



SAP Report Submission for Building Regulations Compliance

Client: Foreman Homes

Project: 12 Shaw Crescent, West End
SOUTHAMPTON, SO30 3LH

Contact: Tobias Whiting
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Report Issue Date: 07/01/2025

EXCELLENCE
IN ENERGY
ASSESSMENT

BUILDING REGULATION COMPLIANCE

Calculation Type: New Build (As Built)

Property Reference	SAP 0943 Plot 16			Issued on Date	07/01/2025
Assessment Reference	As Built	Prop Type Ref	Type D		
Property	12 Shaw Crescent, West End, SOUTHAMPTON, SO30 3LH				
SAP Rating	87 B	DER	14.21	TER	18.67
Environmental	89 B	% DER<TER	23.88		
CO ₂ Emissions (t/year)	0.87	DFEE	47.46	TFEE	55.97
General Requirements Compliance	Pass	% DFEE<TFEE	15.20		
Assessor Details	Mr. Tobias Whiting, Abacus Energy (UK) Ltd, Tel: 07798936079, toby@abacusenergyuk.com			Assessor ID	E477-0001
Client	Foreman Homes, FORE				

SUMMARY FOR INPUT DATA FOR New Build (As Built)

Criterion 1 – Achieving the TER and TFEE rate

1a TER and DER

Fuel for main heating	Mains gas		
Fuel factor	1.00 (mains gas)		
Target Carbon Dioxide Emission Rate (TER)	18.67	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	14.21	kgCO ₂ /m ²	Pass
	-4.46 (-23.9%)	kgCO ₂ /m ²	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	55.97	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	47.46	kWh/m ² /yr	
	-8.5 (-15.2%)	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	1.19 (max. 2.00)	1.20 (max. 3.30)	Pass

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	3.86 (measured in this dwelling)	m ³ /(h.m ²) @ 50 Pa	
Maximum	10.0	m ³ /(h.m ²) @ 50 Pa	Pass

Limiting System Efficiencies

4 Heating efficiency

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

BUILDING REGULATION COMPLIANCE

Calculation Type: New Build (As Built)

Main heating system

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

Pass

Secondary heating system

None

5 Cylinder insulation

Hot water storage

No cylinder

6 Controls

Space heating controls

Programmer, room thermostat and TRVs

Pass

Hot water controls

No cylinder

Boiler interlock

Yes

Pass

7 Low energy lights

Percentage of fixed lights with low-energy fittings

100 %

Minimum

75 %

Pass

8 Mechanical ventilation

Continuous extract system

Specific fan power

0.17

Maximum

0.7

Pass

Criterion 3 – Limiting the effects of heat gains in summer

9 Summertime temperature

Overheating risk (Southern England)

Slight

Pass

Based on:

Overshading

Average

Windows facing North

6.94 m², No overhang

Windows facing East

7.00 m², No overhang

Windows facing West

5.62 m², No overhang

Air change rate

4.00 ach

Blinds/curtains

None

Criterion 4 – Building performance consistent with DER and DFEE rate

Party Walls

Type

U-value

Filled Cavity with Edge Sealing

0.00

W/m²K

Pass

Air permeability and pressure testing

3 Air permeability

Air permeability at 50 pascals

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

Maximum

10.0 m³/(h.m²) @ 50 Pa

Pass

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BUILDING REGULATION COMPLIANCE

Calculation Type: New Build (As Built)

10 Key features

Party wall U-value	0.00	W/m ² K
Roof U-value	0.10	W/m ² K
Floor U-value	0.12	W/m ² K
Door U-value	1.10	W/m ² K
Air permeability	3.9	m ³ /m ² h
Photovoltaic array	0.80	kW

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THERMAL BRIDGING

Calculation Type: New Build (As Built)

Property Reference	SAP 0943 Plot 16	Issued on Date	07/01/2025
Assessment Reference	As Built	Prop Type Ref	Type D
Property	12 Shaw Crescent, West End, SOUTHAMPTON, SO30 3LH		
SAP Rating	87 B	DER	14.21
Environmental	89 B	TER	18.67
CO ₂ Emissions (t/year)	0.87	% DER<TER	23.88
General Requirements Compliance	Pass	DFEE	47.46
		TFEE	55.97
		% DFEE<TFEE	15.20
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	1.93	0.14	Birtley Supatherm
External wall	E2 Other lintels (including other steel lintels)	Independently assessed	0.064	6.24	0.40	Birtley Supatherm
External wall	E2 Other lintels (including other steel lintels)	Independently assessed	0.070	5.44	0.38	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	14.40	0.30	Knauf P5
External wall	E4 Jamb	Independently assessed	0.016	33.00	0.53	Knauf P6
External wall	E5 Ground floor (normal)	Table K1 - Default	0.320	18.95	6.06	
External wall	E6 Intermediate floor within a dwelling	Independently assessed	0.000	18.95	0.00	CD0029
External wall	E10 Eaves (insulation at ceiling level)	Table K1 - Approved	0.060	9.98	0.60	
External wall	E12 Gable (insulation at ceiling level)	Independently assessed	0.044	9.12	0.40	Knauf P21
External wall	E16 Corner (normal)	Independently assessed	0.039	19.79	0.77	Knauf P23
External wall	E25 Staggered party wall between dwellings	Independently assessed	0.055	9.90	0.54	Knauf P27 Halved
Party wall	P1 Party wall - Ground floor	Table K1 - Default	0.160	8.81	1.41	
Party wall	P2 Party wall - Intermediate floor within a dwelling	Table K1 - Default	0.000	8.81	0.00	
Party wall	P4 Party wall - Roof (insulation at ceiling level)	Independently assessed	0.035	8.81	0.31	Knauf P29 Halved

Total: **12.06** W/mK:
Y-Value: **0.068** W/m²K:

FULL SAP CALCULATION PRINTOUT

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Environmental	89 B	% DER<TER	23.88		
CO ₂ Emissions (t/year)	0.87	DFEE	47.46	TFEE	55.97
General Requirements Compliance	Pass	% DFEE<TFEE	15.20		
Assessor Details	Mr. Tobias Whiting, Abacus Energy (UK) Ltd, Tel: 07798936079, toby@abacusenergyuk.com			Assessor ID	E477-0001
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FULL SAP CALCULATION PRINTOUT

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

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

DWELLING AS BUILT

Semi-Detached House, total floor area 85 m²

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

1a TER and DER

Fuel for main heating:Mains gas

Fuel factor:1.00 (mains gas)

Target Carbon Dioxide Emission Rate (TER) 18.67 kgCO₂/m²

Dwelling Carbon Dioxide Emission Rate (DER) 14.21 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)56.0 kWh/m²/yr

Dwelling Fabric Energy Efficiency (DFEE)47.5 kWh/m²/yrOK

2 Fabric U-values

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

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals: 3.86 (measured in this dwelling)
Maximum 10.0 OK

4 Heating efficiency

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

Data from database

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

Combi boiler

Efficiency: 89.3% SEDBUK2009

Minimum: 88.0% OK

Secondary heating system:

None

5 Cylinder insulation

Hot water storage No cylinder

6 Controls

Space heating controls: Programmer, room thermostat and TRVs OK

Hot water controls:

No cylinder

Boiler interlock

Yes

OK

7 Low energy lights

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

8 Mechanical ventilation

Continuous extract system

Specific fan power: 0.17
Maximum 0.7 OK

9 Summertime temperature

Overheating risk (Southern England): Slight OK

Based on:

Overshading: Average

Windows facing North: 6.94 m², No overhang

Windows facing East: 7.00 m², No overhang

Windows facing West: 5.62 m², No overhang

Air change rate: 4.00 ach

Blinds/curtains: None

10 Key features

Party wall U-value 0.00 W/m²K

Roof U-value 0.10 W/m²K

Floor U-value 0.12 W/m²K

Door U-value 1.10 W/m²K

Air permeability 3.9 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	42.3100 (1b)	x 2.3900 (2b)	= 101.1209 (1b) - (3b)
First floor	42.3100 (1c)	x 2.5600 (2c)	= 108.3136 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	84.6200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 209.4345 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					0 * 10 = 0.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					0.0000 / (5) = 0.0000 (8)
Pressure test					Yes
Measured/design AP50					3.8600
Infiltration rate					0.1930 (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) =		0.1641 (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	0.2092	0.2051	0.2010	0.1805	0.1764	0.1558	0.1558	0.1517	0.1641	0.1764	0.1846	0.1928 (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 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)			19.5600	1.1450	22.3969		(27)
Ground Floor			42.3100	0.1200	5.0772	84.0000	3554.0400 (28a)
Brick and Block	93.8000	21.7100	72.0900	0.2400	17.3016	42.2200	3043.6398 (29a)
Pitched Roof	42.3100		42.3100	0.1000	4.2310	9.1000	385.0210 (30)
Total net area of external elements Aum(A, m ²)			178.4200				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	51.3717			(33)
Party Wall 1			43.5900	0.0000	0.0000	110.0000	4794.9000 (32)
Ground Floor Block			43.1200			75.0000	3234.0000 (32c)
Ground Floor Stud			29.3800			9.0000	264.4200 (32c)
First Floor Stud			94.9200			9.0000	854.2800 (32c)
Internal Floor 1			42.3100			18.0000	761.5800 (32d)
Internal Ceiling 1			42.3100			18.0000	761.5800 (32e)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	17653.4608 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		208.6204 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)		12.0629 (36)
Total fabric heat loss	(33) + (36) =	63.4346 (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	34.5567	34.5567	34.5567	34.5567	34.5567	34.5567	34.5567	34.5567	34.5567	34.5567	34.5567	34.5567 (38)
Heat transfer coeff	97.9913	97.9913	97.9913	97.9913	97.9913	97.9913	97.9913	97.9913	97.9913	97.9913	97.9913	97.9913 (39)
Average = Sum(39)m / 12 =												97.9913 (39)
HLP	1.1580	1.1580	1.1580	1.1580	1.1580	1.1580	1.1580	1.1580	1.1580	1.1580	1.1580	1.1580 (40)
HLP (average)												1.1580 (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												2.5447 (42)
Average daily hot water use (litres/day)												94.6367 (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	104.1003	100.3149	96.5294	92.7439	88.9585	85.1730	85.1730	88.9585	92.7439	96.5294	100.3149	104.1003 (44)
Energy conte	154.3778	135.0198	139.3284	121.4698	116.5532	100.5765	93.1990	106.9472	108.2245	126.1252	137.6755	149.5067 (45)
Energy content (annual)										Total = Sum (45)m =		1489.0034 (45)
Distribution loss (46)m = 0.15 x (45)m	23.1567	20.2530	20.8993	18.2205	17.4830	15.0865	13.9798	16.0421	16.2337	18.9188	20.6513	22.4260 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	0.6706	0.6070	0.6052	0.5070	0.4666	0.3855	0.3572	0.4281	0.4517	0.5479	0.6189	0.6495 (61)
Total heat required for water heating calculated for each month	155.0484	135.6268	139.9336	121.9768	117.0198	100.9620	93.5562	107.3753	108.6761	126.6730	138.2944	150.1561 (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	155.0484	135.6268	139.9336	121.9768	117.0198	100.9620	93.5562	107.3753	108.6761	126.6730	138.2944	150.1561 (64)
Heat gains from water heating, kWh/month	51.4983	45.0458	46.4780	40.5155	38.8706	33.5381	31.0780	35.6670	36.0975	42.0736	45.9318	49.8733 (65)
										Total per year (kWh/year) = Sum (64)m =		1495.2985 (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	127.2351	127.2351	127.2351	127.2351	127.2351	127.2351	127.2351	127.2351	127.2351	127.2351	127.2351	127.2351 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	20.3999	18.1190	14.7354	11.1556	8.3390	7.0401	7.6071	9.8880	13.2716	16.8514	19.6680	20.9669 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	228.8250	231.1995	225.2159	212.4774	196.3974	181.2845	171.1881	168.8137	174.7973	187.5357	203.6157	218.7287 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.7235	35.7235	35.7235	35.7235	35.7235	35.7235	35.7235	35.7235	35.7235	35.7235	35.7235	35.7235 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881 (71)
Water heating gains (Table 5)	69.2181	67.0325	62.4704	56.2715	52.2454	46.5807	41.7714	47.9395	50.1355	56.5505	63.7942	67.0340 (72)
Total internal gains	382.6136	380.5216	366.5922	344.0751	321.1523	299.0758	284.7372	290.8116	302.3749	325.1081	351.2485	370.9001 (73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c		Access factor Table 6d	Gains W		
North				6.9400	10.6334	0.6300	0.7000		0.7700	22.5529 (74)		
East				7.0000	19.6403	0.6300	0.7000		0.7700	42.0162 (76)		
West				5.6200	19.6403	0.6300	0.7000		0.7700	33.7330 (80)		
Solar gains	98.3022	191.2815	317.2712	473.5468	594.6487	616.1532	583.4793	490.8080	371.8765	227.1347	122.2724	81.0938 (83)
Total gains	480.9158	571.8030	683.8634	817.6218	915.8010	915.2290	868.2165	781.6196	674.2514	552.2429	473.5209	451.9939 (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	50.0426	50.0426	50.0426	50.0426	50.0426	50.0426	50.0426	50.0426	50.0426	50.0426	50.0426	50.0426
alpha	4.3362	4.3362	4.3362	4.3362	4.3362	4.3362	4.3362	4.3362	4.3362	4.3362	4.3362	4.3362
util living area	0.9965	0.9921	0.9778	0.9282	0.8106	0.6369	0.4843	0.5530	0.8137	0.9666	0.9933	0.9973 (86)
MIT	19.5248	19.7120	20.0411	20.4559	20.7846	20.9436	20.9864	20.9764	20.8375	20.3813	19.8632	19.4760 (87)
Th 2	19.9537	19.9537	19.9537	19.9537	19.9537	19.9537	19.9537	19.9537	19.9537	19.9537	19.9537	19.9537 (88)
util rest of house	0.9955	0.9899	0.9712	0.9068	0.7589	0.5501	0.3750	0.4380	0.7417	0.9527	0.9910	0.9966 (89)
MIT 2	18.6086	18.7948	19.1198	19.5181	19.8087	19.9268	19.9499	19.9462	19.8600	19.4559	18.9463	18.5600 (90)
Living area fraction									fLA = Living area / (4) =			0.1825 (91)
MIT	18.7758	18.9621	19.2879	19.6892	19.9868	20.1123	20.1390	20.1342	20.0384	19.6248	19.1136	18.7271 (92)
Temperature adjustment												0.0000
adjusted MIT	18.7758	18.9621	19.2879	19.6892	19.9868	20.1123	20.1390	20.1342	20.0384	19.6248	19.1136	18.7271 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9939	0.9870	0.9658	0.9004	0.7608	0.5640	0.3949	0.4587	0.7484	0.9470	0.9884	0.9953 (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	1418.4988	1377.9683	1253.1009	1057.2480	812.0326	540.1605	346.7895	365.9198	581.9103	884.3505	1177.2250	1423.5338 (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	699.7406	546.7481	440.9253	231.1875	85.8060	0.0000	0.0000	0.0000	0.0000	268.8825	510.6255	724.4154 (98)
Space heating												3508.3308 (98)
Space heating per m2										(98) / (4) =		41.4598 (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	3889.5020 (211)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	699.7406	546.7481	440.9253	231.1875	85.8060	0.0000	0.0000	0.0000	0.0000	268.8825	510.6255	724.4154 (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)	775.7656	606.1509	488.8307	256.3054	95.1286	0.0000	0.0000	0.0000	0.0000	298.0959	566.1037	803.1213 (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	155.0484	135.6268	139.9336	121.9768	117.0198	100.9620	93.5562	107.3753	108.6761	126.6730	138.2944	150.1561 (64)
Efficiency of water heater (217)m	87.3385	87.0739	86.4386	84.9032	81.6871	76.4000	76.4000	76.4000	76.4000	85.2677	86.8565	76.4000 (216)
Fuel for water heating, kWh/month	177.5259	155.7605	161.8878	143.6656	143.2536	132.1493	122.4557	140.5436	142.2462	148.5592	159.2217	171.6328 (219)
Water heating fuel used												1798.9019 (219)
Annual totals kWh/year												3889.5020 (211)
Space heating fuel - main system												0.0000 (215)
Space heating fuel - secondary												
Electricity for pumps and fans:												
(MEV)Centralised, Database: in-use factor = 1.4000, SFP = 0.2380)												
mechanical ventilation fans (SFP = 0.2380)												60.8114 (230a)
central heating pump												30.0000 (230c)
main heating flue fan												45.0000 (230e)
Total electricity for the above, kWh/year												135.8114 (231)
Electricity for lighting (calculated in Appendix L)												360.2689 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV Unit 0 (0.80 * 0.80 * 1068 * 0.80) =											-546.8521	-546.8521 (233)
Total delivered energy for all uses												5637.6321 (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	3889.5020	0.2160	840.1324 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1798.9019	0.2160	388.5628 (264)
Space and water heating			1228.6952 (265)
Pumps and fans	135.8114	0.5190	70.4861 (267)
Energy for lighting	360.2689	0.5190	186.9796 (268)
Energy saving/generation technologies			
PV Unit	-546.8521	0.5190	-283.8162 (269)
Total CO2, kg/year			1202.3447 (272)
Dwelling Carbon Dioxide Emission Rate (DER)			14.2100 (273)

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

DER		14.2100 ZC1
Total Floor Area	TFA	84.6200
Assumed number of occupants	N	2.5447
CO2 emission factor in Table 12 for electricity displaced from grid	EF	0.5190
CO2 emissions from appliances, equation (L14)		16.0242 ZC2
CO2 emissions from cooking, equation (L16)		2.1280 ZC3
Total CO2 emissions		32.3622 ZC4
Residual CO2 emissions offset from biofuel CHP		0.0000 ZC5
Additional allowable electricity generation, kWh/m²/year		0.0000 ZC6
Resulting CO2 emissions offset from additional allowable electricity generation		0.0000 ZC7
Net CO2 emissions		32.3622 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	42.3100 (1b)	x 2.3900 (2b)	= 101.1209 (1b) - (3b)
First floor	42.3100 (1c)	x 2.5600 (2c)	= 108.3136 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	84.6200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 209.4345 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					3 * 10 = 30.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					30.0000 / (5) = 0.1432 (8)
Pressure test					Yes
Measured/design AP50					5.0000
Infiltration rate					0.3932 (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) =	0.3343 (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	0.4262	0.4178	0.4095	0.3677	0.3593	0.3175	0.3175	0.3092	0.3343	0.3593	0.3760	0.3928 (22b)
Effective ac	0.5908	0.5873	0.5838	0.5676	0.5646	0.5504	0.5504	0.5478	0.5559	0.5646	0.5707	0.5771 (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)			19.0200	1.3258	25.2159		(27)
Ground Floor			42.3100	0.1300	5.5003		(28a)
Brick and Block	93.8000	21.1700	72.6300	0.1800	13.0734		(29a)
Pitched Roof	42.3100		42.3100	0.1300	5.5003		(30)
Total net area of external elements Aum(A, m ²)			178.4200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	51.4399		(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)							11.5356 (36)
Total fabric heat loss						(33) + (36) =	62.9755 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)							
(38)m	40.8331	40.5894	40.3505	39.2284	39.0185	38.0412	38.0412
Heat transfer coeff	103.8086	103.5649	103.3260	102.2039	101.9940	101.0167	101.0167
Average = Sum(39)m / 12 =							102.2029 (39)
HLP	1.2268	1.2239	1.2211	1.2078	1.2053	1.1938	1.1938
HLP (average)							1.2078 (40)
Days in month	31	28	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.5447 (42)
Average daily hot water use (litres/day)												94.6367 (43)
Daily hot water use	104.1003	100.3149	96.5294	92.7439	88.9585	85.1730	85.1730	88.9585	92.7439	96.5294	100.3149	104.1003 (44)
Energy conte	154.3778	135.0198	139.3284	121.4698	116.5532	100.5765	93.1990	106.9472	108.2245	126.1252	137.6755	149.5067 (45)
Energy content (annual)												Total = Sum(45)m = 1489.0034 (45)
Distribution loss (46)m = 0.15 x (45)m	23.1567	20.2530	20.8993	18.2205	17.4830	15.0865	13.9798	16.0421	16.2337	18.9188	20.6513	22.4260 (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	49.1903	45.7367	45.3323	42.0031	43.4032	45.3323	45.7367	49.1903	49.3151	50.9589 (61)
Solar input	205.3367	181.0472	188.5187	167.2066	161.8855	142.5797	136.6022	152.2794	153.9612	175.3155	186.9906	200.4656 (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	205.3367	181.0472	188.5187	167.2066	161.8855	142.5797	136.6022	152.2794	153.9612	175.3155	186.9906	200.4656 (64)
	64.0703	56.4009	58.6243	51.8229	50.0870	43.9425	41.8395	46.8930	47.4188	54.2342	58.1059	62.4507 (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	127.2351	127.2351	127.2351	127.2351	127.2351	127.2351	127.2351	127.2351	127.2351	127.2351	127.2351	127.2351	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	20.3973	18.1167	14.7335	11.1542	8.3379	7.0392	7.6061	9.8867	13.2699	16.8492	19.6655	20.9642	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	228.8250	231.1995	225.2159	212.4774	196.3974	181.2845	171.1881	168.8137	174.7973	187.5357	203.6157	218.7287	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.7235	35.7235	35.7235	35.7235	35.7235	35.7235	35.7235	35.7235	35.7235	35.7235	35.7235	35.7235	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	(71)
Water heating gains (Table 5)	86.1161	83.9300	78.7960	71.9763	67.3212	61.0312	56.2358	63.0282	65.8595	72.8954	80.7026	83.9391	(72)
Total internal gains	399.5089	397.4167	382.9159	359.7784	336.2271	313.5255	299.2006	305.8991	318.0972	341.4509	368.1543	387.8025	(73)

6. Solar gains

[Jan]													
	Area m2				Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W
North	6.7500				10.6334		0.6300		0.7000		0.7700		21.9355 (74)
East	6.8100				19.6403		0.6300		0.7000		0.7700		40.8758 (76)
West	5.4600				19.6403		0.6300		0.7000		0.7700		32.7727 (80)
Solar gains	95.5840	185.9919	308.4982	460.4554	578.2133	599.1254	567.3537	477.2408	361.5943	220.8537	118.8912	78.8514	(83)
Total gains	495.0929	583.4086	691.4141	820.2339	914.4404	912.6509	866.5543	783.1399	679.6915	562.3046	487.0456	466.6539	(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	56.6079	56.7411	56.8723	57.4967	57.6151	58.1725	58.1725	58.2769	57.9565	57.6151	57.3761	57.1285	
alpha	4.7739	4.7827	4.7915	4.8331	4.8410	4.8782	4.8782	4.8851	4.8638	4.8410	4.8251	4.8086	
util living area	0.9982	0.9957	0.9866	0.9491	0.8436	0.6641	0.5031	0.5727	0.8412	0.9777	0.9963	0.9987 (86)	
MIT	19.6434	19.8102	20.1058	20.4968	20.8054	20.9555	20.9906	20.9831	20.8593	20.4385	19.9698	19.6158 (87)	
Th 2	19.8986	19.9009	19.9032	19.9138	19.9157	19.9250	19.9250	19.9267	19.9214	19.9157	19.9117	19.9076 (88)	
util rest of house	0.9976	0.9942	0.9817	0.9302	0.7907	0.5702	0.3853	0.4488	0.7662	0.9662	0.9947	0.9982 (89)	
MIT 2	18.0945	18.3394	18.7700	19.3304	19.7308	19.8967	19.9217	19.9200	19.8095	19.2610	18.5809	18.0604 (90)	
Living area fraction									fLA = Living area / (4) =			0.1825 (91)	
MIT	18.3771	18.6078	19.0138	19.5432	19.9269	20.0899	20.1168	20.1140	20.0010	19.4759	18.8343	18.3442 (92)	
Temperature adjustment												0.0000	
adjusted MIT	18.3771	18.6078	19.0138	19.5432	19.9269	20.0899	20.1168	20.1140	20.0010	19.4759	18.8343	18.3442 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9962	0.9916	0.9762	0.9222	0.7913	0.5855	0.4068	0.4713	0.7726	0.9597	0.9923	0.9971 (94)
Useful gains	493.2228	578.4934	674.9495	756.3787	723.6132	534.3351	352.5309	369.1136	525.1560	539.6559	483.3180	465.3144 (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	1461.3272	1419.6445	1292.9968	1087.7790	839.0933	554.5713	355.2511	374.5028	598.3232	905.2842	1201.8161	1454.9095 (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	720.2697	565.2535	459.8272	238.6082	85.9172	0.0000	0.0000	0.0000	0.0000	272.0275	517.3187	736.2588 (98)
Space heating												3595.4806 (98)
Space heating per m2										(98) / (4) =		42.4897 (99)

8c. Space cooling requirement

Not applicable

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF TARGET EMISSIONS 09 Jan 2014

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												93.4000 (206)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement												3849.5510 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	720.2697	565.2535	459.8272	238.6082	85.9172	0.0000	0.0000	0.0000	0.0000	272.0275	517.3187	736.2588 (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)	771.1667	605.1965	492.3203	255.4692	91.9884	0.0000	0.0000	0.0000	0.0000	291.2499	553.8744	788.2856 (211)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	205.3367	181.0472	188.5187	167.2066	161.8855	142.5797	136.6022	152.2794	153.9612	175.3155	186.9906	200.4656 (64)
Efficiency of water heater	87.9461	87.7233	87.2105	85.9459	83.5359	80.3000	80.3000	80.3000	80.3000	86.1532	87.4788	80.3000 (216)
(217)m	87.9461	87.7233	87.2105	85.9459	83.5359	80.3000	80.3000	80.3000	80.3000	86.1532	87.4788	88.0304 (217)
Fuel for water heating, kWh/month	233.4803	206.3844	216.1651	194.5486	193.7914	177.5588	170.1148	189.6381	191.7325	203.4926	213.7553	227.7230 (219)
Water heating fuel used	233.4803	206.3844	216.1651	194.5486	193.7914	177.5588	170.1148	189.6381	191.7325	203.4926	213.7553	2418.3849 (219)
Annual totals kWh/year												
Space heating fuel - main system												3849.5510 (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)												360.2224 (232)
Total delivered energy for all uses												6703.1583 (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	3849.5510	0.2160	831.5030 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2418.3849	0.2160	522.3711 (264)
Space and water heating			1353.8742 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	360.2224	0.5190	186.9554 (268)
Total CO2, kg/m2/year			1579.7546 (272)
Emissions per m2 for space and water heating			15.9995 (272a)
Fuel factor (mains gas)			1.0000
Emissions per m2 for lighting			2.2094 (272b)
Emissions per m2 for pumps and fans			0.4600 (272c)
Target Carbon Dioxide Emission Rate (TER) = (15.9995 * 1.00) + 2.2094 + 0.4600, rounded to 2 d.p.			18.6700 (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	42.3100 (1b)	x 2.3900 (2b)	= 101.1209 (1b) - (3b)
First floor	42.3100 (1c)	x 2.5600 (2c)	= 108.3136 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	84.6200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 209.4345 (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) = 0.1432 (8)
Pressure test					Yes
Measured/design AP50					3.8600
Infiltration rate					0.3362 (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) =	0.2858 (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	0.3644	0.3573	0.3501	0.3144	0.3072	0.2715	0.2715	0.2644	0.2858	0.3072	0.3215	0.3358 (22b)
Effective ac	0.5664	0.5638	0.5613	0.5494	0.5472	0.5369	0.5369	0.5349	0.5408	0.5472	0.5517	0.5564 (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)			19.5600	1.1450	22.3969		(27)
Ground Floor			42.3100	0.1200	5.0772	84.0000	3554.0400 (28a)
Brick and Block	93.8000	21.7100	72.0900	0.2400	17.3016	42.2200	3043.6398 (29a)
Pitched Roof	42.3100		42.3100	0.1000	4.2310	9.1000	385.0210 (30)
Total net area of external elements Aum(A, m ²)			178.4200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	51.3717		(33)
Party Wall 1			43.5900	0.0000	0.0000	110.0000	4794.9000 (32)
Ground Floor Block			43.1200			75.0000	3234.0000 (32c)
Ground Floor Stud			29.3800			9.0000	264.4200 (32c)
First Floor Stud			94.9200			9.0000	854.2800 (32c)
Internal Floor 1			42.3100			18.0000	761.5800 (32d)
Internal Ceiling 1			42.3100			9.0000	380.7900 (32e)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 17272.6708 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							204.1204 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							12.0629 (36)
Total fabric heat loss							(33) + (36) = 63.4346 (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	39.1455	38.9673	38.7926	37.9722	37.8188	37.1042	37.1042	36.9719	37.3795	37.8188	38.1293	38.4539 (38)
Heat transfer coeff	102.5801	102.4019	102.2272	101.4069	101.2534	100.5389	100.5389	100.4065	100.8141	101.2534	101.5639	101.8885 (39)
Average = Sum(39)m / 12 =												101.4061 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.2122	1.2101	1.2081	1.1984	1.1966	1.1881	1.1881	1.1866	1.1914	1.1966	1.2002	1.2041 (40)
HLP (average)												1.1984 (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	2.5447 (42)
Average daily hot water use (litres/day)	94.6367 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	104.1003	100.3149	96.5294	92.7439	88.9585	85.1730	85.1730	88.9585	92.7439	96.5294	100.3149	104.1003 (44)
Energy conte	154.3778	135.0198	139.3284	121.4698	116.5532	100.5765	93.1990	106.9472	108.2245	126.1252	137.6755	149.5067 (45)

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Energy content (annual)	Total = Sum(45)m = 1489.0034 (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	32.8053	28.6917	29.6073	25.8123	24.7676	21.3725	19.8048	22.7263	22.9977	26.8016	29.2560	31.7702 (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	127.2351	127.2351	127.2351	127.2351	127.2351	127.2351	127.2351	127.2351	127.2351	127.2351	127.2351	127.2351	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	20.3999	18.1190	14.7354	11.1556	8.3390	7.0401	7.6071	9.8880	13.2716	16.8514	19.6680	20.9669	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	228.8250	231.1995	225.2159	212.4774	196.3974	181.2845	171.1881	168.8137	174.7973	187.5357	203.6157	218.7287	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.7235	35.7235	35.7235	35.7235	35.7235	35.7235	35.7235	35.7235	35.7235	35.7235	35.7235	35.7235	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	(71)
Water heating gains (Table 5)	44.0931	42.6960	39.7947	35.8505	33.2897	29.6841	26.6193	30.5461	31.9412	36.0237	40.6334	42.7018	(72)
Total internal gains	354.4886	353.1851	340.9165	320.6541	299.1967	279.1792	266.5851	270.4182	281.1807	301.5813	325.0877	343.5679	(73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d			Gains W
North				6.9400	10.6334	0.6300	0.7000			0.7700			22.5529 (74)
East				7.0000	19.6403	0.6300	0.7000			0.7700			42.0162 (76)
West				5.6200	19.6403	0.6300	0.7000			0.7700			33.7330 (80)
Solar gains	98.3022	191.2815	317.2712	473.5468	594.6487	616.1532	583.4793	490.8080	371.8765	227.1347	122.2724	81.0938	(83)
Total gains	452.7908	544.4665	658.1877	794.2008	893.8453	895.3324	850.0644	761.2262	653.0572	528.7160	447.3601	424.6617	(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	46.7729	46.8543	46.9343	47.3140	47.3857	47.7225	47.7225	47.7854	47.5922	47.3857	47.2408	47.0903	
alpha	4.1182	4.1236	4.1290	4.1543	4.1590	4.1815	4.1815	4.1857	4.1728	4.1590	4.1494	4.1394	
util living area	0.9969	0.9930	0.9802	0.9352	0.8266	0.6567	0.5036	0.5749	0.8313	0.9708	0.9942	0.9977	(86)
MIT	19.3835	19.5798	19.9265	20.3777	20.7393	20.9285	20.9816	20.9688	20.8034	20.3062	19.7580	19.3469	(87)
Th 2	19.9102	19.9119	19.9135	19.9213	19.9227	19.9295	19.9295	19.9308	19.9269	19.9227	19.9198	19.9167	(88)
util rest of house	0.9960	0.9910	0.9743	0.9155	0.7765	0.5683	0.3889	0.4554	0.7618	0.9584	0.9922	0.9970	(89)
MIT 2	18.4364	18.6331	18.9775	19.4194	19.7447	19.8947	19.9242	19.9206	19.8111	19.3607	18.8175	18.4049	(90)
Living area fraction	fLA = Living area / (4) =												0.1825 (91)
MIT	18.6093	18.8058	19.1507	19.5943	19.9262	20.0833	20.1171	20.1119	19.9922	19.5332	18.9891	18.5768	(92)
Temperature adjustment													0.0000
adjusted MIT	18.6093	18.8058	19.1507	19.5943	19.9262	20.0833	20.1171	20.1119	19.9922	19.5332	18.9891	18.5768	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	450.3176	538.0379	637.6693	721.2858	694.2590	520.9446	348.2758	362.8809	500.6836	503.5976	442.7582	422.8661	(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	1467.8445	1423.9848	1293.2419	1084.4741	832.9308	551.2884	353.6057	372.6954	594.0162	904.5200	1207.5058	1464.8295	(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	757.0400	595.3564	487.7460	261.4956	103.1718	0.0000	0.0000	0.0000	0.0000	298.2863	550.6183	775.2207	(98)
Space heating													3828.9351 (98)
Space heating per m2	(98) / (4) =												45.2486 (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	945.0653	743.9876	763.0897	0.0000	0.0000	0.0000	0.0000	(100)

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Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8749	0.9248	0.8944	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	826.8266	688.0247	682.5273	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1141.7443	1086.8375	984.6053	0.0000	0.0000	0.0000	0.0000 (103)
Month fracti	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000 (103a)
Space cooling kWh												
Space cooling	0.0000	0.0000	0.0000	0.0000	0.0000	226.7407	296.7167	224.7461	0.0000	0.0000	0.0000	0.0000 (104)
Space cooling												748.2035 (104)
Cooled fraction									FC = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)												
Intermittency factor	0.0000	0.0000	0.0000	0.0000	0.0000	0.2500	0.2500	0.2500	0.0000	0.0000	0.0000	0.0000 (106)
Space cooling kWh												
Space cooling	0.0000	0.0000	0.0000	0.0000	0.0000	56.6852	74.1792	56.1865	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling												187.0509 (107)
Space cooling per m2												2.2105 (108)
Energy for space heating												45.2486 (99)
Energy for space cooling												2.2105 (108)
Total												47.4591 (109)
Dwelling Fabric Energy Efficiency (DFEE)												47.5 (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	42.3100 (1b)	x 2.3900 (2b)	= 101.1209 (1b) - (3b)
First floor	42.3100 (1c)	x 2.5600 (2c)	= 108.3136 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	84.6200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 209.4345 (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																3 * 10 =	30.0000 (7a)
Number of passive vents																0 * 10 =	0.0000 (7b)
Number of flueless gas fires																0 * 40 =	0.0000 (7c)
										Air changes per hour							
Infiltration due to chimneys, flues and fans										= (6a)+(6b)+(7a)+(7b)+(7c) =					30.0000	/ (5) =	0.1432 (8)
Pressure test										Yes							
Measured/design AP50										5.0000							
Infiltration rate										0.3932 (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) =					0.3343 (21)		
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec					
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	0.4262	0.4178	0.4095	0.3677	0.3593	0.3175	0.3175	0.3092	0.3343	0.3593	0.3760	0.3928	(22b)				
Effective ac	0.5908	0.5873	0.5838	0.5676	0.5646	0.5504	0.5504	0.5478	0.5559	0.5646	0.5707	0.5771	(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)			19.0200	1.3258	25.2159		(27)					
Ground Floor			42.3100	0.1300	5.5003		(28a)					
Brick and Block	93.8000	21.1700	72.6300	0.1800	13.0734		(29a)					
Pitched Roof	42.3100		42.3100	0.1300	5.5003		(30)					
Total net area of external elements Aum(A, m2)			178.4200				(31)					
Fabric heat loss, W/K = Sum (A x U)				(26) ... (30) + (32) =	51.4399		(33)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							11.5356 (36)					
Total fabric heat loss						(33) + (36) =	62.9755 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 40.8331	Feb 40.5894	Mar 40.3505	Apr 39.2284	May 39.0185	Jun 38.0412	Jul 38.0412	Aug 37.8602	Sep 38.4176	Oct 39.0185	Nov 39.4432	Dec 39.8872 (38)
Heat transfer coeff	103.8086	103.5649	103.3260	102.2039	101.9940	101.0167	101.0167	100.8357	101.3931	101.9940	102.4187	102.8627 (39)
Average = Sum(39)m / 12 =												102.2029 (39)
HLP	Jan 1.2268	Feb 1.2239	Mar 1.2211	Apr 1.2078	May 1.2053	Jun 1.1938	Jul 1.1938	Aug 1.1916	Sep 1.1982	Oct 1.2053	Nov 1.2103	Dec 1.2156 (40)
HLP (average)												1.2078 (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												2.5447 (42)
Average daily hot water use (litres/day)												94.6367 (43)
Daily hot water use	Jan 104.1003	Feb 100.3149	Mar 96.5294	Apr 92.7439	May 88.9585	Jun 85.1730	Jul 85.1730	Aug 88.9585	Sep 92.7439	Oct 96.5294	Nov 100.3149	Dec 104.1003 (44)
Energy conte	154.3778	135.0198	139.3284	121.4698	116.5532	100.5765	93.1990	106.9472	108.2245	126.1252	137.6755	149.5067 (45)
Energy content (annual)												Total = Sum(45)m = 1489.0034 (45)
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												

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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	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	0.0000 (59)
	32.8053	28.6917	29.6073	25.8123	24.7676	21.3725	19.8048	22.7263	22.9977	26.8016	29.2560	31.7702	(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	127.2351	127.2351	127.2351	127.2351	127.2351	127.2351	127.2351	127.2351	127.2351	127.2351	127.2351	127.2351	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	20.3973	18.1167	14.7335	11.1542	8.3379	7.0392	7.6061	9.8867	13.2699	16.8492	19.6655	20.9642	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	228.8250	231.1995	225.2159	212.4774	196.3974	181.2845	171.1881	168.8137	174.7973	187.5357	203.6157	218.7287	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.7235	35.7235	35.7235	35.7235	35.7235	35.7235	35.7235	35.7235	35.7235	35.7235	35.7235	35.7235	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	(71)
Water heating gains (Table 5)	44.0931	42.6960	39.7947	35.8505	33.2897	29.6841	26.6193	30.5461	31.9412	36.0237	40.6334	42.7018	(72)
Total internal gains	354.4860	353.1827	340.9146	320.6526	299.1956	279.1783	266.5841	270.4169	281.1790	301.5791	325.0851	343.5652	(73)

6. Solar gains													

[Jan]			Area	Solar flux		g		FF		Access		Gains	
			m2	Table 6a		Specific data		Specific data		factor		W	
				W/m2		or Table 6b		or Table 6c		Table 6d			
North			6.7500	10.6334		0.6300		0.7000		0.7700		21.9355	(74)
East			6.8100	19.6403		0.6300		0.7000		0.7700		40.8758	(76)
West			5.4600	19.6403		0.6300		0.7000		0.7700		32.7727	(80)

Solar gains	95.5840	185.9919	308.4982	460.4554	578.2133	599.1254	567.3537	477.2408	361.5943	220.8537	118.8912	78.8514	(83)
Total gains	450.0699	539.1746	649.4128	781.1081	877.4088	878.3037	833.9378	747.6578	642.7733	522.4328	443.9764	422.4166	(84)

7. Mean internal temperature (heating season)													

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
alpha	56.6079	56.7411	56.8723	57.4967	57.6151	58.1725	58.1725	58.2769	57.9565	57.6151	57.3761	57.1285	
util living area	4.7739	4.7827	4.7915	4.8331	4.8410	4.8782	4.8782	4.8851	4.8638	4.8410	4.8251	4.8086	
	0.9988	0.9969	0.9896	0.9571	0.8594	0.6839	0.5211	0.5961	0.8626	0.9833	0.9975	0.9991	(86)
MIT	19.5945	19.7627	20.0626	20.4628	20.7863	20.9495	20.9891	20.9800	20.8403	20.3989	19.9233	19.5676	(87)
Th 2	19.8986	19.9009	19.9032	19.9138	19.9157	19.9250	19.9250	19.9267	19.9214	19.9157	19.9117	19.9076	(88)
util rest of house													
	0.9984	0.9959	0.9857	0.9406	0.8092	0.5894	0.3999	0.4689	0.7923	0.9743	0.9964	0.9988	(89)
MIT 2	18.6181	18.7876	19.0872	19.4844	19.7751	19.9027	19.9224	19.9212	19.8323	19.4310	18.9569	18.5983	(90)
Living area fraction													
MIT	18.7963	18.9655	19.2652	19.6629	19.9596	20.0937	20.1170	20.1144	20.0162	19.6076	19.1333	18.7751	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.7963	18.9655	19.2652	19.6629	19.9596	20.0937	20.1170	20.1144	20.0162	19.6076	19.1333	18.7751	(93)

8. Space heating requirement													

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9978	0.9946	0.9827	0.9359	0.8115	0.6053	0.4222	0.4923	0.7996	0.9709	0.9953	0.9984	(94)
Ext temp.	449.0771	536.2373	638.1695	731.0232	712.0281	531.6299	352.0797	368.0461	513.9579	507.2123	441.9107	421.7296	(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	1504.8373	1456.6941	1318.9720	1100.0141	842.4334	554.9599	355.2761	374.5415	599.8657	918.7260	1232.4304	1499.2360	(97)
Space heating kWh	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	(97a)
Space heating	785.4856	618.5469	506.5171	265.6735	97.0216	0.0000	0.0000	0.0000	0.0000	306.1662	569.1742	801.6648	(98)
Space heating per m2												3950.2498	(98)
										(98) / (4) =		46.6822	(99)

8c. Space cooling requirement													

Calculated for June, July and August. See Table 10b													
Ext. temp.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	949.5569	747.5235	766.3514	0.0000	0.0000	0.0000	0.0000	(100)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.8910	0.9400	0.9111	0.0000	0.0000	0.0000	0.0000	(101)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	846.0606	702.6577	698.2485	0.0000	0.0000	0.0000	0.0000	(102)
Month fracti	0.0000	0.0000	0.0000	0.0000	0.0000	1121.8394	1067.9869	968.7444	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	(103a)
Space cooling	0.0000	0.0000	0.0000	0.0000	0.0000	198.5607	271.8049	201.2489	0.0000	0.0000	0.0000	0.0000	(104)
												671.6145	(104)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)



CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

Cooled fraction											FC = cooled area / (4) =	1.0000 (105)
Intermittency factor (Table 10b)	0.0000	0.0000	0.0000	0.0000	0.0000	0.2500	0.2500	0.2500	0.0000	0.0000	0.0000	0.0000 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	49.6402	67.9512	50.3122	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling												167.9036 (107)
Space cooling per m2												1.9842 (108)
Energy for space heating												46.6822 (99)
Energy for space cooling												1.9842 (108)
Total												48.6664 (109)
Target Fabric Energy Efficiency (TFEE)												56.0 (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	42.3100 (1b)	x 2.3900 (2b)	= 101.1209 (1b) - (3b)
First floor	42.3100 (1c)	x 2.5600 (2c)	= 108.3136 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	84.6200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 209.4345 (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												3.8600	
Infiltration rate												0.1930 (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) =			0.1641 (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)	
	0.1928	0.1805	0.1805	0.1641	0.1682	0.1599	0.1599	0.1558	0.1558	0.1682	0.1641	0.1682 (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)			19.5600	1.1450	22.3969		(27)					
Ground Floor			42.3100	0.1200	5.0772	84.0000	3554.0400 (28a)					
Brick and Block	93.8000	21.7100	72.0900	0.2400	17.3016	42.2200	3043.6398 (29a)					
Pitched Roof	42.3100		42.3100	0.1000	4.2310	9.1000	385.0210 (30)					
Total net area of external elements Aum(A, m2)			178.4200				(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	51.3717		(33)					
Party Wall 1			43.5900	0.0000	0.0000	110.0000	4794.9000 (32)					
Ground Floor Block			43.1200			75.0000	3234.0000 (32c)					
Ground Floor Stud			29.3800			9.0000	264.4200 (32c)					
First Floor Stud			94.9200			9.0000	854.2800 (32c)					
Internal Floor 1			42.3100			18.0000	761.5800 (32d)					
Internal Ceiling 1			42.3100			18.0000	761.5800 (32e)					
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		17653.4608 (34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							208.6204 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							12.0629 (36)					
Total fabric heat loss						(33) + (36) =	63.4346 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 34.5567	Feb 34.5567	Mar 34.5567	Apr 34.5567	May 34.5567	Jun 34.5567	Jul 34.5567	Aug 34.5567	Sep 34.5567	Oct 34.5567	Nov 34.5567	Dec 34.5567 (38)
Heat transfer coeff	97.9913	97.9913	97.9913	97.9913	97.9913	97.9913	97.9913	97.9913	97.9913	97.9913	97.9913	97.9913 (39)
Average = Sum(39)m / 12 =												97.9913 (39)
HLP	Jan 1.1580	Feb 1.1580	Mar 1.1580	Apr 1.1580	May 1.1580	Jun 1.1580	Jul 1.1580	Aug 1.1580	Sep 1.1580	Oct 1.1580	Nov 1.1580	Dec 1.1580 (40)
HLP (average)												1.1580 (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												2.5447 (42)
Average daily hot water use (litres/day)												94.6367 (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	104.1003	100.3149	96.5294	92.7439	88.9585	85.1730	85.1730	88.9585	92.7439	96.5294	100.3149	104.1003 (44)
Energy conte	154.3778	135.0198	139.3284	121.4698	116.5532	100.5765	93.1990	106.9472	108.2245	126.1252	137.6755	149.5067 (45)
Energy content (annual)										Total =	Sum(45)m =	1489.0034 (45)
Distribution loss (46)m = 0.15 x (45)m	23.1567	20.2530	20.8993	18.2205	17.4830	15.0865	13.9798	16.0421	16.2337	18.9188	20.6513	22.4260 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	0.6706	0.6070	0.6052	0.5070	0.4666	0.3855	0.3572	0.4281	0.4517	0.5479	0.6189	0.6495 (61)
Total heat required for water heating calculated for each month	155.0484	135.6268	139.9336	121.9768	117.0198	100.9620	93.5562	107.3753	108.6761	126.6730	138.2944	150.1561 (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	155.0484	135.6268	139.9336	121.9768	117.0198	100.9620	93.5562	107.3753	108.6761	126.6730	138.2944	150.1561 (64)
RHI water heating demand												
Heat gains from water heating, kWh/month	51.4983	45.0458	46.4780	40.5155	38.8706	33.5381	31.0780	35.6670	36.0975	42.0736	45.9318	49.8733 (65)
												1495 (64)

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

Metabolic gains (Table 5), Watts												
(66)m	152.6821	152.6821	152.6821	152.6821	152.6821	152.6821	152.6821	152.6821	152.6821	152.6821	152.6821	152.6821 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	50.9998	45.2976	36.8385	27.8891	20.8474	17.6003	19.0177	24.7199	33.1790	42.1284	49.1701	52.4172 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	341.5299	345.0739	336.1431	317.1305	293.1305	270.5739	255.5047	251.9607	260.8915	279.9041	303.9041	326.4607 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	52.8129	52.8129	52.8129	52.8129	52.8129	52.8129	52.8129	52.8129	52.8129	52.8129	52.8129	52.8129 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881 (71)
Water heating gains (Table 5)	69.2181	67.0325	62.4704	56.2715	52.2454	46.5807	41.7714	47.9395	50.1355	56.5505	63.7942	67.0340 (72)
Total internal gains	568.4548	564.1109	542.1589	507.9980	472.9303	441.4618	423.0008	431.3270	450.9130	485.2900	523.5753	552.6189 (73)

6. Solar gains

[Jan]		Area	Solar flux	g	FF	Access	Gains
		m2	Table 6a	W/m2	Specific data	factor	W
					or Table 6b	Table 6d	
North		6.9400	13.4684	0.6300	0.7000	0.7700	28.5659 (74)
East		7.0000	25.1733	0.6300	0.7000	0.7700	53.8529 (76)
West		5.6200	25.1733	0.6300	0.7000	0.7700	43.2362 (80)

Solar gains	125.6550	208.5930	352.4555	526.7699	620.3782	710.0429	646.5250	569.1135	432.1572	267.4361	155.9119	98.0382 (83)
Total gains	694.1098	772.7039	894.6144	1034.7679	1093.3085	1151.5046	1069.5258	1000.4406	883.0702	752.7261	679.4872	650.6571 (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	50.0426	50.0426	50.0426	50.0426	50.0426	50.0426	50.0426	50.0426	50.0426	50.0426	50.0426	50.0426
alpha	4.3362	4.3362	4.3362	4.3362	4.3362	4.3362	4.3362	4.3362	4.3362	4.3362	4.3362	4.3362
util living area	0.9811	0.9698	0.9307	0.8253	0.6531	0.4273	0.3012	0.3120	0.5890	0.8671	0.9629	0.9847 (86)
MIT	19.9444	20.0815	20.3875	20.7270	20.9234	20.9902	20.9984	20.9982	20.9635	20.7203	20.2851	19.9055 (87)
Th 2	19.9537	19.9537	19.9537	19.9537	19.9537	19.9537	19.9537	19.9537	19.9537	19.9537	19.9537	19.9537 (88)
util rest of house	0.9757	0.9616	0.9122	0.7835	0.5834	0.3427	0.2063	0.2108	0.4920	0.8215	0.9506	0.9802 (89)
MIT 2	19.0241	19.1578	19.4508	19.7563	19.9106	19.9504	19.9535	19.9535	19.9388	19.7609	19.3588	18.9862 (90)
Living area fraction	19.1920	19.3264	19.6217	19.9334	20.0954	20.1402	20.1441	20.1441	fLA = Living area / (4) =	19.9360	19.5278	0.1825 (91)
MIT	19.1920	19.3264	19.6217	19.9334	20.0954	20.1402	20.1441	20.1441	20.1257	19.9360	19.5278	19.1539 (92)
Temperature adjustment												0.0000
adjusted MIT	19.1920	19.3264	19.6217	19.9334	20.0954	20.1402	20.1441	20.1441	20.1257	19.9360	19.5278	19.1539 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9707	0.9553	0.9052	0.7826	0.5933	0.3580	0.2237	0.2293	0.5087	0.8206	0.9442	0.9757 (94)
Ext temp.	673.7893	738.1843	809.8329	809.7604	648.6638	412.2891	239.2227	229.4021	449.2321	617.6840	641.5911	634.8733 (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	1331.8965	1305.8682	1178.0264	963.5877	685.4890	415.4989	239.5054	229.7021	463.0802	767.8583	1070.8312	1318.3689 (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	489.6318	381.4836	273.9360	110.7556	27.3980	0.0000	0.0000	0.0000	0.0000	111.7296	309.0529	508.5208 (98)
RHI space heating demand												2212.5081 (98)
												2213 (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	42.3100 (1b)	x 2.3900 (2b)	= 101.1209 (1b) - (3b)
First floor	42.3100 (1c)	x 2.5600 (2c)	= 108.3136 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	84.6200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 209.4345 (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					3.8600
Infiltration rate					0.1930 (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) =		0.1641 (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	0.2092	0.2051	0.2010	0.1805	0.1764	0.1558	0.1558	0.1517	0.1641	0.1764	0.1846	0.1928 (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)			19.5600	1.1450	22.3969		(27)					
Ground Floor			42.3100	0.1200	5.0772	84.0000	3554.0400 (28a)					
Brick and Block	93.8000	21.7100	72.0900	0.2400	17.3016	42.2200	3043.6398 (29a)					
Pitched Roof	42.3100		42.3100	0.1000	4.2310	9.1000	385.0210 (30)					
Total net area of external elements Aum(A, m2)			178.4200				(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	51.3717		(33)					
Party Wall 1			43.5900	0.0000	0.0000	110.0000	4794.9000 (32)					
Ground Floor Block			43.1200			75.0000	3234.0000 (32c)					
Ground Floor Stud			29.3800			9.0000	264.4200 (32c)					
First Floor Stud			94.9200			9.0000	854.2800 (32c)					
Internal Floor 1			42.3100			18.0000	761.5800 (32d)					
Internal Ceiling 1			42.3100			18.0000	761.5800 (32e)					
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		17653.4608 (34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							208.6204 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							12.0629 (36)					
Total fabric heat loss						(33) + (36) =	63.4346 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	34.5567	34.5567	34.5567	34.5567	34.5567	34.5567	34.5567	34.5567	34.5567	34.5567	34.5567	34.5567 (38)
Average = Sum(39)m / 12 =	97.9913	97.9913	97.9913	97.9913	97.9913	97.9913	97.9913	97.9913	97.9913	97.9913	97.9913	97.9913 (39)
												97.9913 (39)
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1580	1.1580	1.1580	1.1580	1.1580	1.1580	1.1580	1.1580	1.1580	1.1580	1.1580	1.1580 (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												2.5447 (42)
Average daily hot water use (litres/day)												94.6367 (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	104.1003	100.3149	96.5294	92.7439	88.9585	85.1730	85.1730	88.9585	92.7439	96.5294	100.3149	104.1003 (44)
Energy conte	154.3778	135.0198	139.3284	121.4698	116.5532	100.5765	93.1990	106.9472	108.2245	126.1252	137.6755	149.5067 (45)
Energy content (annual)										Total = Sum (45)m =		1489.0034 (45)
Distribution loss (46)m = 0.15 x (45)m	23.1567	20.2530	20.8993	18.2205	17.4830	15.0865	13.9798	16.0421	16.2337	18.9188	20.6513	22.4260 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	0.6706	0.6070	0.6052	0.5070	0.4666	0.3855	0.3572	0.4281	0.4517	0.5479	0.6189	0.6495 (61)
Total heat required for water heating calculated for each month												
Solar input	155.0484	135.6268	139.9336	121.9768	117.0198	100.9620	93.5562	107.3753	108.6761	126.6730	138.2944	150.1561 (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	155.0484	135.6268	139.9336	121.9768	117.0198	100.9620	93.5562	107.3753	108.6761	126.6730	138.2944	150.1561 (64)
Heat gains from water heating, kWh/month	51.4983	45.0458	46.4780	40.5155	38.8706	33.5381	31.0780	35.6670	36.0975	42.0736	45.9318	49.8733 (65)
										Total per year (kWh/year) = Sum (64)m =		1495.2985 (64)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	152.6821	152.6821	152.6821	152.6821	152.6821	152.6821	152.6821	152.6821	152.6821	152.6821	152.6821	152.6821 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	50.9998	45.2976	36.8385	27.8891	20.8474	17.6003	19.0177	24.7199	33.1790	42.1284	49.1701	52.4172 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	341.5299	345.0739	336.1431	317.1305	293.1305	270.5739	255.5047	251.9607	260.8915	279.9041	303.9041	326.4607 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	52.8129	52.8129	52.8129	52.8129	52.8129	52.8129	52.8129	52.8129	52.8129	52.8129	52.8129	52.8129 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881 (71)
Water heating gains (Table 5)	69.2181	67.0325	62.4704	56.2715	52.2454	46.5807	41.7714	47.9395	50.1355	56.5505	63.7942	67.0340 (72)
Total internal gains	568.4548	564.1109	542.1589	507.9980	472.9303	441.4618	423.0008	431.3270	450.9130	485.2900	523.5753	552.6189 (73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W			
North				6.9400	10.6334	0.6300	0.7000	0.7700	22.5529 (74)			
East				7.0000	19.6403	0.6300	0.7000	0.7700	42.0162 (76)			
West				5.6200	19.6403	0.6300	0.7000	0.7700	33.7330 (80)			
Solar gains	98.3022	191.2815	317.2712	473.5468	594.6487	616.1532	583.4793	490.8080	371.8765	227.1347	122.2724	81.0938 (83)
Total gains	666.7570	755.3924	859.4301	981.5448	1067.5789	1057.6150	1006.4801	922.1350	822.7895	712.4247	645.8477	633.7127 (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	50.0426	50.0426	50.0426	50.0426	50.0426	50.0426	50.0426	50.0426	50.0426	50.0426	50.0426	50.0426
alpha	4.3362	4.3362	4.3362	4.3362	4.3362	4.3362	4.3362	4.3362	4.3362	4.3362	4.3362	4.3362
util living area	0.9878	0.9782	0.9521	0.8805	0.7433	0.5663	0.4221	0.4774	0.7254	0.9252	0.9789	0.9901 (86)
MIT	19.7535	19.9308	20.2317	20.5903	20.8499	20.9640	20.9920	20.9865	20.8990	20.5411	20.0696	19.7012 (87)
Th 2	19.9537	19.9537	19.9537	19.9537	19.9537	19.9537	19.9537	19.9537	19.9537	19.9537	19.9537	19.9537 (88)
util rest of house	0.9846	0.9724	0.9394	0.8503	0.6863	0.4838	0.3248	0.3742	0.6454	0.8990	0.9723	0.9875 (89)
MIT 2	18.8351	19.0097	19.3023	19.6369	19.8567	19.9372	19.9515	19.9497	19.8995	19.6017	19.1486	18.7835 (90)
Living area fraction									fLA = Living area / (4) =			0.1825 (91)
MIT	19.0027	19.1777	19.4719	19.8108	20.0379	20.1246	20.1414	20.1388	20.0819	19.7731	19.3166	18.9510 (92)
Temperature adjustment												0.0000
adjusted MIT	19.0027	19.1777	19.4719	19.8108	20.0379	20.1246	20.1414	20.1388	20.0819	19.7731	19.3166	18.9510 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9807	0.9670	0.9323	0.8456	0.6912	0.4978	0.3425	0.3929	0.6561	0.8935	0.9671	0.9841 (94)
Ext temp.	653.8647	730.4559	801.2237	830.0008	737.9334	526.4585	344.7690	362.3108	539.8378	636.5524	624.5828	623.6243 (95)
Heat loss rate W	4.3000	4.9000	6.5000	8.0000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Month fracti	1440.7374	1399.0932	1271.1309	1069.1672	817.0410	541.3605	347.0231	366.3747	586.1695	898.8866	1197.1238	1445.4679 (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	585.4333	449.3243	349.6110	172.1998	58.8560	0.0000	0.0000	0.0000	0.0000	195.1766	412.2295	611.4516 (98)
Space heating per m ²												2834.2821 (98)
										(98) / (4) =		33.4942 (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													3142.2196 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	585.4333	449.3243	349.6110	172.1998	58.8560	0.0000	0.0000	0.0000	0.0000	195.1766	412.2295	611.4516	(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)	649.0391	498.1422	387.5953	190.9088	65.2505	0.0000	0.0000	0.0000	0.0000	216.3821	457.0172	677.8843	(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	155.0484	135.6268	139.9336	121.9768	117.0198	100.9620	93.5562	107.3753	108.6761	126.6730	138.2944	150.1561	(64)
Efficiency of water heater	86.9128	86.5742	85.7715	83.9151	80.5226	76.4000	76.4000	76.4000	76.4000	84.2132	86.2848	76.4000	(216)
Fuel for water heating, kWh/month	178.3953	156.6595	163.1470	145.3573	145.3253	132.1493	122.4557	140.5436	142.2462	150.4195	160.2766	172.3985	(219)
Water heating fuel used													1809.3738 (219)
Annual totals kWh/year													
Space heating fuel - main system													3142.2196 (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)													60.8114 (230a)
central heating pump													30.0000 (230c)
main heating flue fan													45.0000 (230e)
Total electricity for the above, kWh/year													135.8114 (231)
Electricity for lighting (calculated in Appendix L)													360.2689 (232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV Unit 0 (0.80 * 0.80 * 1068 * 0.80) =													-546.8521 (233)
Total delivered energy for all uses													4900.8217 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	3142.2196	3.4800	109.3492 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1809.3738	3.4800	62.9662 (247)
Mechanical ventilation fans	60.8114	13.1900	8.0210 (249)
Pumps and fans for heating	75.0000	13.1900	9.8925 (249)
Energy for lighting	360.2689	13.1900	47.5195 (250)
Additional standing charges			120.0000 (251)
Energy saving/generation technologies			
PV Unit	-546.8521	13.1900	-72.1298 (252)
Total energy cost			285.6187 (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] =	0.9255 (257)
SAP value		87.0896
SAP rating (Section 12)		87 (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	3142.2196	0.2160	678.7194 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1809.3738	0.2160	390.8247 (264)
Space and water heating			1069.5442 (265)
Pumps and fans	135.8114	0.5190	70.4861 (267)
Energy for lighting	360.2689	0.5190	186.9796 (268)
Energy saving/generation technologies			
PV Unit	-546.8521	0.5190	-283.8162 (269)
Total kg/year			1043.1936 (272)
CO2 emissions per m2			12.3300 (273)
EI value			89.2156
EI rating			89 (274)

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EI band

B

Calculation of stars for heating and DHW	

Main heating energy efficiency	$3.48 \times (1 + 0.29 \times 0.00) / 0.9020 = 3.858$, stars = 4
Main heating environmental impact	$0.216 \times (1 + 0.29 \times 0.00) / 0.9020 = 0.2395$, stars = 4
Water heating energy efficiency	$3.48 / 0.8224 = 4.231$, stars = 4
Water heating environmental impact	$0.216 / 0.8224 = 0.2626$, 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	42.3100 (1b)	x 2.3900 (2b)	= 101.1209 (1b) - (3b)
First floor	42.3100 (1c)	x 2.5600 (2c)	= 108.3136 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	84.6200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 209.4345 (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												3.8600
Infiltration rate												0.1930 (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) =	0.1641 (21)
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	4.7000	4.4000	4.4000	4.0000	4.1000	3.9000	3.9000	3.8000	3.8000	4.1000	4.0000	4.1000 (22)
Wind factor	1.1750	1.1000	1.1000	1.0000	1.0250	0.9750	0.9750	0.9500	0.9500	1.0250	1.0000	1.0250 (22a)
Adj infilt rate												
	0.1928	0.1805	0.1805	0.1641	0.1682	0.1599	0.1599	0.1558	0.1558	0.1682	0.1641	0.1682 (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)			19.5600	1.1450	22.3969		(27)					
Ground Floor			42.3100	0.1200	5.0772	84.0000	3554.0400 (28a)					
Brick and Block	93.8000	21.7100	72.0900	0.2400	17.3016	42.2200	3043.6398 (29a)					
Pitched Roof	42.3100		42.3100	0.1000	4.2310	9.1000	385.0210 (30)					
Total net area of external elements Aum(A, m2)			178.4200				(31)					
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =	51.3717			(33)					
Party Wall 1			43.5900	0.0000	0.0000	110.0000	4794.9000 (32)					
Ground Floor Block			43.1200			75.0000	3234.0000 (32c)					
Ground Floor Stud			29.3800			9.0000	264.4200 (32c)					
First Floor Stud			94.9200			9.0000	854.2800 (32c)					
Internal Floor 1			42.3100			18.0000	761.5800 (32d)					
Internal Ceiling 1			42.3100			18.0000	761.5800 (32e)					
Heat capacity Cm = Sum(A x k)				(28) ... (30) + (32) + (32a) ... (32e) =	17653.4608		(34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							208.6204 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							12.0629 (36)					
Total fabric heat loss				(33) + (36) =	63.4346		(37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 34.5567	Feb 34.5567	Mar 34.5567	Apr 34.5567	May 34.5567	Jun 34.5567	Jul 34.5567	Aug 34.5567	Sep 34.5567	Oct 34.5567	Nov 34.5567	Dec 34.5567 (38)
Heat transfer coeff	97.9913	97.9913	97.9913	97.9913	97.9913	97.9913	97.9913	97.9913	97.9913	97.9913	97.9913	97.9913 (39)
Average = Sum(39)m / 12 =												97.9913 (39)
HLP	Jan 1.1580	Feb 1.1580	Mar 1.1580	Apr 1.1580	May 1.1580	Jun 1.1580	Jul 1.1580	Aug 1.1580	Sep 1.1580	Oct 1.1580	Nov 1.1580	Dec 1.1580 (40)
HLP (average)												1.1580 (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												2.5447 (42)
Average daily hot water use (litres/day)												94.6367 (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	104.1003	100.3149	96.5294	92.7439	88.9585	85.1730	85.1730	88.9585	92.7439	96.5294	100.3149	104.1003 (44)
Energy conte	154.3778	135.0198	139.3284	121.4698	116.5532	100.5765	93.1990	106.9472	108.2245	126.1252	137.6755	149.5067 (45)
Energy content (annual)										Total = Sum (45)m =		1489.0034 (45)
Distribution loss (46)m = 0.15 x (45)m	23.1567	20.2530	20.8993	18.2205	17.4830	15.0865	13.9798	16.0421	16.2337	18.9188	20.6513	22.4260 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	0.6706	0.6070	0.6052	0.5070	0.4666	0.3855	0.3572	0.4281	0.4517	0.5479	0.6189	0.6495 (61)
Total heat required for water heating calculated for each month												
Solar input	155.0484	135.6268	139.9336	121.9768	117.0198	100.9620	93.5562	107.3753	108.6761	126.6730	138.2944	150.1561 (62)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63)
Output from w/h	155.0484	135.6268	139.9336	121.9768	117.0198	100.9620	93.5562	107.3753	108.6761	126.6730	138.2944	150.1561 (64)
Heat gains from water heating, kWh/month	51.4983	45.0458	46.4780	40.5155	38.8706	33.5381	31.0780	35.6670	36.0975	42.0736	45.9318	49.8733 (65)
										Total per year (kWh/year) = Sum (64)m =		1495.2985 (64)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	152.6821	152.6821	152.6821	152.6821	152.6821	152.6821	152.6821	152.6821	152.6821	152.6821	152.6821	152.6821	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	50.9998	45.2976	36.8385	27.8891	20.8474	17.6003	19.0177	24.7199	33.1790	42.1284	49.1701	52.4172	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	341.5299	345.0739	336.1431	317.1305	293.1305	270.5739	255.5047	251.9607	260.8915	279.9041	303.9041	326.4607	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	52.8129	52.8129	52.8129	52.8129	52.8129	52.8129	52.8129	52.8129	52.8129	52.8129	52.8129	52.8129	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	(71)
Water heating gains (Table 5)	69.2181	67.0325	62.4704	56.2715	52.2454	46.5807	41.7714	47.9395	50.1355	56.5505	63.7942	67.0340	(72)
Total internal gains	568.4548	564.1109	542.1589	507.9980	472.9303	441.4618	423.0008	431.3270	450.9130	485.2900	523.5753	552.6189	(73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W
North				6.9400	13.4684		0.6300		0.7000		0.7700		28.5659 (74)
East				7.0000	25.1733		0.6300		0.7000		0.7700		53.8529 (76)
West				5.6200	25.1733		0.6300		0.7000		0.7700		43.2362 (80)
Solar gains	125.6550	208.5930	352.4555	526.7699	620.3782	710.0429	646.5250	569.1135	432.1572	267.4361	155.9119		98.0382 (83)
Total gains	694.1098	772.7039	894.6144	1034.7679	1093.3085	1151.5046	1069.5258	1000.4406	883.0702	752.7261	679.4872		650.6571 (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	50.0426	50.0426	50.0426	50.0426	50.0426	50.0426	50.0426	50.0426	50.0426	50.0426	50.0426	50.0426	
alpha	4.3362	4.3362	4.3362	4.3362	4.3362	4.3362	4.3362	4.3362	4.3362	4.3362	4.3362	4.3362	
util living area	0.9811	0.9698	0.9307	0.8253	0.6531	0.4273	0.3012	0.3120	0.5890	0.8671	0.9629	0.9847	(86)
MIT	19.9444	20.0815	20.3875	20.7270	20.9234	20.9902	20.9984	20.9982	20.9635	20.7203	20.2851	19.9055	(87)
Th 2	19.9537	19.9537	19.9537	19.9537	19.9537	19.9537	19.9537	19.9537	19.9537	19.9537	19.9537	19.9537	(88)
util rest of house	0.9757	0.9616	0.9122	0.7835	0.5834	0.3427	0.2063	0.2108	0.4920	0.8215	0.9506	0.9802	(89)
MIT 2	19.0241	19.1578	19.4508	19.7563	19.9106	19.9504	19.9535	19.9535	19.9388	19.7609	19.3588	18.9862	(90)
Living area fraction									fLA = Living area / (4) =			0.1825	(91)
MIT	19.1920	19.3264	19.6217	19.9334	20.0954	20.1402	20.1441	20.1441	20.1257	19.9360	19.5278	19.1539	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.1920	19.3264	19.6217	19.9334	20.0954	20.1402	20.1441	20.1441	20.1257	19.9360	19.5278	19.1539	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	0.9707	0.9553	0.9052	0.7826	0.5933	0.3580	0.2237	0.2293	0.5087	0.8206	0.9442	0.9757	(94)
Useful gains	673.7893	738.1843	809.8329	809.7604	648.6638	412.2891	239.2227	229.4021	449.2321	617.6840	641.5911	634.8733	(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	1331.8965	1305.8682	1178.0264	963.5877	685.4890	415.4989	239.5054	229.7021	463.0802	767.8583	1070.8312	1318.3689	(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	489.6318	381.4836	273.9360	110.7556	27.3980	0.0000	0.0000	0.0000	0.0000	111.7296	309.0529	508.5208	(98)
Space heating												2212.5081	(98)
Space heating per m2												(98) / (4) =	26.1464 (99)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

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

8c. Space cooling requirement

Not applicable

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													90.2000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													2452.8915 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	489.6318	381.4836	273.9360	110.7556	27.3980	0.0000	0.0000	0.0000	0.0000	111.7296	309.0529	508.5208	(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)	542.8290	422.9308	303.6984	122.7889	30.3747	0.0000	0.0000	0.0000	0.0000	123.8687	342.6307	563.7702	(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	155.0484	135.6268	139.9336	121.9768	117.0198	100.9620	93.5562	107.3753	108.6761	126.6730	138.2944	150.1561	(64)
Efficiency of water heater (217)m	86.4447	86.1201	85.0083	82.3994	78.6838	76.4000	76.4000	76.4000	76.4000	82.3011	85.4296	76.4000	(216)
Fuel for water heating, kWh/month	179.3614	157.4857	164.6116	148.0312	148.7216	132.1493	122.4557	140.5436	142.2462	153.9141	161.8811	173.3250	(219)
Water heating fuel used												1824.7264	(219)
Annual totals kWh/year													
Space heating fuel - main system												2452.8915	(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)													60.8114 (230a)
central heating pump													30.0000 (230c)
main heating flue fan													45.0000 (230e)
Total electricity for the above, kWh/year													135.8114 (231)
Electricity for lighting (calculated in Appendix L)													360.2689 (232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV Unit 0 (0.80 * 0.80 * 1184 * 0.80) =										-606.1655			-606.1655 (233)
Total delivered energy for all uses													4167.5328 (238)

10a. Fuel costs - using BEDF prices (556)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2452.8915	5.9600	146.1923 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1824.7264	5.9600	108.7537 (247)
Mechanical ventilation fans	60.8114	25.0500	15.2333 (249)
Pumps and fans for heating	75.0000	25.0500	18.7875 (249)
Energy for lighting	360.2689	25.0500	90.2474 (250)
Additional standing charges			112.0000 (251)
Energy saving/generation technologies			
PV Unit	-606.1655	25.0500	-151.8445 (252)
Total energy cost			339.3697 (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	2452.8915	0.2160	529.8246 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1824.7264	0.2160	394.1409 (264)
Space and water heating			923.9655 (265)
Pumps and fans	135.8114	0.5190	70.4861 (267)
Energy for lighting	360.2689	0.5190	186.9796 (268)
Energy saving/generation technologies			
PV Unit	-606.1655	0.5190	-314.5999 (269)
Total kg/year			866.8313 (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	2452.8915	1.2200	2992.5276 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1824.7264	1.2200	2226.1662 (264)
Space and water heating			5218.6939 (265)
Pumps and fans	135.8114	3.0700	416.9410 (267)
Energy for lighting	360.2689	3.0700	1106.0256 (268)

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Energy saving/generation technologies			
PV Unit	-606.1655	3.0700	-1860.9280 (269)
Primary energy kWh/year			4880.7325 (272)
Primary energy kWh/m2/year			57.6782 (273)

SAP 2012 EPC IMPROVEMENTS

Current energy efficiency rating:	B 87
Current environmental impact rating:	B 89

(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	-£ 51	-204 kg (23.6%)

Recommended measures	Typical annual savings	Energy efficiency	Environmental impact
Solar water heating	£51 2.42 kg/m²	B 88	B 91
Total Savings	£51 2.42 kg/m²		

Potential energy efficiency rating:	B 88
Potential environmental impact rating:	B 91

Fuel prices for cost data on this page from database revision number 556 TEST (29 Nov 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	£124	£137	-£13
Mains gas	£367	£303	£64
Space heating	£292	£292	£0
Water heating	£109	£58	£51
Lighting	£90	£90	£0
Generated (PV)	-£152	-£152	£0
Total cost of fuels	£339	£288	£51
Total cost of uses	£339	£288	£51
Delivered energy	49 kWh/m²	37 kWh/m²	12 kWh/m²
Carbon dioxide emissions	0.9 tonnes	0.7 tonnes	0.2 tonnes
CO2 emissions per m²	10 kg/m²	8 kg/m²	2 kg/m²
Primary energy	58 kWh/m²	44 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	42.3100 (1b)	x 2.3900 (2b)	= 101.1209 (1b) - (3b)
First floor	42.3100 (1c)	x 2.5600 (2c)	= 108.3136 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	84.6200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 209.4345 (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					3.8600
Infiltration rate					0.1930 (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)	=	0.1641 (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	0.2092	0.2051	0.2010	0.1805	0.1764	0.1558	0.1558	0.1517	0.1641	0.1764	0.1846	0.1928 (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)			19.5600	1.1450	22.3969		(27)					
Ground Floor			42.3100	0.1200	5.0772	84.0000	3554.0400 (28a)					
Brick and Block	93.8000	21.7100	72.0900	0.2400	17.3016	42.2200	3043.6398 (29a)					
Pitched Roof	42.3100		42.3100	0.1000	4.2310	9.1000	385.0210 (30)					
Total net area of external elements Aum(A, m2)			178.4200				(31)					
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =	51.3717			(33)					
Party Wall 1			43.5900	0.0000	0.0000	110.0000	4794.9000 (32)					
Ground Floor Block			43.1200			75.0000	3234.0000 (32c)					
Ground Floor Stud			29.3800			9.0000	264.4200 (32c)					
First Floor Stud			94.9200			9.0000	854.2800 (32c)					
Internal Floor 1			42.3100			18.0000	761.5800 (32d)					
Internal Ceiling 1			42.3100			18.0000	761.5800 (32e)					
Heat capacity Cm = Sum(A x k)				(28) ... (30) + (32) + (32a) ... (32e) =	17653.4608		(34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							208.6204 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							12.0629 (36)					
Total fabric heat loss				(33) + (36) =	63.4346		(37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	34.5567	34.5567	34.5567	34.5567	34.5567	34.5567	34.5567	34.5567	34.5567	34.5567	34.5567	34.5567 (38)
Average = Sum(39)m / 12 =	97.9913	97.9913	97.9913	97.9913	97.9913	97.9913	97.9913	97.9913	97.9913	97.9913	97.9913	97.9913 (39)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.1580	1.1580	1.1580	1.1580	1.1580	1.1580	1.1580	1.1580	1.1580	1.1580	1.1580	1.1580 (40)
HLP (average)												1.1580 (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												2.5447 (42)
Average daily hot water use (litres/day)												94.6367 (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 FOR IMPROVED DWELLING 09 Jan 2014

Daily hot water use	104.1003	100.3149	96.5294	92.7439	88.9585	85.1730	85.1730	88.9585	92.7439	96.5294	100.3149	104.1003 (44)
Energy conte	154.3778	135.0198	139.3284	121.4698	116.5532	100.5765	93.1990	106.9472	108.2245	126.1252	137.6755	149.5067 (45)
Energy content (annual)												
Distribution loss (46)m = 0.15 x (45)m	23.1567	20.2530	20.8993	18.2205	17.4830	15.0865	13.9798	16.0421	16.2337	18.9188	20.6513	22.4260 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	0.6706	0.6070	0.6052	0.5070	0.4666	0.3855	0.3572	0.4281	0.4517	0.5479	0.6189	0.6495 (61)
Total heat required for water heating calculated for each month	155.0484	135.6268	139.9336	121.9768	117.0198	100.9620	93.5562	107.3753	108.6761	126.6730	138.2944	150.1561 (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												1.2180 (H8)
Utilisation factor												0.5600 (H9)
Collector performance factor												0.8793 (H10)
Dedicated solar storage volume												75.0000 (H11)
Effective solar volume												75.0000 (H13)
Daily hot water demand												94.6367 (H14)
Volume ratio Veff/V												0.7925 (H15)
Solar storage volume factor												0.9535 (H16)
Solar input												-851.5159 (H17)
Solar input	-24.6923	-41.2043	-70.1756	-94.0492	-116.1898	-114.2331	-112.7235	-98.4871	-77.1351	-52.6742	-29.2886	-20.6632 (63)
Solar input (sum of months) = Sum (63)m =												-851.5159 (63)
Output from w/h	130.3562	94.4225	69.7580	27.9276	0.8300	0.0000	0.0000	8.8882	31.5410	73.9988	109.0058	129.4929 (64)
Total per year (kWh/year) = Sum (64)m =												676.2210 (64)
Heat gains from water heating, kWh/month	51.4983	45.0458	46.4780	40.5155	38.8706	33.5381	31.0780	35.6670	36.0975	42.0736	45.9318	49.8733 (65)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	152.6821	152.6821	152.6821	152.6821	152.6821	152.6821	152.6821	152.6821	152.6821	152.6821	152.6821	152.6821	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	50.9998	45.2976	36.8385	27.8891	20.8474	17.6003	19.0177	24.7199	33.1790	42.1284	49.1701	52.4172	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	341.5299	345.0739	336.1431	317.1305	293.1305	270.5739	255.5047	251.9607	260.8915	279.9041	303.9041	326.4607	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	52.8129	52.8129	52.8129	52.8129	52.8129	52.8129	52.8129	52.8129	52.8129	52.8129	52.8129	52.8129	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	(71)
Water heating gains (Table 5)	69.2181	67.0325	62.4704	56.2715	52.2454	46.5807	41.7714	47.9395	50.1355	56.5505	63.7942	67.0340	(72)
Total internal gains	568.4548	564.1109	542.1589	507.9980	472.9303	441.4618	423.0008	431.3270	450.9130	485.2900	523.5753	552.6189	(73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a		g	FF		Access		Gains
					W/m2		Specific data or Table 6b	Specific data or Table 6c		factor Table 6d		W
North				6.9400	10.6334		0.6300	0.7000		0.7700		22.5529 (74)
East				7.0000	19.6403		0.6300	0.7000		0.7700		42.0162 (76)
West				5.6200	19.6403		0.6300	0.7000		0.7700		33.7330 (80)
Solar gains	98.3022	191.2815	317.2712	473.5468	594.6487	616.1532	583.4793	490.8080	371.8765	227.1347	122.2724	81.0938 (83)
Total gains	666.7570	755.3924	859.4301	981.5448	1067.5789	1057.6150	1006.4801	922.1350	822.7895	712.4247	645.8477	633.7127 (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	50.0426	50.0426	50.0426	50.0426	50.0426	50.0426	50.0426	50.0426	50.0426	50.0426	50.0426	50.0426	
alpha	4.3362	4.3362	4.3362	4.3362	4.3362	4.3362	4.3362	4.3362	4.3362	4.3362	4.3362	4.3362	
util living area	0.9878	0.9782	0.9521	0.8805	0.7433	0.5663	0.4221	0.4774	0.7254	0.9252	0.9789	0.9901	(86)
MIT	19.7535	19.9308	20.2317	20.5903	20.8499	20.9640	20.9920	20.9865	20.8990	20.5411	20.0696	19.7012	(87)
Th 2	19.9537	19.9537	19.9537	19.9537	19.9537	19.9537	19.9537	19.9537	19.9537	19.9537	19.9537	19.9537	(88)
util rest of house	0.9846	0.9724	0.9394	0.8503	0.6863	0.4838	0.3248	0.3742	0.6454	0.8990	0.9723	0.9875	(89)
MIT 2	18.8351	19.0097	19.3023	19.6369	19.8567	19.9372	19.9515	19.9497	19.8995	19.6017	19.1486	18.7835	(90)
Living area fraction													0.1825 (91)
MIT	19.0027	19.1777	19.4719	19.8108	20.0379	20.1246	20.1414	20.1388	20.0819	19.7731	19.3166	18.9510	(92)
Temperature adjustment													0.0000
adjusted MIT	19.0027	19.1777	19.4719	19.8108	20.0379	20.1246	20.1414	20.1388	20.0819	19.7731	19.3166	18.9510	(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	0.9807	0.9670	0.9323	0.8456	0.6912	0.4978	0.3425	0.3929	0.6561	0.8935	0.9671	0.9841	(94)
Useful gains	653.8647	730.4559	801.2237	830.0008	737.9334	526.4585	344.7690	362.3108	539.8378	636.5524	624.5828	623.6243	(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	1440.7374	1399.0932	1271.1309	1069.1672	817.0410	541.3605	347.0231	366.3747	586.1695	898.8866	1197.1238	1445.4679	(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	585.4333	449.3243	349.6110	172.1998	58.8560	0.0000	0.0000	0.0000	0.0000	195.1766	412.2295	611.4516	(98)
Space heating												2834.2821	(98)
Space heating per m2											(98) / (4) =	33.4942	(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													3142.2196 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	585.4333	449.3243	349.6110	172.1998	58.8560	0.0000	0.0000	0.0000	0.0000	195.1766	412.2295	611.4516	(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)	649.0391	498.1422	387.5953	190.9088	65.2505	0.0000	0.0000	0.0000	0.0000	216.3821	457.0172	677.8843	(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	130.3562	94.4225	69.7580	27.9276	0.8300	0.0000	0.0000	8.8882	31.5410	73.9988	109.0058	129.4929	(64)
Efficiency of water heater (217)m	87.3274	87.4568	87.5689	87.9823	89.9740	76.4000	76.4000	76.4000	76.4000	85.9329	86.9167	76.4000	(216)
Fuel for water heating, kWh/month	149.2730	107.9647	79.6606	31.7423	0.9224	0.0000	0.0000	11.6338	41.2840	86.1124	125.4141	148.0939	(219)
Water heating fuel used												782.1013	(219)
Annual totals kWh/year													
Space heating fuel - main system												3142.2196	(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)													60.8114 (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													185.8114 (231)
Electricity for lighting (calculated in Appendix L)													360.2689 (232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV Unit 0 (0.80 * 0.80 * 1068 * 0.80) =										-546.8521		-546.8521	(233)
Total delivered energy for all uses												3923.5492	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	3142.2196	3.4800	109.3492 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	782.1013	3.4800	27.2171 (247)
Mechanical ventilation fans	60.8114	13.1900	8.0210 (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	360.2689	13.1900	47.5195 (250)
Additional standing charges			120.0000 (251)
Energy saving/generation technologies			
PV Unit	-546.8521	13.1900	-72.1298 (252)
Total energy cost			256.4646 (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] =	0.8310 (257)
SAP value		88.4075
SAP rating (Section 12)		88 (258)
SAP band		B

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

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	3142.2196	0.2160	678.7194 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	782.1013	0.2160	168.9339 (264)
Space and water heating			847.6533 (265)
Pumps and fans	185.8114	0.5190	96.4361 (267)
Energy for lighting	360.2689	0.5190	186.9796 (268)
Energy saving/generation technologies			
PV Unit	-546.8521	0.5190	-283.8162 (269)
Total kg/year			847.2528 (272)
CO2 emissions per m2			10.0100 (273)
EI value			91.2412
EI rating			91 (274)
EI band			B

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

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

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

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	42.3100 (1b)	x 2.3900 (2b)	= 101.1209 (1b) - (3b)
First floor	42.3100 (1c)	x 2.5600 (2c)	= 108.3136 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	84.6200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 209.4345 (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												3.8600
Infiltration rate												0.1930 (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) =	0.1641 (21)
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	4.7000	4.4000	4.4000	4.0000	4.1000	3.9000	3.9000	3.8000	3.8000	4.1000	4.0000	4.1000 (22)
Wind factor	1.1750	1.1000	1.1000	1.0000	1.0250	0.9750	0.9750	0.9500	0.9500	1.0250	1.0000	1.0250 (22a)
Adj infilt rate												
	0.1928	0.1805	0.1805	0.1641	0.1682	0.1599	0.1599	0.1558	0.1558	0.1682	0.1641	0.1682 (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)			19.5600	1.1450	22.3969		(27)					
Ground Floor			42.3100	0.1200	5.0772	84.0000	3554.0400 (28a)					
Brick and Block	93.8000	21.7100	72.0900	0.2400	17.3016	42.2200	3043.6398 (29a)					
Pitched Roof	42.3100		42.3100	0.1000	4.2310	9.1000	385.0210 (30)					
Total net area of external elements Aum(A, m2)			178.4200				(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	51.3717		(33)					
Party Wall 1			43.5900	0.0000	0.0000	110.0000	4794.9000 (32)					
Ground Floor Block			43.1200			75.0000	3234.0000 (32c)					
Ground Floor Stud			29.3800			9.0000	264.4200 (32c)					
First Floor Stud			94.9200			9.0000	854.2800 (32c)					
Internal Floor 1			42.3100			18.0000	761.5800 (32d)					
Internal Ceiling 1			42.3100			18.0000	761.5800 (32e)					
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		17653.4608 (34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							208.6204 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							12.0629 (36)					
Total fabric heat loss						(33) + (36) =	63.4346 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 34.5567	Feb 34.5567	Mar 34.5567	Apr 34.5567	May 34.5567	Jun 34.5567	Jul 34.5567	Aug 34.5567	Sep 34.5567	Oct 34.5567	Nov 34.5567	Dec 34.5567 (38)
Heat transfer coeff	97.9913	97.9913	97.9913	97.9913	97.9913	97.9913	97.9913	97.9913	97.9913	97.9913	97.9913	97.9913 (39)
Average = Sum(39)m / 12 =												97.9913 (39)
HLP	Jan 1.1580	Feb 1.1580	Mar 1.1580	Apr 1.1580	May 1.1580	Jun 1.1580	Jul 1.1580	Aug 1.1580	Sep 1.1580	Oct 1.1580	Nov 1.1580	Dec 1.1580 (40)
HLP (average)												1.1580 (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												2.5447 (42)
Average daily hot water use (litres/day)												94.6367 (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	104.1003	100.3149	96.5294	92.7439	88.9585	85.1730	85.1730	88.9585	92.7439	96.5294	100.3149	104.1003 (44)
Energy conte	154.3778	135.0198	139.3284	121.4698	116.5532	100.5765	93.1990	106.9472	108.2245	126.1252	137.6755	149.5067 (45)
Energy content (annual)												
Distribution loss (46)m = 0.15 x (45)m	23.1567	20.2530	20.8993	18.2205	17.4830	15.0865	13.9798	16.0421	16.2337	18.9188	20.6513	22.4260 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	0.6706	0.6070	0.6052	0.5070	0.4666	0.3855	0.3572	0.4281	0.4517	0.5479	0.6189	0.6495 (61)
Total heat required for water heating calculated for each month	155.0484	135.6268	139.9336	121.9768	117.0198	100.9620	93.5562	107.3753	108.6761	126.6730	138.2944	150.1561 (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												1.3607 (H8)
Utilisation factor												0.5205 (H9)
Collector performance factor												0.8793 (H10)
Dedicated solar storage volume												75.0000 (H11)
Effective solar volume												75.0000 (H13)
Daily hot water demand												94.6367 (H14)
Volume ratio Veff/V												0.7925 (H15)
Solar storage volume factor												0.9535 (H16)
Solar input												-884.0781 (H17)
Solar input	-28.8486	-41.0259	-71.1906	-95.7633	-111.2835	-121.0441	-114.7683	-104.6576	-81.9152	-56.6169	-34.1213	-22.8428 (63)
Solar input (sum of months) = Sum (63)m =												-884.0781 (63)
Output from w/h	126.1998	94.6008	68.7430	26.2134	5.7363	0.0000	0.0000	2.7177	26.7609	70.0562	104.1731	127.3133 (64)
Total per year (kWh/year) = Sum (64)m =												652.5146 (64)
Heat gains from water heating, kWh/month	51.4983	45.0458	46.4780	40.5155	38.8706	33.5381	31.0780	35.6670	36.0975	42.0736	45.9318	49.8733 (65)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(66)
(66)m	152.6821	152.6821	152.6821	152.6821	152.6821	152.6821	152.6821	152.6821	152.6821	152.6821	152.6821	152.6821	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	50.9998	45.2976	36.8385	27.8891	20.8474	17.6003	19.0177	24.7199	33.1790	42.1284	49.1701	52.4172	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	341.5299	345.0739	336.1431	317.1305	293.1305	270.5739	255.5047	251.9607	260.8915	279.9041	303.9041	326.4607	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	52.8129	52.8129	52.8129	52.8129	52.8129	52.8129	52.8129	52.8129	52.8129	52.8129	52.8129	52.8129	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	-101.7881	(71)
Water heating gains (Table 5)	69.2181	67.0325	62.4704	56.2715	52.2454	46.5807	41.7714	47.9395	50.1355	56.5505	63.7942	67.0340	(72)
Total internal gains	568.4548	564.1109	542.1589	507.9980	472.9303	441.4618	423.0008	431.3270	450.9130	485.2900	523.5753	552.6189	(73)

6. Solar gains

[Jan]						Area m2	Solar flux Table 6a		g	FF	Access factor		Gains W
							or Table 6b		Specific data or Table 6c	Specific data or Table 6c	Table 6d		
North					6.9400	13.4684		0.6300	0.7000	0.7700	28.5659 (74)		
East					7.0000	25.1733		0.6300	0.7000	0.7700	53.8529 (76)		
West					5.6200	25.1733		0.6300	0.7000	0.7700	43.2362 (80)		
Solar gains	125.6550	208.5930	352.4555	526.7699	620.3782	710.0429	646.5250	569.1135	432.1572	267.4361	155.9119	98.0382 (83)	
Total gains	694.1098	772.7039	894.6144	1034.7679	1093.3085	1151.5046	1069.5258	1000.4406	883.0702	752.7261	679.4872	650.6571 (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	50.0426	50.0426	50.0426	50.0426	50.0426	50.0426	50.0426	50.0426	50.0426	50.0426	50.0426	50.0426	
alpha	4.3362	4.3362	4.3362	4.3362	4.3362	4.3362	4.3362	4.3362	4.3362	4.3362	4.3362	4.3362	
util living area	0.9811	0.9698	0.9307	0.8253	0.6531	0.4273	0.3012	0.3120	0.5890	0.8671	0.9629	0.9847	(86)
MIT	19.9444	20.0815	20.3875	20.7270	20.9234	20.9902	20.9984	20.9982	20.9635	20.7203	20.2851	19.9055	(87)
Th 2	19.9537	19.9537	19.9537	19.9537	19.9537	19.9537	19.9537	19.9537	19.9537	19.9537	19.9537	19.9537	(88)
util rest of house	0.9757	0.9616	0.9122	0.7835	0.5834	0.3427	0.2063	0.2108	0.4920	0.8215	0.9506	0.9802	(89)
MIT 2	19.0241	19.1578	19.4508	19.7563	19.9106	19.9504	19.9535	19.9535	19.9388	19.7609	19.3588	18.9862	(90)
Living area fraction									fLA = Living area / (4) =			0.1825	(91)
MIT	19.1920	19.3264	19.6217	19.9334	20.0954	20.1402	20.1441	20.1441	20.1257	19.9360	19.5278	19.1539	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.1920	19.3264	19.6217	19.9334	20.0954	20.1402	20.1441	20.1441	20.1257	19.9360	19.5278	19.1539	(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	0.9707	0.9553	0.9052	0.7826	0.5933	0.3580	0.2237	0.2293	0.5087	0.8206	0.9442	0.9757	(94)
Useful gains	673.7893	738.1843	809.8329	809.7604	648.6638	412.2891	239.2227	229.4021	449.2321	617.6840	641.5911	634.8733	(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	1331.8965	1305.8682	1178.0264	963.5877	685.4890	415.4989	239.5054	229.7021	463.0802	767.8583	1070.8312	1318.3689	(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	489.6318	381.4836	273.9360	110.7556	27.3980	0.0000	0.0000	0.0000	0.0000	111.7296	309.0529	508.5208	(98)
Space heating												2212.5081	(98)
Space heating per m2											(98) / (4) =	26.1464	(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													2452.8915 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	489.6318	381.4836	273.9360	110.7556	27.3980	0.0000	0.0000	0.0000	0.0000	111.7296	309.0529	508.5208	(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)	542.8290	422.9308	303.6984	122.7889	30.3747	0.0000	0.0000	0.0000	0.0000	123.8687	342.6307	563.7702	(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	126.1998	94.6008	68.7430	26.2134	5.7363	0.0000	0.0000	2.7177	26.7609	70.0562	104.1731	127.3133	(64)
Efficiency of water heater (217)m	86.9804	87.0747	87.0459	87.1861	87.4649	76.4000	76.4000	76.4000	76.4000	84.3298	86.2716	76.4000	(216)
Fuel for water heating, kWh/month	145.0900	108.6433	78.9733	30.0661	6.5584	0.0000	0.0000	3.5572	35.0273	83.0740	120.7502	146.2505	(219)
Water heating fuel used												757.9903	(219)
Annual totals kWh/year													
Space heating fuel - main system												2452.8915	(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)													60.8114 (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													185.8114 (231)
Electricity for lighting (calculated in Appendix L)													360.2689 (232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV Unit 0 (0.80 * 0.80 * 1184 * 0.80) =										-606.1655		-606.1655	(233)
Total delivered energy for all uses												3150.7967	(238)

10a. Fuel costs - using BEDF prices (556)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2452.8915	5.9600	146.1923 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	757.9903	5.9600	45.1762 (247)
Mechanical ventilation fans	60.8114	25.0500	15.2333 (249)
Pumps and fans for heating	75.0000	25.0500	18.7875 (249)
Pump for solar water heating	50.0000	25.0500	12.5250 (249)
Energy for lighting	360.2689	25.0500	90.2474 (250)
Additional standing charges			112.0000 (251)
Energy saving/generation technologies			
PV Unit	-606.1655	25.0500	-151.8445 (252)
Total energy cost			288.3172 (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	2452.8915	0.2160	529.8246 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	757.9903	0.2160	163.7259 (264)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

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

Space and water heating			693.5505 (265)
Pumps and fans	185.8114	0.5190	96.4361 (267)
Energy for lighting	360.2689	0.5190	186.9796 (268)
Energy saving/generation technologies			
PV Unit	-606.1655	0.5190	-314.5999 (269)
Total kg/year			662.3663 (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	2452.8915	1.2200	2992.5276 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	757.9903	1.2200	924.7482 (264)
Space and water heating			3917.2758 (265)
Pumps and fans	185.8114	3.0700	570.4410 (267)
Energy for lighting	360.2689	3.0700	1106.0256 (268)
Energy saving/generation technologies			
PV Unit	-606.1655	3.0700	-1860.9280 (269)
Primary energy kWh/year			3732.8144 (272)
Primary energy kWh/m2/year			44.1127 (273)

U-VALUE CALCULATOR REPORT

Property Reference	SAP 0943 Plot 16	Issued on Date	07/01/2025
Assessment Reference	As Built	Prop Type Ref	Type D
Project	12 Shaw Crescent, West End, SOUTHAMPTON, SO30 3LH		
Calculation Type	New Build (As Built)		

SAP Rating	87 B	DER	14.21	TER	18.67
Environmental	89 B	% DER<TER	23.88		
CO ₂ Emissions (t/year)	0.87	DFEE	47.46	TFEE	55.97
General Requirements Compliance	Pass	% DFEE<TFEE	15.20		

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 16	Issued on Date	07/01/2025
Assessment Reference	As Built	Prop Type Ref	Type D
Project	12 Shaw Crescent, West End, SOUTHAMPTON, SO30 3LH		
Calculation Type	New Build (As Built)		

SAP Rating	87 B	DER	14.21	TER	18.67
Environmental	89 B	% DER<TER	23.88		
CO ₂ Emissions (t/year)	0.87	DFEE	47.46	TFEE	55.97
General Requirements Compliance	Pass	% DFEE<TFEE	15.20		

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 16	Issued on Date	07/01/2025
Assessment Reference	As Built	Prop Type Ref	Type D
Project	12 Shaw Crescent, West End, SOUTHAMPTON, SO30 3LH		
Calculation Type	New Build (As Built)		

SAP Rating	87 B	DER	14.21	TER	18.67
Environmental	89 B	% DER<TER	23.88		
CO ₂ Emissions (t/year)	0.87	DFEE	47.46	TFEE	55.97
General Requirements Compliance	Pass	% DFEE<TFEE	15.20		

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 16	Issued on Date	07/01/2025
Assessment Reference	As Built	Prop Type Ref	Type D
Property	12 Shaw Crescent, West End, SOUTHAMPTON, SO30 3LH		
SAP Rating	87 B	DER	14.21
Environmental	89 B	TER	18.67
CO ₂ Emissions (t/year)	0.87	% DER<TER	23.88
General Requirements Compliance	Pass	DfEE	47.46
		TFEE	55.97
		% DfEE<TFEE	15.20
Assessor Details	Mr. Tobias Whiting, Abacus Energy (UK) Ltd, Tel: 07798936079, toby@abacusenergyuk.com		Assessor ID
			E477-0001
Client	Foreman Homes, FORE		

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

Orientation	North
Property Tenure	Unknown
Transaction Type	New dwelling
Terrain Type	Suburban
1.0 Property Type	House, Semi-Detached
2.0 Number of Storeys	2
3.0 Date Built	2023
4.0 Sheltered Sides	2
5.0 Sunlight/Shade	Average or unknown

6.0 Measurements		Heat Loss Perimeter	Internal Floor Area	Average Storey Height
	Ground Floor:	18.95 m	42.31 m ²	2.39 m
	1st Storey:	18.95 m	42.31 m ²	2.56 m

7.0 Living Area	15.44	m ²
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8.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	208.62	kJ/m ² K

9.0 External Walls			U-Value	Kappa	Gross Area	Nett Area
Description	Type	Construction	(W/m ² K)	(kJ/m ² K)	(m ²)	(m ²)
Brick and Block	Cavity Wall	Other	0.24	42.22	93.80	72.09

9.1 Party Walls			U-Value	Kappa	Area
Description	Type	Construction	(W/m ² K)	(kJ/m ² K)	(m ²)
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	43.59

9.2 Internal Walls			Kappa	Area
Description	Construction		(kJ/m ² K)	(m ²)
Ground Floor Block	Dense block, plasterboard on dabs		75.00	43.12
Ground Floor Stud	Plasterboard on timber frame		9.00	29.38
First Floor Stud	Plasterboard on timber frame		9.00	94.92

10.0 External Roofs			U-Value	Kappa	Gross Area	Nett Area
Description	Type	Construction	(W/m ² K)	(kJ/m ² K)	(m ²)	(m ²)
Pitched Roof	External Plane Roof	Other	0.10	9.10	42.31	42.31

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Built)

10.2 Internal Ceilings

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Ceiling 1	Plasterboard ceiling, carpeted chipboard floor	9.00	42.31

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	42.31

11.2 Internal Floors

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Floor 1	Plasterboard ceiling, carpeted chipboard floor	18.00	42.31

12.0 Opening Types

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

13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width (m)	Height (m)	Count	Area (m²)	Curtain Closed
Front Door	Solid Door	[1] Brick and Block	North							2.15	
Front Elevation	Window	[1] Brick and Block	North	None	0.00					6.94	
Side Elevation	Window	[1] Brick and Block	West	None	0.00					5.62	
Rear Elevation	Window	[1] Brick and Block	East	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)	1.93	0.071	No	Birtley Supatherm
Independently assessed	E2 Other lintels (including other steel lintels)	6.24	0.064	No	Birtley Supatherm
Independently assessed	E2 Other lintels (including other steel lintels)	5.44	0.070	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	14.40	0.021	No	Knauf P5
Independently assessed	E4 Jamb	33.00	0.016	No	Knauf P6
Table K1 - Default	E5 Ground floor (normal)	18.95	0.320	No	
Independently assessed	E6 Intermediate floor within a dwelling	18.95	0.000	No	CD0029
Table K1 - Approved	E10 Eaves (insulation at ceiling level)	9.98	0.060	No	
Independently assessed	E12 Gable (insulation at ceiling level)	9.12	0.044	No	Knauf P21
Independently assessed	E16 Corner (normal)	19.79	0.039	No	Knauf P23
Independently assessed	E25 Staggered party wall between dwellings	9.90	0.055	No	Knauf P27 Halved
Table K1 - Default	P1 Party wall - Ground floor	8.81	0.160	No	
Table K1 - Default	P2 Party wall - Intermediate floor within a dwelling	8.81	0.000	No	
Independently assessed	P4 Party wall - Roof (insulation at ceiling level)	8.81	0.035	No	Knauf P29 Halved

Y-value	0.068	W/m²K
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18.0 Pressure Testing

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

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Built)

As Built AP₅₀

3.86

m³/(h.m²) @ 50 Pa

19.0 Mechanical Ventilation

Summer Overheating

Windows open in hot weather	Windows half open
Cross ventilation possible	Yes
Night Ventilation	Yes
Air change rate	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	26	
Total number of L.E.L. fittings	26	
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	
Delayed Start Stat	No	

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Built)

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	South	45°	Modest	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	£51	B 88	