144.7926	241.9891	352.4466	404.8311	457.8381	419.0655	376.7535	294.0280	185.2275	108.1372	67.7282 (83)
Total gains	661.7067	714.6449	789.0903	864.5002	881.0853	902.2336	845.0581	811.5795	749.2353	675.6990	637.6311	626.6511 (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	65.6685	65.6685	65.6685	65.6685	65.6685	65.6685	65.6685	65.6685	65.6685	65.6685	65.6685	65.6685
alpha	5.3779	5.3779	5.3779	5.3779	5.3779	5.3779	5.3779	5.3779	5.3779	5.3779	5.3779	5.3779
util living area	0.9807	0.9703	0.9333	0.8326	0.6608	0.4345	0.3018	0.3047	0.5651	0.8511	0.9598	0.9843 (86)
MIT	20.2916	20.3901	20.6078	20.8386	20.9621	20.9966	20.9996	20.9996	20.9871	20.8518	20.5464	20.2598 (87)
Th 2	20.1595	20.1595	20.1595	20.1595	20.1595	20.1595	20.1595	20.1595	20.1595	20.1595	20.1595	20.1595 (88)
util rest of house	0.9756	0.9626	0.9165	0.7958	0.6010	0.3643	0.2251	0.2249	0.4860	0.8075	0.9474	0.9800 (89)
MIT 2	19.5316	19.6273	19.8350	20.0415	20.1378	20.1583	20.1594	20.1594	20.1541	20.0577	19.7805	19.5006 (90)
Living area fraction	19.7028	19.7992	20.0091	20.2211	20.3235	20.3472	20.3487	20.3487	20.3418	20.2366	19.9530	19.6717 (92)
MIT	19.7028	19.7992	20.0091	20.2211	20.3235	20.3472	20.3487	20.3487	20.3418	20.2366	19.9530	19.6717 (92)
Temperature adjustment												0.0000
adjusted MIT	19.7028	19.7992	20.0091	20.2211	20.3235	20.3472	20.3487	20.3487	20.3418	20.2366	19.9530	19.6717 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9721	0.9586	0.9131	0.7987	0.6131	0.3801	0.2424	0.2429	0.5035	0.8119	0.9438	0.9769 (94)
Ext temp.	643.2688	685.0827	720.5330	690.4936	540.2077	342.8972	204.8664	197.1313	377.2653	548.6163	601.7771	612.1746 (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	1091.1828	1067.6883	960.1385	783.1064	558.9070	344.0929	204.9427	197.2054	382.3614	629.5587	878.4245	1081.0373 (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	333.2480	257.1110	178.2665	66.6812	13.9123	0.0000	0.0000	0.0000	0.0000	60.2212	199.1861	348.8338 (98)
Space heating per m2												1457.4601 (98)
										(98) / (4) =		17.1305 (99)

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

8c. Space cooling requirement

Not applicable

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													90.2000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													1615.8094 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	333.2480	257.1110	178.2665	66.6812	13.9123	0.0000	0.0000	0.0000	0.0000	60.2212	199.1861	348.8338	(98)
Space heating efficiency (main heating system 1)	90.2000	90.2000	90.2000	90.2000	90.2000	0.0000	0.0000	0.0000	0.0000	90.2000	90.2000	90.2000	(210)
Space heating fuel (main heating system)	369.4545	285.0454	197.6347	73.9260	15.4238	0.0000	0.0000	0.0000	0.0000	66.7641	220.8272	386.7337	(211)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating requirement	155.3397	135.8816	140.1987	122.2079	117.2414	101.1532	93.7334	107.5787	108.8820	126.9131	138.5543	150.4382	(64)
Efficiency of water heater	85.3013	84.8978	83.5558	80.7619	77.6603	76.4000	76.4000	76.4000	76.4000	80.3563	83.9772	85.5442	(216)
(217)m	85.3013	84.8978	83.5558	80.7619	77.6603	76.4000	76.4000	76.4000	76.4000	80.3563	83.9772	85.5442	(217)
Fuel for water heating, kWh/month	182.1071	160.0532	167.7906	151.3187	150.9669	132.3995	122.6876	140.8098	142.5157	157.9379	164.9903	175.8603	(219)
Water heating fuel used	182.1071	160.0532	167.7906	151.3187	150.9669	132.3995	122.6876	140.8098	142.5157	157.9379	164.9903	1849.4378	(219)
Annual totals kWh/year													
Space heating fuel - main system												1615.8094	(211)
Space heating fuel - secondary												0.0000	(215)
Electricity for pumps and fans:													
(MEV)Centralised, Database: in-use factor = 1.4000, SFP = 0.2380)													
mechanical ventilation fans (SFP = 0.2380)												61.7596	(230a)
central heating pump												30.0000	(230c)
main heating flue fan												45.0000	(230e)
Total electricity for the above, kWh/year												136.7596	(231)
Electricity for lighting (calculated in Appendix L)												392.4632	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV Unit 0 (0.80 * 0.80 * 1030 * 1.00) =										-659.2380		-659.2380	(233)
Total delivered energy for all uses												3335.2320	(238)

10a. Fuel costs - using BEDF prices (542)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1615.8094	7.6100	122.9631 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1849.4378	7.6100	140.7422 (247)
Mechanical ventilation fans	61.7596	31.0800	19.1949 (249)
Pumps and fans for heating	75.0000	31.0800	23.3100 (249)
Energy for lighting	392.4632	31.0800	121.9776 (250)
Additional standing charges			105.0000 (251)
Energy saving/generation technologies			
PV Unit	-659.2380	31.0800	-204.8912 (252)
Total energy cost			328.2966 (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	1615.8094	0.2160	349.0148 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1849.4378	0.2160	399.4786 (264)
Space and water heating			748.4934 (265)
Pumps and fans	136.7596	0.5190	70.9782 (267)
Energy for lighting	392.4632	0.5190	203.6884 (268)
Energy saving/generation technologies			
PV Unit	-659.2380	0.5190	-342.1445 (269)
Total kg/year			681.0155 (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	1615.8094	1.2200	1971.2875 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1849.4378	1.2200	2256.3141 (264)
Space and water heating			4227.6016 (265)
Pumps and fans	136.7596	3.0700	419.8519 (267)
Energy for lighting	392.4632	3.0700	1204.8620 (268)

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Energy saving/generation technologies			
PV Unit	-659.2380	3.0700	-2023.8607 (269)
Primary energy kWh/year			3828.4548 (272)
Primary energy kWh/m2/year			44.9983 (273)

SAP 2012 EPC IMPROVEMENTS

Current energy efficiency rating:	B 89
Current environmental impact rating:	B 91

(For testing purposes):

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

Recommended measures:	SAP change	Cost change	CO2 change
N Solar water heating	+ 1.3	-£ 67	-207 kg (30.4%)

Recommended measures	Typical annual savings		Energy efficiency	Environmental impact
Solar water heating	£67	2.43 kg/m²	B 90	A 93
Total Savings	£67	2.43 kg/m²		

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

Fuel prices for cost data on this page from database revision number 542 TEST (30 Apr 2024)
Recommendation texts revision number 4.9c (22 Feb 2014)

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

	Current	Potential	Saving
Electricity	£164	£180	-£16
Mains gas	£369	£287	£82
Space heating	£270	£270	£0
Water heating	£141	£74	£67
Lighting	£122	£122	£0
Generated (PV)	-£205	-£205	£0
Total cost of fuels	£328	£262	£66
Total cost of uses	£328	£261	£67
Delivered energy	39 kWh/m²	27 kWh/m²	12 kWh/m²
Carbon dioxide emissions	0.7 tonnes	0.5 tonnes	0.2 tonnes
CO2 emissions per m²	8 kg/m²	6 kg/m²	2 kg/m²
Primary energy	45 kWh/m²	31 kWh/m²	14 kWh/m²

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF ENERGY RATINGS FOR IMPROVED DWELLING 09 Jan 2014

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

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	42.5400 (1b)	x 2.3900 (2b)	= 101.6706 (1b) - (3b)
First floor	42.5400 (1c)	x 2.6100 (2c)	= 111.0294 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	85.0800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 212.7000 (5)

2. Ventilation rate

										main	secondary	other	total	m3 per hour			
										heating	heating						
Number of chimneys										0	+	0	+	0	=	0 * 40 =	0.0000 (6a)
Number of open flues										0	+	0	+	0	=	0 * 20 =	0.0000 (6b)
Number of intermittent fans																0 * 10 =	0.0000 (7a)
Number of passive vents																0 * 10 =	0.0000 (7b)
Number of flueless gas fires																0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans										= (6a)+(6b)+(7a)+(7b)+(7c) =				0.0000 / (5) =		0.0000 (8)	
Pressure test														Yes			
Measured/design AP50														3.9500			
Infiltration rate														0.1975 (18)			
Number of sides sheltered														2 (19)			
Shelter factor										(20) = 1 - [0.075 x (19)] =				0.8500 (20)			
Infiltration rate adjusted to include shelter factor										(21) = (18) x (20) =				0.1679 (21)			
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec					
	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																	
	0.2140	0.2098	0.2056	0.1847	0.1805	0.1595	0.1595	0.1553	0.1679	0.1805	0.1889	0.1973 (22b)					
Mechanical extract ventilation - centralised																	
If mechanical ventilation:																0.5000 (23a)	
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (25)					

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K					
Front Door			2.1500	1.1000	2.3650		(26)					
Windows (Uw = 1.20)			11.3100	1.1450	12.9504		(27)					
Ground Floor			42.5400	0.1200	5.1048	84.0000	3573.3600 (28a)					
Brick and Block	48.6500	13.4600	35.1900	0.2400	8.4456	42.2200	1485.7218 (29a)					
Pitched Roof	42.5400		42.5400	0.1000	4.2540	9.1000	387.1140 (30)					
Total net area of external elements Aum(A, m2)			133.7300				(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	33.1198		(33)					
Party Wall 1			44.0500	0.0000	0.0000	110.0000	4845.5000 (32)					
Party Wall 2			44.0500	0.0000	0.0000	110.0000	4845.5000 (32)					
Ground Floor Stud			72.3100			9.0000	650.7900 (32c)					
First Floor Stud			108.0200			9.0000	972.1800 (32c)					
Internal Floor 1			42.5400			18.0000	765.7200 (32d)					
Internal Ceiling 1			42.5400			18.0000	765.7200 (32e)					
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		18291.6058 (34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							214.9930 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							9.1582 (36)					
Total fabric heat loss						(33) + (36) =	42.2780 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 35.0955	Feb 35.0955	Mar 35.0955	Apr 35.0955	May 35.0955	Jun 35.0955	Jul 35.0955	Aug 35.0955	Sep 35.0955	Oct 35.0955	Nov 35.0955	Dec 35.0955 (38)
Heat transfer coeff	77.3735	77.3735	77.3735	77.3735	77.3735	77.3735	77.3735	77.3735	77.3735	77.3735	77.3735	77.3735 (39)
Average = Sum(39)m / 12 =												77.3735 (39)
HLP	Jan 0.9094	Feb 0.9094	Mar 0.9094	Apr 0.9094	May 0.9094	Jun 0.9094	Jul 0.9094	Aug 0.9094	Sep 0.9094	Oct 0.9094	Nov 0.9094	Dec 0.9094 (40)
HLP (average)												0.9094 (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												2.5522 (42)
Average daily hot water use (litres/day)												94.8152 (43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	

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Calculation Type: New Build (As Built)

CALCULATION OF ENERGY RATINGS FOR IMPROVED DWELLING 09 Jan 2014

Daily hot water use	104.2967	100.5041	96.7115	92.9189	89.1263	85.3337	85.3337	89.1263	92.9189	96.7115	100.5041	104.2967 (44)
Energy conte	154.6691	135.2746	139.5912	121.6990	116.7731	100.7663	93.3748	107.1489	108.4286	126.3631	137.9352	149.7887 (45)
Energy content (annual)												1491.8127 (45)
Distribution loss (46)m = 0.15 x (45)m												
	23.2004	20.2912	20.9387	18.2549	17.5160	15.1149	14.0062	16.0723	16.2643	18.9545	20.6903	22.4683 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	0.6707	0.6071	0.6075	0.5089	0.4683	0.3869	0.3586	0.4297	0.4534	0.5499	0.6190	0.6495 (61)
Total heat required for water heating calculated for each month	155.3397	135.8816	140.1987	122.2079	117.2414	101.1532	93.7334	107.5787	108.8820	126.9131	138.5543	150.4382 (62)
Aperture area of solar collector												3.0000 (H1)
Zero-loss collector efficiency												0.7000 (H2)
Collector heat loss coefficient												1.8000 (H3)
Collector 2nd order heat loss coefficient												0.0050 (H3a)
Collector effective heat loss coefficient												1.8063 (H3b)
Collector performance ratio												2.5804 (H4)
Annual solar radiation per m2												1079.5246 (H5)
Overshading factor												0.8000 (H6)
Solar energy available												1813.6014 (H7)
Adjustment factor for showers												1.0000 (H7a)
Solar-to-load ratio												1.2157 (H8)
Utilisation factor												0.5607 (H9)
Collector performance factor												0.8793 (H10)
Dedicated solar storage volume												75.0000 (H11)
Effective solar volume												75.0000 (H13)
Daily hot water demand												94.8152 (H14)
Volume ratio Veff/V												0.7910 (H15)
Solar storage volume factor												0.9531 (H16)
Solar input												-852.2143 (H17)
Solar input	-24.7125	-41.2381	-70.2332	-94.1263	-116.2851	-114.3268	-112.8159	-98.5678	-77.1984	-52.7174	-29.3126	-20.6802 (63)
Solar input (sum of months) = Sum (63)m =												-852.2143 (63)
Output from w/h	130.6272	94.6436	69.9655	28.0816	0.9563	0.0000	0.0000	9.0108	31.6836	74.1957	109.2417	129.7581 (64)
Total per year (kWh/year) = Sum (64)m =												678.1641 (64)
Heat gains from water heating, kWh/month	51.5951	45.1306	46.5660	40.5921	38.9441	33.6015	31.1368	35.7345	36.1659	42.1532	46.0182	49.9671 (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	153.1332	153.1332	153.1332	153.1332	153.1332	153.1332	153.1332	153.1332	153.1332	153.1332	153.1332	153.1332	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	55.5572	49.3454	40.1304	30.3813	22.7104	19.1731	20.7172	26.9290	36.1440	45.8931	53.5640	57.1013	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	342.8803	346.4383	337.4722	318.3844	294.2896	271.6437	256.5150	252.9569	261.9230	281.0108	305.1057	327.7515	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	52.8655	52.8655	52.8655	52.8655	52.8655	52.8655	52.8655	52.8655	52.8655	52.8655	52.8655	52.8655	(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)	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	(71)
Water heating gains (Table 5)	69.3483	67.1586	62.5887	56.3780	52.3443	46.6688	41.8505	48.0302	50.2304	56.6576	63.9142	67.1601	(72)
Total internal gains	574.6958	569.8523	547.1012	512.0537	476.2541	444.3955	425.9925	434.8260	455.2073	490.4714	529.4939	558.9229	(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	
East					4.3100	19.6403	0.6300	0.7000	0.7700		25.8700 (76)	
West					7.0000	19.6403	0.6300	0.7000	0.7700		42.0162 (80)	

Solar gains	67.8862	132.7999	218.7025	318.9645	390.9030	400.1588	380.9675	327.2454	254.3600	157.5783	84.6462	55.8263 (83)
Total gains	642.5820	702.6522	765.8037	831.0182	867.1572	844.5543	806.9600	762.0715	709.5674	648.0497	614.1400	614.7493 (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	65.6685	65.6685	65.6685	65.6685	65.6685	65.6685	65.6685	65.6685	65.6685	65.6685	65.6685	65.6685	
alpha	5.3779	5.3779	5.3779	5.3779	5.3779	5.3779	5.3779	5.3779	5.3779	5.3779	5.3779	5.3779	
util living area	0.9881	0.9794	0.9554	0.8888	0.7554	0.5721	0.4195	0.4629	0.7042	0.9188	0.9783	0.9905	(86)
MIT	20.1420	20.2721	20.4905	20.7420	20.9157	20.9843	20.9975	20.9958	20.9554	20.7268	20.3803	20.0979	(87)
Th 2	20.1595	20.1595	20.1595	20.1595	20.1595	20.1595	20.1595	20.1595	20.1595	20.1595	20.1595	20.1595	(88)
util rest of house	0.9851	0.9742	0.9441	0.8624	0.7059	0.5026	0.3406	0.3804	0.6348	0.8932	0.9719	0.9881	(89)
MIT 2	19.3838	19.5117	19.7236	19.9578	20.1041	20.1521	20.1588	20.1582	20.1354	19.9496	19.6195	19.3403	(90)
Living area fraction	19.5547	19.6831	19.8964	20.1345	20.2870	20.3396	20.3478	20.3469	20.3202	20.1247	19.7909	19.5110	(91)
Temperature adjustment												0.0000	(92)
adjusted MIT	19.5547	19.6831	19.8964	20.1345	20.2870	20.3396	20.3478	20.3469	20.3202	20.1247	19.7909	19.5110	(93)

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Calculation Type: New Build (As Built)

CALCULATION OF ENERGY RATINGS FOR IMPROVED DWELLING 09 Jan 2014

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9823	0.9706	0.9400	0.8615	0.7138	0.5178	0.3584	0.3990	0.6487	0.8920	0.9684	0.9857	(94)
Useful gains	631.2200	682.0081	719.8700	715.9504	619.0104	437.3412	289.2194	304.0440	460.3194	578.0666	594.7305	605.9301	(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	1180.3053	1143.8166	1036.5257	869.2507	664.4060	444.0928	289.9766	305.3865	481.2760	736.9588	981.9413	1184.6670	(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	408.5194	310.3354	235.5919	110.3762	33.7743	0.0000	0.0000	0.0000	0.0000	118.2158	278.7918	430.5803	(98)
Space heating												1926.1850	(98)
Space heating per m2											(98) / (4) =	22.6397	(99)

8c. Space cooling requirement

Not applicable

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000	(201)
Fraction of space heat from main system(s)													1.0000	(202)
Efficiency of main space heating system 1 (in %)													90.2000	(206)
Efficiency of secondary/supplementary heating system, %													0.0000	(208)
Space heating requirement													2135.4601	(211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Space heating requirement	408.5194	310.3354	235.5919	110.3762	33.7743	0.0000	0.0000	0.0000	0.0000	118.2158	278.7918	430.5803	(98)	
Space heating efficiency (main heating system 1)	90.2000	90.2000	90.2000	90.2000	90.2000	0.0000	0.0000	0.0000	0.0000	90.2000	90.2000	90.2000	(210)	
Space heating fuel (main heating system)	452.9040	344.0525	261.1883	122.3683	37.4438	0.0000	0.0000	0.0000	0.0000	131.0596	309.0818	477.3617	(211)	
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)	
Water heating														
Water heating requirement	130.6272	94.6436	69.9655	28.0816	0.9563	0.0000	0.0000	9.0108	31.6836	74.1957	109.2417	129.7581	(64)	
Efficiency of water heater	86.4180	86.5466	86.6175	87.0123	89.7536	76.4000	76.4000	76.4000	76.4000	84.3265	85.8351	86.5786	(216)	
Fuel for water heating, kWh/month	151.1573	109.3556	80.7753	32.2731	1.0655	0.0000	0.0000	11.7943	41.4707	87.9862	127.2692	149.8732	(219)	
Water heating fuel used												793.0204	(219)	
Annual totals kWh/year														
Space heating fuel - main system												2135.4601	(211)	
Space heating fuel - secondary												0.0000	(215)	
Electricity for pumps and fans:														
(MEV)Centralised, Database: in-use factor = 1.4000, SFP = 0.2380)														
mechanical ventilation fans (SFP = 0.2380)													61.7596	(230a)
central heating pump													30.0000	(230c)
main heating flue fan													45.0000	(230e)
pump for solar water heating													50.0000	(230g)
Total electricity for the above, kWh/year													186.7596	(231)
Electricity for lighting (calculated in Appendix L)													392.4632	(232)
Energy saving/generation technologies (Appendices M ,N and Q)														
PV Unit 0 (0.80 * 0.80 * 908 * 1.00) =										-581.0267			-581.0267	(233)
Total delivered energy for all uses													2926.6765	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	2135.4601	3.4800	74.3140	(240)
Space heating - secondary	0.0000	0.0000	0.0000	(242)
Water heating (other fuel)	793.0204	3.4800	27.5971	(247)
Mechanical ventilation fans	61.7596	13.1900	8.1461	(249)
Pumps and fans for heating	75.0000	13.1900	9.8925	(249)
Pump for solar water heating	50.0000	13.1900	6.5950	(249)
Energy for lighting	392.4632	13.1900	51.7659	(250)
Additional standing charges			120.0000	(251)
Energy saving/generation technologies				
PV Unit	-581.0267	13.1900	-76.6374	(252)
Total energy cost			221.6732	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.4200	(256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	0.7157	(257)
SAP value		90.0155	
SAP rating (Section 12)		90	(258)
SAP band		B	

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CALCULATION OF ENERGY RATINGS FOR IMPROVED DWELLING 09 Jan 2014

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	2135.4601	0.2160	461.2594 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	793.0204	0.2160	171.2924 (264)
Space and water heating			632.5518 (265)
Pumps and fans	186.7596	0.5190	96.9282 (267)
Energy for lighting	392.4632	0.5190	203.6884 (268)
Energy saving/generation technologies			
PV Unit	-581.0267	0.5190	-301.5529 (269)
Total kg/year			631.6155 (272)
CO2 emissions per m2			7.4200 (273)
EI value			93.4935
EI rating			93 (274)
EI band			A

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Calculation Type: New Build (As Built)

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

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

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	42.5400 (1b)	x 2.3900 (2b)	= 101.6706 (1b) - (3b)
First floor	42.5400 (1c)	x 2.6100 (2c)	= 111.0294 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	85.0800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 212.7000 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					0 * 10 = 0.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					0.0000 / (5) = 0.0000 (8)
Pressure test					Yes
Measured/design AP50					3.9500
Infiltration rate					0.1975 (18)
Number of sides sheltered					2 (19)
Shelter factor			(20) = 1 - [0.075 x (19)] =		0.8500 (20)
Infiltration rate adjusted to include shelter factor			(21) = (18) x (20) =		0.1679 (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	0.1973	0.1847	0.1847	0.1679	0.1721	0.1637	0.1637	0.1595	0.1595	0.1721	0.1679	0.1721 (22b)
Mechanical extract ventilation - centralised												
If mechanical ventilation:												0.5000 (23a)
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K					
Front Door			2.1500	1.1000	2.3650		(26)					
Windows (Uw = 1.20)			11.3100	1.1450	12.9504		(27)					
Ground Floor			42.5400	0.1200	5.1048	84.0000	3573.3600 (28a)					
Brick and Block	48.6500	13.4600	35.1900	0.2400	8.4456	42.2200	1485.7218 (29a)					
Pitched Roof	42.5400		42.5400	0.1000	4.2540	9.1000	387.1140 (30)					
Total net area of external elements Aum(A, m2)			133.7300				(31)					
Fabric heat loss, W/K = Sum (A x U)				(26) ... (30) + (32) =	33.1198		(33)					
Party Wall 1			44.0500	0.0000	0.0000	110.0000	4845.5000 (32)					
Party Wall 2			44.0500	0.0000	0.0000	110.0000	4845.5000 (32)					
Ground Floor Stud			72.3100			9.0000	650.7900 (32c)					
First Floor Stud			108.0200			9.0000	972.1800 (32c)					
Internal Floor 1			42.5400			18.0000	765.7200 (32d)					
Internal Ceiling 1			42.5400			18.0000	765.7200 (32e)					
Heat capacity Cm = Sum(A x k)					(28) ... (30) + (32) + (32a) ... (32e) =		18291.6058 (34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							214.9930 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							9.1582 (36)					
Total fabric heat loss						(33) + (36) =	42.2780 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 35.0955	Feb 35.0955	Mar 35.0955	Apr 35.0955	May 35.0955	Jun 35.0955	Jul 35.0955	Aug 35.0955	Sep 35.0955	Oct 35.0955	Nov 35.0955	Dec 35.0955 (38)
Heat transfer coeff	77.3735	77.3735	77.3735	77.3735	77.3735	77.3735	77.3735	77.3735	77.3735	77.3735	77.3735	77.3735 (39)
Average = Sum(39)m / 12 =												77.3735 (39)
HLP	Jan 0.9094	Feb 0.9094	Mar 0.9094	Apr 0.9094	May 0.9094	Jun 0.9094	Jul 0.9094	Aug 0.9094	Sep 0.9094	Oct 0.9094	Nov 0.9094	Dec 0.9094 (40)
HLP (average)												0.9094 (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												2.5522 (42)
Average daily hot water use (litres/day)												94.8152 (43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

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

Daily hot water use	104.2967	100.5041	96.7115	92.9189	89.1263	85.3337	85.3337	89.1263	92.9189	96.7115	100.5041	104.2967 (44)
Energy conte	154.6691	135.2746	139.5912	121.6990	116.7731	100.7663	93.3748	107.1489	108.4286	126.3631	137.9352	149.7887 (45)
Energy content (annual)	Total = Sum(45)m =										1491.8127 (45)	
Distribution loss (46)m = 0.15 x (45)m												
23.2004	20.2912	20.9387	18.2549	17.5160	15.1149	14.0062	16.0723	16.2643	18.9545	20.6903	22.4683 (46)	
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	0.6707	0.6071	0.6075	0.5089	0.4683	0.3869	0.3586	0.4297	0.4534	0.5499	0.6190	0.6495 (61)
Total heat required for water heating calculated for each month	155.3397	135.8816	140.1987	122.2079	117.2414	101.1532	93.7334	107.5787	108.8820	126.9131	138.5543	150.4382 (62)
Aperture area of solar collector												3.0000 (H1)
Zero-loss collector efficiency												0.7000 (H2)
Collector heat loss coefficient												1.8000 (H3)
Collector 2nd order heat loss coefficient												0.0050 (H3a)
Collector effective heat loss coefficient												1.8063 (H3b)
Collector performance ratio												2.5804 (H4)
Annual solar radiation per m2												1206.0102 (H5)
Overshading factor												0.8000 (H6)
Solar energy available												2026.0972 (H7)
Adjustment factor for showers												1.0000 (H7a)
Solar-to-load ratio												1.3581 (H8)
Utilisation factor												0.5211 (H9)
Collector performance factor												0.8793 (H10)
Dedicated solar storage volume												75.0000 (H11)
Effective solar volume												75.0000 (H13)
Daily hot water demand												94.8152 (H14)
Volume ratio Veff/V												0.7910 (H15)
Solar storage volume factor												0.9531 (H16)
Solar input												-884.8568 (H17)
Solar input	-28.8740	-41.0621	-71.2533	-95.8477	-111.3815	-121.1507	-114.8694	-104.7497	-81.9874	-56.6667	-34.1514	-22.8629 (63)
	Solar input (sum of months) = Sum(63)m =										-884.8568 (63)	
Output from w/h	126.4657	94.8196	68.9455	26.3602	5.8599	0.0000	0.0000	2.8289	26.8946	70.2463	104.4029	127.5753 (64)
	Total per year (kWh/year) = Sum(64)m =										654.3990 (64)	
Heat gains from water heating, kWh/month	51.5951	45.1306	46.5660	40.5921	38.9441	33.6015	31.1368	35.7345	36.1659	42.1532	46.0182	49.9671 (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	153.1332	153.1332	153.1332	153.1332	153.1332	153.1332	153.1332	153.1332	153.1332	153.1332	153.1332	153.1332 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	55.5572	49.3454	40.1304	30.3813	22.7104	19.1731	20.7172	26.9290	36.1440	45.8931	53.5640	57.1013 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	342.8803	346.4383	337.4722	318.3844	294.2896	271.6437	256.5150	252.9569	261.9230	281.0108	305.1057	327.7515 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	52.8655	52.8655	52.8655	52.8655	52.8655	52.8655	52.8655	52.8655	52.8655	52.8655	52.8655	52.8655 (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)	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888	-102.0888 (71)
Water heating gains (Table 5)	69.3483	67.1586	62.5887	56.3780	52.3443	46.6688	41.8505	48.0302	50.2304	56.6576	63.9142	67.1601 (72)
Total internal gains	574.6958	569.8523	547.1012	512.0537	476.2541	444.3955	425.9925	434.8260	455.2073	490.4714	529.4939	558.9229 (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
East					4.3100	25.1733	0.6300	0.7000			0.7700			33.1580 (76)
West					7.0000	25.1733	0.6300	0.7000			0.7700			53.8529 (80)

Solar gains	87.0109	144.7926	241.9891	352.4466	404.8311	457.8381	419.0655	376.7535	294.0280	185.2275	108.1372			67.7282 (83)
Total gains	661.7067	714.6449	789.0903	864.5002	881.0853	902.2336	845.0581	811.5795	749.2353	675.6990	637.6311			626.6511 (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	65.6685	65.6685	65.6685	65.6685	65.6685	65.6685	65.6685	65.6685	65.6685	65.6685	65.6685	65.6685
alpha	5.3779	5.3779	5.3779	5.3779	5.3779	5.3779	5.3779	5.3779	5.3779	5.3779	5.3779	5.3779
util living area	0.9807	0.9703	0.9333	0.8326	0.6608	0.4345	0.3018	0.3047	0.5651	0.8511	0.9598	0.9843 (86)
MIT	20.2916	20.3901	20.6078	20.8386	20.9621	20.9966	20.9996	20.9996	20.9871	20.8518	20.5464	20.2598 (87)
Th 2	20.1595	20.1595	20.1595	20.1595	20.1595	20.1595	20.1595	20.1595	20.1595	20.1595	20.1595	20.1595 (88)
util rest of house	0.9756	0.9626	0.9165	0.7958	0.6010	0.3643	0.2251	0.2249	0.4860	0.8075	0.9474	0.9800 (89)
MIT 2	19.5316	19.6273	19.8350	20.0415	20.1378	20.1583	20.1594	20.1594	20.1541	20.0577	19.7805	19.5006 (90)
Living area fraction									fLA = Living area / (4) =			0.2253 (91)
MIT	19.7028	19.7992	20.0091	20.2211	20.3235	20.3472	20.3487	20.3487	20.3418	20.2366	19.9530	19.6717 (92)
Temperature adjustment												0.0000
adjusted MIT	19.7028	19.7992	20.0091	20.2211	20.3235	20.3472	20.3487	20.3487	20.3418	20.2366	19.9530	19.6717 (93)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

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

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9721	0.9586	0.9131	0.7987	0.6131	0.3801	0.2424	0.2429	0.5035	0.8119	0.9438	0.9769	(94)
Useful gains	643.2688	685.0827	720.5330	690.4936	540.2077	342.8972	204.8664	197.1313	377.2653	548.6163	601.7771	612.1746	(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	1091.1828	1067.6883	960.1385	783.1064	558.9070	344.0929	204.9427	197.2054	382.3614	629.5587	878.4245	1081.0373	(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	333.2480	257.1110	178.2665	66.6812	13.9123	0.0000	0.0000	0.0000	0.0000	60.2212	199.1861	348.8338	(98)
Space heating												1457.4601	(98)
Space heating per m2											(98) / (4) =	17.1305	(99)

8c. Space cooling requirement

Not applicable

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000	(201)
Fraction of space heat from main system(s)													1.0000	(202)
Efficiency of main space heating system 1 (in %)													90.2000	(206)
Efficiency of secondary/supplementary heating system, %													0.0000	(208)
Space heating requirement													1615.8094	(211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Space heating requirement	333.2480	257.1110	178.2665	66.6812	13.9123	0.0000	0.0000	0.0000	0.0000	60.2212	199.1861	348.8338	(98)	
Space heating efficiency (main heating system 1)	90.2000	90.2000	90.2000	90.2000	90.2000	0.0000	0.0000	0.0000	0.0000	90.2000	90.2000	90.2000	(210)	
Space heating fuel (main heating system)	369.4545	285.0454	197.6347	73.9260	15.4238	0.0000	0.0000	0.0000	0.0000	66.7641	220.8272	386.7337	(211)	
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)	
Water heating														
Water heating requirement	126.4657	94.8196	68.9455	26.3602	5.8599	0.0000	0.0000	2.8289	26.8946	70.2463	104.4029	127.5753	(64)	
Efficiency of water heater	85.9301	86.0140	85.8740	85.8087	85.6167	76.4000	76.4000	76.4000	76.4000	82.2052	84.9247	86.0384	(216)	
Fuel for water heating, kWh/month	147.1728	110.2373	80.2867	30.7197	6.8444	0.0000	0.0000	3.7028	35.2024	85.4524	122.9358	148.2773	(219)	
Water heating fuel used												770.8316	(219)	
Annual totals kWh/year														
Space heating fuel - main system												1615.8094	(211)	
Space heating fuel - secondary												0.0000	(215)	
Electricity for pumps and fans:														
(MEV)Centralised, Database: in-use factor = 1.4000, SFP = 0.2380)														
mechanical ventilation fans (SFP = 0.2380)													61.7596	(230a)
central heating pump													30.0000	(230c)
main heating flue fan													45.0000	(230e)
pump for solar water heating													50.0000	(230g)
Total electricity for the above, kWh/year													186.7596	(231)
Electricity for lighting (calculated in Appendix L)													392.4632	(232)
Energy saving/generation technologies (Appendices M ,N and Q)														
PV Unit 0 (0.80 * 0.80 * 1030 * 1.00) =										-659.2380			-659.2380	(233)
Total delivered energy for all uses													2306.6257	(238)

10a. Fuel costs - using BEDF prices (542)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1615.8094	7.6100	122.9631	(240)
Space heating - secondary	0.0000	0.0000	0.0000	(242)
Water heating (other fuel)	770.8316	7.6100	58.6603	(247)
Mechanical ventilation fans	61.7596	31.0800	19.1949	(249)
Pumps and fans for heating	75.0000	31.0800	23.3100	(249)
Pump for solar water heating	50.0000	31.0800	15.5400	(249)
Energy for lighting	392.4632	31.0800	121.9776	(250)
Additional standing charges			105.0000	(251)
Energy saving/generation technologies				
PV Unit	-659.2380	31.0800	-204.8912	(252)
Total energy cost			261.7546	(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	1615.8094	0.2160	349.0148	(261)
Space heating - secondary	0.0000	0.0000	0.0000	(263)
Water heating (other fuel)	770.8316	0.2160	166.4996	(264)
Space and water heating			515.5145	(265)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

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

Pumps and fans	186.7596	0.5190	96.9282 (267)
Energy for lighting	392.4632	0.5190	203.6884 (268)
Energy saving/generation technologies			
PV Unit	-659.2380	0.5190	-342.1445 (269)
Total kg/year			473.9865 (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	1615.8094	1.2200	1971.2875 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	770.8316	1.2200	940.4145 (264)
Space and water heating			2911.7020 (265)
Pumps and fans	186.7596	3.0700	573.3519 (267)
Energy for lighting	392.4632	3.0700	1204.8620 (268)
Energy saving/generation technologies			
PV Unit	-659.2380	3.0700	-2023.8607 (269)
Primary energy kWh/year			2666.0552 (272)
Primary energy kWh/m2/year			31.3359 (273)

U-VALUE CALCULATOR REPORT

Property Reference	SAP 0943 Plot 26	Issued on Date	29/05/2024
Assessment Reference	As Built	Prop Type Ref	Block J Mid Terrace
Project	26, Shaw Crescent, West End, Southampton, SO30 3LH		
Calculation Type	New Build (As Built)		

SAP Rating	89 B	DER	11.71	TER	16.78
Environmental	91 B	% DER<TER	30.23		
CO ₂ Emissions (t/year)	0.68	DFEE	36.70	TFEE	44.30
General Requirements Compliance	Pass	% DFEE<TFEE	17.16		

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

Building Elements

Roof 000002 - Mineral Wool between and above

Roof Type: Pitched Roof, insulated flat ceiling

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

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

Unheated space: None

Total thickness: 463 mm

U-value: 0.10 W/m² K

Kappa: 9.10 kJ/m² K

U-VALUE CALCULATOR REPORT

Property Reference	SAP 0943 Plot 26	Issued on Date	29/05/2024
Assessment Reference	As Built	Prop Type Ref	Block J Mid Terrace
Project	26, Shaw Crescent, West End, Southampton, SO30 3LH		
Calculation Type	New Build (As Built)		

SAP Rating	89 B	DER	11.71	TER	16.78
Environmental	91 B	% DER<TER	30.23		
CO ₂ Emissions (t/year)	0.68	DFEE	36.70	TFEE	44.30
General Requirements Compliance	Pass	% DFEE<TFEE	17.16		

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

Wall 000001

Wall Type: Standard Wall

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

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

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

U-VALUE CALCULATOR REPORT

Property Reference	SAP 0943 Plot 26	Issued on Date	29/05/2024
Assessment Reference	As Built	Prop Type Ref	Block J Mid Terrace
Project	26, Shaw Crescent, West End, Southampton, SO30 3LH		
Calculation Type	New Build (As Built)		

SAP Rating	89 B	DER	11.71	TER	16.78
Environmental	91 B	% DER<TER	30.23		
CO ₂ Emissions (t/year)	0.68	DFEE	36.70	TFEE	44.30
General Requirements Compliance	Pass	% DFEE<TFEE	17.16		

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

Building Elements

Floor 000003 - Worst Case Slab

Floor Type: Slab On Ground Floor

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

Horizontal edge insulation: none

Vertical edge insulation: none

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

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

Total correction = 0.0096 m² K/W

U-value (unrounded) = 0.12 W/m² K

Unheated space: None

Total thickness: 321 mm

U-value: 0.12 W/m² K

Kappa: 84.00 kJ/m² K

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Built)

Property Reference	SAP 0943 Plot 26	Issued on Date	29/05/2024
Assessment Reference	As Built	Prop Type Ref	Block J Mid Terrace
Property	26, Shaw Crescent, West End, Southampton, SO30 3LH		
SAP Rating	89 B	DER	11.71
Environmental	91 B	TER	16.78
CO ₂ Emissions (t/year)	0.68	% DER<TER	30.23
General Requirements Compliance	Pass	DFEE	36.70
		TFEE	44.30
		% DFEE<TFEE	17.16
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	East
Property Tenure	Unknown
Transaction Type	New dwelling
Terrain Type	Suburban
1.0 Property Type	House, Mid-Terrace
2.0 Number of Storeys	2
3.0 Date Built	2023
4.0 Sheltered Sides	2
5.0 Sunlight/Shade	Average or unknown

6.0 Measurements		Heat Loss Perimeter	Internal Floor Area	Average Storey Height
	Ground Floor:	9.73 m	42.54 m ²	2.39 m
	1st Storey:	9.73 m	42.54 m ²	2.61 m

7.0 Living Area	19.17	m ²
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8.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	214.99	kJ/m ² K

9.0 External Walls			U-Value (W/m ² K)	Kappa (kJ/m ² K)	Gross Area (m ²)	Nett Area (m ²)
Description	Type	Construction				
Brick and Block	Cavity Wall	Other	0.24	42.22	48.65	35.19

9.1 Party Walls			U-Value (W/m ² K)	Kappa (kJ/m ² K)	Area (m ²)
Description	Type	Construction			
Party Wall 1	Filled Cavity with Edge Sealing	Single plasterboard on dabs both sides, lightweight aggregate blocks, cavity or cavity fill	0.00	110.00	44.05
Party Wall 2	Filled Cavity with Edge Sealing	Single plasterboard on dabs both sides, lightweight aggregate blocks, cavity or cavity fill	0.00	110.00	44.05

9.2 Internal Walls		Kappa (kJ/m ² K)	Area (m ²)
Description	Construction		
Ground Floor Stud	Plasterboard on timber frame	9.00	72.31
First Floor Stud	Plasterboard on timber frame	9.00	108.02

10.0 External Roofs

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Built)

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area (m²)	Nett Area (m²)
Pitched Roof	External Plane Roof	Other	0.10	9.10	42.54	42.54

10.2 Internal Ceilings	Description	Construction	Kappa (kJ/m²K)	Area (m²)
	Internal Ceiling 1	Plasterboard ceiling, carpeted chipboard floor	9.00	42.54

11.0 Heat Loss Floors	Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)
	Ground Floor	Ground Floor - Solid	Other	0.12	84.00	42.54

11.2 Internal Floors	Description	Construction	Kappa (kJ/m²K)	Area (m²)
	Internal Floor 1	Plasterboard ceiling, carpeted chipboard floor	18.00	42.54

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

13.0 Openings	Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width (m)	Height (m)	Count	Area (m²)	Curtain Closed
	Front Door	Solid Door	[1] Brick and Block	East							2.15	
	Front Elevation	Window	[1] Brick and Block	East	None	0.00					4.31	
	Rear Elevation	Window	[1] Brick and Block	West	None	0.00					7.00	

14.0 Conservatory	None
15.0 Draught Proofing	100 %
16.0 Draught Lobby	No
17.0 Thermal Bridging	Calculate Bridges

17.1 List of Bridges	Source Type	Bridge Type	Length	Psi	Imported	Reference:
	Independently assessed	E2 Other lintels (including other steel lintels)	1.02	0.071	No	Birtley Supatherm
	Independently assessed	E2 Other lintels (including other steel lintels)	4.99	0.064	No	Birtley Supatherm
	Independently assessed	E2 Other lintels (including other steel lintels)	1.59	0.067	No	Birtley Supatherm
	Independently assessed	E2 Other lintels (including other steel lintels)	1.81	0.061	No	Birtley Supatherm
	Independently assessed	E3 Sill	6.80	0.021	No	Knauf P5
	Independently assessed	E4 Jamb	20.10	0.016	No	Knauf P6
	Table K1 - Default	E5 Ground floor (normal)	9.73	0.320	No	
	Independently assessed	E6 Intermediate floor within a dwelling	9.73	0.000	No	CD0029
	Table K1 - Approved	E10 Eaves (insulation at ceiling level)	9.73	0.060	No	
	Independently assessed	E18 Party wall between dwellings	10.00	0.036	No	Knauf P25 Halved
	Independently assessed	E18 Party wall between dwellings	2.39	0.024	No	Knauf P25 Divided by 3
	Independently assessed	E25 Staggered party wall between dwellings	10.00	0.055	No	Knauf P27 Halved
	Table K1 - Default	P1 Party wall - Ground floor	17.54	0.160	No	
	Table K1 - Default	P2 Party wall - Intermediate floor within a dwelling	17.54	0.000	No	
	Independently assessed	P4 Party wall - Roof (insulation at ceiling level)	17.54	0.035	No	Knauf P29 Halved

Y-value	0.068	W/m²K
18.0 Pressure Testing	Yes	
Designed AP ₅₀	5.00	m³/(h.m²) @ 50 Pa

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Built)

Property Tested ? Yes
As Built AP₅₀ 3.95 m³/(h.m²) @ 50 Pa

19.0 Mechanical Ventilation

Summer Overheating

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

Mechanical Ventilation

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

20.0 Fans, Open Fireplaces, Flues

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

21.0 Fixed Cooling System

No

22.0 Lighting

Internal

Total number of light fittings 22
Total number of L.E.L. fittings 22
Percentage of L.E.L. fittings 100.00 %

External

External lights fitted Yes
Light and motion sensor Yes

23.0 Electricity Tariff

Standard

24.0 Main Heating 1

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

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Built)

Delayed Start Stat	No
Sap Code	2106
Flue Type	Balanced
Fan Assisted Flue	Yes
Is MHS Pumped	Pump in heated space
Heat Emitter	Radiators
Flow Temperature	Normal (> 45°C)
Combi boiler type	Standard Combi
Combi keep hot type	None
25.0 Main Heating 2	None

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

29.0 Hot Water Cylinder	None
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32.0 Photovoltaic Unit		One Dwelling		
PV Cells kWp	Orientation	Elevation	Overshading	Connected to Dwelling
0.80	West	30°	None Or Little	Yes

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

	Typical Cost	Typical savings per year	Ratings after improvement	
			SAP rating	Environmental Impact
Solar water heating	£4,000 - £6,000	£67	B 90	