



SAP Report Submission for Building Regulations Compliance

Client: Foreman Homes

Project: 6, Shaw Crescent
West End, Southampton, SO30 3LH

Contact: Tobias Whiting
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Report Issue Date: 07/08/2024

EXCELLENCE
IN ENERGY
ASSESSMENT

BUILDING REGULATION COMPLIANCE

Calculation Type: New Build (As Built)

Property Reference	SAP 0943 Plot 19				Issued on Date	07/08/2024
Assessment Reference	As Built	Prop Type Ref	Type D			
Property	6, Shaw Crescent, West End, Southampton, SO30 3LH					
SAP Rating	88 B	DER	12.63	TER	17.63	
Environmental	90 B	% DER<TER	28.36			
CO ₂ Emissions (t/year)	0.75	DFEE	43.36	TFEE	50.80	
General Requirements Compliance	Pass	% DFEE<TFEE	14.65			
Assessor Details	Mr. Tobias Whiting, Abacus Energy (UK) Ltd, Tel: 07798936079, toby@abacusenergyuk.com				Assessor ID	E477-0001
Client	Foreman Homes, FORE					

SUMMARY FOR INPUT DATA FOR New Build (As Built)

Criterion 1 – Achieving the TER and TFEE rate

1a TER and DER

Fuel for main heating	Mains gas		
Fuel factor	1.00 (mains gas)		
Target Carbon Dioxide Emission Rate (TER)	17.63	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	12.63	kgCO ₂ /m ²	Pass
	-5.00 (-28.4%)	kgCO ₂ /m ²	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	50.80	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	43.36	kWh/m ² /yr	
	-7.4 (-14.6%)	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	4.10 (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 East

7.00 m², No overhang

Windows facing South

6.94 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

4.10 (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
Photovoltaic array	0.73	kW

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THERMAL BRIDGING

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Environmental	90 B	% DER<TER	28.36		
CO ₂ Emissions (t/year)	0.75	DFEE	43.36	TFEE	50.80
General Requirements Compliance	Pass	% DFEE<TFEE	14.65		
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	19.80	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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CO ₂ Emissions (t/year)	0.75	DFEE	43.36	TFEE	50.80
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Assessor Details	Mr. Tobias Whiting, Abacus Energy (UK) Ltd, Tel: 07798936079, toby@abacusenergyuk.com			Assessor ID	E477-0001
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REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

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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) 17.63 kgCO₂/m²

Dwelling Carbon Dioxide Emission Rate (DER) 12.63 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 50.8 kWh/m²/yr

Dwelling Fabric Energy Efficiency (DFEE) 43.4 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:	4.10 (measured in this dwelling)	
Maximum	10.0	OK

4 Heating efficiency

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

Data from database

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

Combi boiler

Efficiency: 89.3% SEDBUK2009

Minimum: 88.0% OK

Secondary heating system:

None

5 Cylinder insulation

Hot water storage No cylinder

6 Controls

Space heating controls: Programmer, room thermostat and TRVs OK

Hot water controls:

No cylinder

Boiler interlock

Yes

OK

7 Low energy lights

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

8 Mechanical ventilation

Continuous extract system

Specific fan power:	0.17	
Maximum	0.7	OK

9 Summertime temperature

Overheating risk (Southern England): Slight OK

Based on:

Overshading:	Average
Windows facing East:	7.00 m ² , No overhang
Windows facing South:	6.94 m ² , No overhang
Windows facing West:	5.62 m ² , No overhang
Air change rate:	4.00 ach
Blinds/curtains:	None

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
Photovoltaic array	0.73 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	=	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											4.1000	
Infiltration rate											0.2050 (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) =	0.1743 (21)
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate												
	0.2222	0.2178	0.2135	0.1917	0.1873	0.1655	0.1655	0.1612	0.1743	0.1873	0.1960	0.2047 (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			43.6100	0.0000	0.0000	110.0000	4797.1000 (32)					
Ground Floor Block			43.1200			75.0000	3234.0000 (32c)					
Ground Floor Stud			29.3800			9.0000	264.4200 (32c)					
First Floor Stud			95.1500			9.0000	856.3500 (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) =		17657.7308 (34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							208.6709 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							12.0633 (36)					
Total fabric heat loss						(33) + (36) =	63.4350 (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	97.9917	97.9917	97.9917	97.9917	97.9917	97.9917	97.9917	97.9917	97.9917	97.9917	97.9917	97.9917 (39)
Average = Sum(39)m / 12 =												97.9917 (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

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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												
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	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	6.7071	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			
East				7.0000	19.6403	0.6300	0.7000	0.7700	42.0162 (76)			
South				6.9400	46.7521	0.6300	0.7000	0.7700	99.1590 (78)			
West				5.6200	19.6403	0.6300	0.7000	0.7700	33.7330 (80)			
Solar gains	174.9083	310.5785	450.9898	589.7113	679.8163	680.9747	654.1820	587.6257	499.9165	350.9903	211.9877	147.9750 (83)
Total gains	557.5219	691.1001	817.4911	933.7864	1000.9687	980.0505	938.9192	878.4373	802.2914	676.0984	563.2362	518.8751 (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	50.0545	50.0545	50.0545	50.0545	50.0545	50.0545	50.0545	50.0545	50.0545	50.0545	50.0545	50.0545	
alpha	4.3370	4.3370	4.3370	4.3370	4.3370	4.3370	4.3370	4.3370	4.3370	4.3370	4.3370	4.3370	
util living area	0.9938	0.9841	0.9592	0.8953	0.7726	0.6033	0.4506	0.4989	0.7374	0.9361	0.9872	0.9954	(86)
MIT	19.6204	19.8560	20.1885	20.5544	20.8242	20.9543	20.9897	20.9841	20.8922	20.5077	19.9726	19.5600	(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	0.9921	0.9798	0.9481	0.8676	0.7174	0.5181	0.3476	0.3921	0.6579	0.9127	0.9829	0.9941	(89)
MIT 2	18.7036	18.9366	19.2613	19.6057	19.8382	19.9323	19.9509	19.9489	19.8954	19.5720	19.0540	18.6436	(90)
Living area fraction									fLA = Living area / (4) =			0.1825	(91)
MIT	18.8709	19.1044	19.4305	19.7788	20.0181	20.1188	20.1404	20.1377	20.0772	19.7427	19.2216	18.8108	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.8709	19.1044	19.4305	19.7788	20.0181	20.1188	20.1404	20.1377	20.0772	19.7427	19.2216	18.8108	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	0.9896	0.9752	0.9413	0.8622	0.7211	0.5322	0.3664	0.4114	0.6682	0.9069	0.9789	0.9922	(94)
Useful gains	551.7294	673.9897	769.5042	805.1007	721.8419	521.5979	343.9998	361.4152	536.0606	613.1565	551.3710	514.8032	(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	1427.8249	1391.9129	1267.0801	1066.0306	815.1035	540.7934	346.9295	366.2673	585.7206	895.9098	1187.8134	1431.7376	(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	651.8150	482.4444	370.1965	187.8695	69.3866	0.0000	0.0000	0.0000	0.0000	210.3685	458.2385	682.1992	(98)
Space heating												3112.5182	(98)
Space heating per m2												(98) / (4) =	36.7823 (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	3450.6854 (211)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	651.8150	482.4444	370.1965	187.8695	69.3866	0.0000	0.0000	0.0000	0.0000	210.3685	458.2385	682.1992 (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)	722.6331	534.8607	410.4174	208.2810	76.9253	0.0000	0.0000	0.0000	0.0000	233.2245	508.0250	756.3184 (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	87.1742	86.7611	85.9418	84.2119	81.0137	76.4000	76.4000	76.4000	76.4000	84.4659	86.5747	76.4000 (216)
Fuel for water heating, kWh/month	177.8605	156.3221	162.8237	144.8451	144.4445	132.1493	122.4557	140.5436	142.2462	149.9695	159.7400	171.8947 (219)
Water heating fuel used												1805.2948 (219)
Annual totals kWh/year												3450.6854 (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 * 0.73 * 1068 * 1.00) =											-623.7532	-623.7532 (233)
Total delivered energy for all uses												5128.3074 (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	3450.6854	0.2160	745.3480 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1805.2948	0.2160	389.9437 (264)
Space and water heating			1135.2917 (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	-623.7532	0.5190	-323.7279 (269)
Total CO2, kg/year			1069.0295 (272)
Dwelling Carbon Dioxide Emission Rate (DER)			12.6300 (273)

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

DER		12.6300 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		30.7822 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		30.7822 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	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					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 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)							11.5365 (36)					
Total fabric heat loss						(33) + (36) =	62.9764 (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	37.8602	38.4176	39.0185	39.4432	39.8872 (38)
Heat transfer coeff	103.8095	103.5658	103.3269	102.2048	101.9949	101.0176	101.0176	100.8366	101.3940	101.9949	102.4196	102.8636 (39)
Average = Sum(39)m / 12 =												102.2038 (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)
	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)
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)
	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	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)
Heat gains from water heating, kWh/month	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
East			6.8100		19.6403		0.6300		0.7000		0.7700		40.8758 (76)
South			6.7500		46.7521		0.6300		0.7000		0.7700		96.4443 (78)
West			5.4600		19.6403		0.6300		0.7000		0.7700		32.7727 (80)
Solar gains	170.0927	302.0229	438.4675	573.4397	661.0493	662.1722	636.1207	571.4079	486.1289	341.3184	206.1503	143.9016	(83)
Total gains	569.6016	699.4396	821.3834	933.2181	997.2764	975.6977	935.3213	877.3070	804.2261	682.7693	574.3047	531.7041	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Thl (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	56.6074	56.7406	56.8718	57.4962	57.6145	58.1719	58.1719	58.2763	57.9560	57.6145	57.3756	57.1280	
alpha	4.7738	4.7827	4.7915	4.8331	4.8410	4.8781	4.8781	4.8851	4.8637	4.8410	4.8250	4.8085	
util living area	0.9967	0.9908	0.9738	0.9220	0.8074	0.6297	0.4685	0.5174	0.7670	0.9543	0.9925	0.9976	(86)
MIT	19.7239	19.9329	20.2348	20.5867	20.8425	20.9646	20.9931	20.9890	20.9089	20.5504	20.0629	19.6864	(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	19.9075	(88)
util rest of house	0.9956	0.9878	0.9650	0.8961	0.7497	0.5373	0.3575	0.4024	0.6821	0.9335	0.9895	0.9968	(89)
MIT 2	18.2118	18.5172	18.9527	19.4482	19.7704	19.9030	19.9226	19.9225	19.8543	19.4124	18.7156	18.1635	(90)
Living area fraction													(91)
MIT	18.4877	18.7755	19.1867	19.6560	19.9660	20.0967	20.1179	20.1171	20.0467	19.6200	18.9614	18.4414	(92)
Temperature adjustment													(93)
adjusted MIT	18.4877	18.7755	19.1867	19.6560	19.9660	20.0967	20.1179	20.1171	20.0467	19.6200	18.9614	18.4414	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9934	0.9833	0.9574	0.8888	0.7527	0.5528	0.3778	0.4234	0.6930	0.9262	0.9856	0.9951	(94)
Ext temp.	565.8394	687.7909	786.3905	829.4016	750.6058	539.3877	353.4047	371.4301	557.3591	632.3802	566.0487	529.1063	(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	1472.8188	1437.0307	1310.8731	1099.3129	843.0902	555.2635	355.3745	374.8227	602.9595	919.9965	1214.8442	1464.9168	(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	674.7927	503.4892	390.2151	194.3361	68.8084	0.0000	0.0000	0.0000	0.0000	213.9866	467.1327	696.2430	(98)
Space heating per m2													(98) / (4) =

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													3435.7641 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	674.7927	503.4892	390.2151	194.3361	68.8084	0.0000	0.0000	0.0000	0.0000	213.9866	467.1327	696.2430	(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)	722.4761	539.0676	417.7892	208.0687	73.6706	0.0000	0.0000	0.0000	0.0000	229.1077	500.1421	745.4422	(211)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating requirement	205.3367	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 (217)m	87.8229	87.4896	86.8420	85.4305	83.0682	80.3000	80.3000	80.3000	80.3000	85.5540	87.2624	80.3000	(216)
Fuel for water heating, kWh/month	233.8077	206.9358	217.0825	195.7223	194.8827	177.5588	170.1148	189.6381	191.7325	204.9179	214.2853	227.9894	(219)
Water heating fuel used												2424.6677	(219)
Annual totals kWh/year													
Space heating fuel - main system												3435.7641	(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												6295.6542	(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	3435.7641	0.2160	742.1251 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2424.6677	0.2160	523.7282 (264)
Space and water heating			1265.8533 (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			1491.7337 (272)
Emissions per m2 for space and water heating			14.9593 (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) = (14.9593 * 1.00) + 2.2094 + 0.4600, rounded to 2 d.p.			17.6300 (273)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

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

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	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					4.1000
Infiltration rate					0.3482 (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) =	0.2960 (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	0.3774	0.3700	0.3626	0.3256	0.3182	0.2812	0.2812	0.2738	0.2960	0.3182	0.3330	0.3478 (22b)
Effective ac	0.5712	0.5685	0.5657	0.5530	0.5506	0.5395	0.5395	0.5375	0.5438	0.5506	0.5554	0.5605 (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			43.6100	0.0000	0.0000	110.0000	4797.1000 (32)
Ground Floor Block			43.1200			75.0000	3234.0000 (32c)
Ground Floor Stud			29.3800			9.0000	264.4200 (32c)
First Floor Stud			95.1500			9.0000	856.3500 (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) = 17276.9408 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							204.1709 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							12.0633 (36)
Total fabric heat loss							(33) + (36) = 63.4350 (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	39.4788	39.2877	39.1004	38.2204	38.0558	37.2893	37.2893	37.1474	37.5845	38.0558	38.3888	38.7370 (38)
Heat transfer coeff	102.9138	102.7227	102.5354	101.6554	101.4908	100.7243	100.7243	100.5824	101.0196	101.4908	101.8238	102.1720 (39)
Average = Sum(39)m / 12 =												101.6546 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.2162	1.2139	1.2117	1.2013	1.1994	1.1903	1.1903	1.1886	1.1938	1.1994	1.2033	1.2074 (40)
HLP (average)												1.2013 (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
East					7.0000	19.6403	0.6300	0.7000				0.7700			42.0162 (76)
South					6.9400	46.7521	0.6300	0.7000				0.7700			99.1590 (78)
West					5.6200	19.6403	0.6300	0.7000				0.7700			33.7330 (80)
Solar gains	174.9083	310.5785	450.8989	589.7113	679.8163	680.9747	654.1820	587.6257	499.9165	350.9903	211.9877	147.9750			(83)
Total gains	529.3969	663.7636	791.8154	910.3654	979.0130	960.1539	920.7671	858.0439	781.0971	652.5716	537.0753	491.5429			(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	46.6327	46.7195	46.8048	47.2100	47.2866	47.6464	47.6464	47.7136	47.5071	47.2866	47.1319	46.9713	
alpha	4.1088	4.1146	4.1203	4.1473	4.1524	4.1764	4.1764	4.1809	4.1671	4.1524	4.1421	4.1314	
util living area	0.9945	0.9859	0.9637	0.9053	0.7909	0.6235	0.4693	0.5196	0.7580	0.9434	0.9887	0.9959	(86)
MIT	19.4741	19.7202	20.0729	20.4789	20.7822	20.9408	20.9857	20.9784	20.8650	20.4350	19.8651	19.4267	(87)
Th 2	19.9071	19.9089	19.9106	19.9189	19.9205	19.9278	19.9278	19.9291	19.9250	19.9205	19.9174	19.9141	(88)
util rest of house	0.9930	0.9820	0.9536	0.8792	0.7367	0.5361	0.3606	0.4076	0.6791	0.9221	0.9850	0.9948	(89)
MIT 2	18.5241	18.7693	19.1164	19.5084	19.7753	19.8995	19.9237	19.9223	19.8504	19.4784	18.9213	18.4823	(90)
Living area fraction	18.6975	18.9428	19.2909	19.6855	19.9590	20.0895	20.1175	20.1150	20.0355	19.6530	19.0935	18.6546	(91)
MIT	18.6975	18.9428	19.2909	19.6855	19.9590	20.0895	20.1175	20.1150	20.0355	19.6530	19.0935	18.6546	(92)
Temperature adjustment	18.6975	18.9428	19.2909	19.6855	19.9590	20.0895	20.1175	20.1150	20.0355	19.6530	19.0935	18.6546	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	524.4138	648.7841	749.3807	794.3949	723.3316	528.1051	350.2299	367.0498	537.4689	597.4422	526.9117	488.0480	(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	1481.6977	1442.5140	1311.5195	1096.4046	838.2127	552.9306	354.2961	373.6664	599.6018	918.7911	1221.2249	1476.8603	(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	712.2192	533.3865	418.2312	217.4470	85.4715	0.0000	0.0000	0.0000	0.0000	239.0836	499.9055	735.6763	(98)
Space heating												3441.4209	(98)
Space heating per m2												40.6691	(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	946.8087	745.3601	764.4263	0.0000	0.0000	0.0000	0.0000	(100)

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Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8931	0.9388	0.9210	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	845.6316	699.7333	704.0485	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1217.5096	1169.4770	1097.7689	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	267.7521	349.4893	292.9280	0.0000	0.0000	0.0000	0.0000 (104)
Space cooling												910.1694 (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	66.9380	87.3723	73.2320	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling												227.5424 (107)
Space cooling per m2												2.6890 (108)
Energy for space heating												40.6691 (99)
Energy for space cooling												2.6890 (108)
Total												43.3581 (109)
Dwelling Fabric Energy Efficiency (DFEE)												43.4 (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 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					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)							11.5365 (36)
Total fabric heat loss						(33) + (36) =	62.9764 (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	37.8602	38.4176	39.0185	39.4432	39.8872 (38)
Heat transfer coeff	103.8095	103.5658	103.3269	102.2048	101.9949	101.0176	101.0176	100.8366	101.3940	101.9949	102.4196	102.8636 (39)
Average = Sum(39)m / 12 =												102.2038 (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)

	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)
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			
East			6.8100	19.6403		0.6300		0.7000		0.7700		40.8758	(76)
South			6.7500	46.7521		0.6300		0.7000		0.7700		96.4443	(78)
West			5.4600	19.6403		0.6300		0.7000		0.7700		32.7727	(80)

Solar gains	170.0927	302.0229	438.4675	573.4397	661.0493	662.1722	636.1207	571.4079	486.1289	341.3184	206.1503	143.9016	(83)
Total gains	524.5787	655.2056	779.3821	894.0923	960.2448	941.3505	902.7048	841.8248	767.3078	642.8975	531.2355	487.4668	(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	56.6074	56.7406	56.8718	57.4962	57.6145	58.1719	58.1719	58.2763	57.9560	57.6145	57.3756	57.1280	
alpha	4.7738	4.7827	4.7915	4.8331	4.8410	4.8781	4.8781	4.8851	4.8637	4.8410	4.8250	4.8085	
util living area	0.9977	0.9930	0.9786	0.9320	0.8237	0.6481	0.4844	0.5371	0.7890	0.9631	0.9946	0.9984	(86)
MIT	19.6753	19.8865	20.1941	20.5569	20.8268	20.9599	20.9920	20.9871	20.8964	20.5148	20.0172	19.6384	(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	19.9075	(88)
util rest of house	0.9969	0.9906	0.9711	0.9086	0.7679	0.5548	0.3702	0.4188	0.7061	0.9457	0.9924	0.9978	(89)
MIT 2	18.6986	18.9104	19.2151	19.5696	19.8052	19.9078	19.9231	19.9233	19.8681	19.5397	19.0500	18.6689	(90)
Living area fraction													fLA = Living area / (4) =
MIT	18.8768	19.0885	19.3937	19.7498	19.9916	20.0998	20.1181	20.1174	20.0558	19.7177	19.2265	18.8458	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.8768	19.0885	19.3937	19.7498	19.9916	20.0998	20.1181	20.1174	20.0558	19.7177	19.2265	18.8458	(93)

8. Space heating requirement													

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	0.9958	0.9883	0.9667	0.9043	0.7723	0.5708	0.3912	0.4405	0.7177	0.9415	0.9904	0.9970	(94)
Useful gains	522.3934	647.5071	753.4364	808.5513	741.5711	537.3667	353.1018	370.8228	550.7010	605.3158	526.1496	486.0132	(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	1513.2153	1469.4419	1332.2669	1108.8999	845.7038	555.5725	355.3947	374.8521	603.8782	929.9541	1241.9871	1506.5236	(97)
Month fracti	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	(97a)
Space heating kWh	737.1715	552.3402	430.6498	216.2510	77.4747	0.0000	0.0000	0.0000	0.0000	241.5309	515.4030	759.2598	(98)
Space heating												3530.0809	(98)
Space heating per m2										(98) / (4) =		41.7169	(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	949.5653	747.5302	766.3582	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9098	0.9533	0.9371	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	863.9463	712.5940	718.1546	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1195.5304	1148.3639	1078.8098	0.0000	0.0000	0.0000	0.0000	(103)
Month fracti	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	(103a)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	238.7406	324.2128	268.3275	0.0000	0.0000	0.0000	0.0000	(104)
Space cooling												831.2809	(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	59.6851	81.0532	67.0819	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling												207.8202 (107)
Space cooling per m2												2.4559 (108)
Energy for space heating												41.7169 (99)
Energy for space cooling												2.4559 (108)
Total												44.1728 (109)
Target Fabric Energy Efficiency (TFEE)												50.8 (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											4.1000	
Infiltration rate											0.2050 (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) =	0.1743 (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	0.2047	0.1917	0.1917	0.1743	0.1786	0.1699	0.1699	0.1655	0.1655	0.1786	0.1743	0.1786 (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			43.6100	0.0000	0.0000	110.0000	4797.1000 (32)					
Ground Floor Block			43.1200			75.0000	3234.0000 (32c)					
Ground Floor Stud			29.3800			9.0000	264.4200 (32c)					
First Floor Stud			95.1500			9.0000	856.3500 (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) =		17657.7308 (34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							208.6709 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							12.0633 (36)					
Total fabric heat loss						(33) + (36) =	63.4350 (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	97.9917	97.9917	97.9917	97.9917	97.9917	97.9917	97.9917	97.9917	97.9917	97.9917	97.9917	97.9917 (39)
Average = Sum(39)m / 12 =												97.9917 (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)												
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	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 (62)
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)
												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	or Table 6b	Specific data	factor	W
			W/m2		or Table 6c	Table 6d	
East		7.0000	25.1733	0.6300	0.7000	0.7700	53.8529 (76)
South		6.9400	56.5862	0.6300	0.7000	0.7700	120.0168 (78)
West		5.6200	25.1733	0.6300	0.7000	0.7700	43.2362 (80)

Solar gains	217.1059	328.2545	485.6058	638.7759	694.4713	770.6839	710.9464	664.9957	563.9506	400.4002	262.3009	173.8561 (83)
Total gains	785.5606	892.3654	1027.7648	1146.7739	1167.4015	1212.1457	1133.9472	1096.3227	1014.8636	885.6902	785.8763	726.4750 (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	50.0545	50.0545	50.0545	50.0545	50.0545	50.0545	50.0545	50.0545	50.0545	50.0545	50.0545	50.0545
alpha	4.3370	4.3370	4.3370	4.3370	4.3370	4.3370	4.3370	4.3370	4.3370	4.3370	4.3370	4.3370
util living area	0.9709	0.9515	0.8971	0.7827	0.6208	0.4071	0.2843	0.2851	0.5228	0.8063	0.9409	0.9773 (86)
MIT	20.0487	20.2088	20.5015	20.7826	20.9370	20.9919	20.9987	20.9987	20.9768	20.7986	20.3937	19.9940 (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	0.9630	0.9392	0.8726	0.7369	0.5519	0.3260	0.1946	0.1924	0.4326	0.7515	0.9229	0.9709 (89)
MIT 2	19.1252	19.2792	19.5538	19.8002	19.9189	19.9510	19.9535	19.9536	19.9446	19.8212	19.4601	19.0725 (90)
Living area fraction												0.1825 (91)
MIT	19.2937	19.4488	19.7267	19.9794	20.1046	20.1409	20.1442	20.1443	20.1329	19.9996	19.6305	19.2406 (92)
Temperature adjustment												0.0000
adjusted MIT	19.2937	19.4488	19.7267	19.9794	20.1046	20.1409	20.1442	20.1443	20.1329	19.9996	19.6305	19.2406 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9569	0.9320	0.8665	0.7382	0.5622	0.3407	0.2110	0.2093	0.4486	0.7542	0.9162	0.9654 (94)
Ext temp.	751.6776	831.6776	890.5264	846.4963	656.3691	412.9385	239.2933	229.5119	455.2198	667.9992	720.0261	701.3534 (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	1341.8722	1317.8693	1188.3182	968.1014	686.3952	415.5778	239.5161	229.7187	463.7877	774.0914	1080.8947	1326.8707 (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	439.1048	326.7208	221.5571	87.5557	22.3394	0.0000	0.0000	0.0000	0.0000	78.9326	259.8254	465.3849 (98)
RHI space heating demand												1901.4207 (98)
												1901 (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	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											4.1000	
Infiltration rate											0.2050 (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) =	0.1743 (21)
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate												
	0.2222	0.2178	0.2135	0.1917	0.1873	0.1655	0.1655	0.1612	0.1743	0.1873	0.1960	0.2047 (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			43.6100	0.0000	0.0000	110.0000	4797.1000 (32)					
Ground Floor Block			43.1200			75.0000	3234.0000 (32c)					
Ground Floor Stud			29.3800			9.0000	264.4200 (32c)					
First Floor Stud			95.1500			9.0000	856.3500 (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) =		17657.7308 (34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							208.6709 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							12.0633 (36)					
Total fabric heat loss						(33) + (36) =	63.4350 (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	97.9917	97.9917	97.9917	97.9917	97.9917	97.9917	97.9917	97.9917	97.9917	97.9917	97.9917	97.9917 (39)
Average = Sum(39)m / 12 =												97.9917 (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)

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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	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	
East				7.0000	19.6403		0.6300	0.7000	0.7700		42.0162 (76)	
South				6.9400	46.7521		0.6300	0.7000	0.7700		99.1590 (78)	
West				5.6200	19.6403		0.6300	0.7000	0.7700		33.7330 (80)	

Solar gains	174.9083	310.5785	450.9898	589.7113	679.8163	680.9747	654.1820	587.6257	499.9165	350.9903	211.9877	147.9750 (83)
Total gains	743.3630	874.6894	993.0578	1097.7093	1152.7466	1122.4364	1077.1828	1018.9527	950.8294	836.2803	735.5630	700.5939 (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	50.0545	50.0545	50.0545	50.0545	50.0545	50.0545	50.0545	50.0545	50.0545	50.0545	50.0545	50.0545
alpha	4.3370	4.3370	4.3370	4.3370	4.3370	4.3370	4.3370	4.3370	4.3370	4.3370	4.3370	4.3370
util living area	0.9819	0.9639	0.9253	0.8426	0.7070	0.5381	0.3957	0.4351	0.6552	0.8833	0.9670	0.9857 (86)
MIT	19.8446	20.0638	20.3601	20.6676	20.8772	20.9704	20.9937	20.9906	20.9323	20.6425	20.1705	19.7819 (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	0.9773	0.9550	0.9074	0.8072	0.6486	0.4580	0.3039	0.3396	0.5746	0.8479	0.9572	0.9820 (89)
MIT 2	18.9245	19.1383	19.4219	19.7025	19.8758	19.9403	19.9520	19.9509	19.9190	19.6892	19.2457	18.8630 (90)
Living area fraction									fLA = Living area / (4) =			0.1825 (91)
MIT	19.0924	19.3072	19.5931	19.8786	20.0585	20.1283	20.1421	20.1406	20.1039	19.8632	19.4145	19.0307 (92)
Temperature adjustment												0.0000
adjusted MIT	19.0924	19.3072	19.5931	19.8786	20.0585	20.1283	20.1421	20.1406	20.1039	19.8632	19.4145	19.0307 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9723	0.9483	0.9002	0.8043	0.6548	0.4718	0.3206	0.3570	0.5869	0.8443	0.9509	0.9777 (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	1449.5336	1411.7829	1283.0140	1075.8081	819.0668	541.7272	347.0973	366.5513	588.3296	907.7141	1206.7169	1453.2828 (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	540.7051	391.3295	289.4953	138.8645	47.7823	0.0000	0.0000	0.0000	0.0000	149.9974	365.2452	571.6398 (98)
Space heating												2495.0591 (98)
Space heating per m2												(98) / (4) = 29.4855 (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	2766.1409 (211)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	540.7051	391.3295	289.4953	138.8645	47.7823	0.0000	0.0000	0.0000	0.0000	149.9974	365.2452	571.6398 (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)	599.4513	433.8464	320.9482	153.9518	52.9737	0.0000	0.0000	0.0000	0.0000	166.2943	404.9282	633.7470 (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	86.7097	86.1929	85.1860	83.1745	79.9463	76.4000	76.4000	76.4000	76.4000	83.3102	85.9368	76.4000 (216)
Fuel for water heating, kWh/month	178.8133	157.3526	164.2683	146.6517	146.3730	132.1493	122.4557	140.5436	142.2462	152.0498	160.9257	172.7255 (219)
Water heating fuel used												1816.5546 (219)
Annual totals kWh/year												2766.1409 (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 * 0.73 * 1068 * 1.00) =											-623.7532	-623.7532 (233)
Total delivered energy for all uses												4455.0227 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2766.1409	3.4800	96.2617 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1816.5546	3.4800	63.2161 (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	-623.7532	13.1900	-82.2730 (252)
Total energy cost			262.6378 (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] =	0.8510 (257)
SAP value		88.1284
SAP rating (Section 12)		88 (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	2766.1409	0.2160	597.4864 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1816.5546	0.2160	392.3758 (264)
Space and water heating			989.8622 (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	-623.7532	0.5190	-323.7279 (269)
Total kg/year			923.6000 (272)
CO2 emissions per m2			10.9100 (273)
EI value			90.4519
EI rating			90 (274)

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CALCULATION OF ENERGY RATINGS 09 Jan 2014

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	$3.48 / 0.8192 = 4.248$, stars = 4
Water heating environmental impact	$0.216 / 0.8192 = 0.2637$, 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											4.1000	
Infiltration rate											0.2050 (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) =	0.1743 (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	0.2047	0.1917	0.1917	0.1743	0.1786	0.1699	0.1699	0.1655	0.1655	0.1786	0.1743	0.1786 (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			43.6100	0.0000	0.0000	110.0000	4797.1000 (32)					
Ground Floor Block			43.1200			75.0000	3234.0000 (32c)					
Ground Floor Stud			29.3800			9.0000	264.4200 (32c)					
First Floor Stud			95.1500			9.0000	856.3500 (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) =	17657.7308		(34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							208.6709 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							12.0633 (36)					
Total fabric heat loss				(33) + (36) =			63.4350 (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	97.9917	97.9917	97.9917	97.9917	97.9917	97.9917	97.9917	97.9917	97.9917	97.9917	97.9917	97.9917 (39)
Average = Sum(39)m / 12 =												97.9917 (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	

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)
								Solar input (sum of months) =	Sum (63)m =			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)
								Total per year (kWh/year) =	Sum (64)m =			1495.2985 (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)

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)

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
East	7.0000	25.1733	0.6300	0.7000	0.7700	53.8529 (76)
South	6.9400	56.5862	0.6300	0.7000	0.7700	120.0168 (78)
West	5.6200	25.1733	0.6300	0.7000	0.7700	43.2362 (80)

FULL SAP CALCULATION PRINTOUT

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

8c. Space cooling requirement

Not applicable

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													90.2000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													2108.0052 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	439.1048	326.7208	221.5571	87.5557	22.3394	0.0000	0.0000	0.0000	0.0000	78.9326	259.8254	465.3849	(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)	486.8124	362.2182	245.6287	97.0684	24.7665	0.0000	0.0000	0.0000	0.0000	87.5084	288.0548	515.9477	(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	86.1397	85.6611	84.3053	81.6178	78.3208	76.4000	76.4000	76.4000	76.4000	81.1673	84.8746	76.4000	(216)
Fuel for water heating, kWh/month	179.9965	158.3294	165.9844	149.4487	149.4108	132.1493	122.4557	140.5436	142.2462	156.0641	162.9397	173.8053	(219)
Water heating fuel used												1833.3737	(219)
Annual totals kWh/year													
Space heating fuel - main system												2108.0052	(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 * 0.73 * 1184 * 1.00) =										-691.4075			-691.4075 (233)
Total delivered energy for all uses													3746.0517 (238)

10a. Fuel costs - using BEDF prices (551)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2108.0052	7.3800	155.5708 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1833.3737	7.3800	135.3030 (247)
Mechanical ventilation fans	60.8114	28.6600	17.4285 (249)
Pumps and fans for heating	75.0000	28.6600	21.4950 (249)
Energy for lighting	360.2689	28.6600	103.2531 (250)
Additional standing charges			107.0000 (251)
Energy saving/generation technologies			
PV Unit	-691.4075	28.6600	-198.1574 (252)
Total energy cost			341.8930 (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	2108.0052	0.2160	455.3291 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1833.3737	0.2160	396.0087 (264)
Space and water heating			851.3378 (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	-691.4075	0.5190	-358.8405 (269)
Total kg/year			749.9630 (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	2108.0052	1.2200	2571.7663 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1833.3737	1.2200	2236.7159 (264)
Space and water heating			4808.4822 (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 -691.4075 3.0700 -2122.6210 (269)
Primary energy kWh/year 4208.8278 (272)
Primary energy kWh/m2/year 49.7380 (273)

SAP 2012 EPC IMPROVEMENTS

Current energy efficiency rating: B 88
Current environmental impact rating: B 90

(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	-£ 65	-205 kg (27.4%)

Recommended measures	Typical annual savings	Energy efficiency	Environmental impact
Solar water heating	£65 2.43 kg/m²	B 89	A 92
Total Savings	£65 2.43 kg/m²		

Potential energy efficiency rating: B 89
Potential environmental impact rating: A 92

Fuel prices for cost data on this page from database revision number 551 TEST (31 Jul 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	£142	£157	-£14
Mains gas	£398	£319	£79
Space heating	£301	£301	£0
Water heating	£135	£71	£65
Lighting	£103	£103	£0
Generated (PV)	-£198	-£198	£0
Total cost of fuels	£342	£278	£65
Total cost of uses	£341	£277	£65
Delivered energy	44 kWh/m²	32 kWh/m²	12 kWh/m²
Carbon dioxide emissions	0.7 tonnes	0.5 tonnes	0.2 tonnes
CO2 emissions per m²	9 kg/m²	6 kg/m²	2 kg/m²
Primary energy	50 kWh/m²	36 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	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											4.1000	
Infiltration rate											0.2050 (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) =	0.1743 (21)
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate												
	0.2222	0.2178	0.2135	0.1917	0.1873	0.1655	0.1655	0.1612	0.1743	0.1873	0.1960	0.2047 (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			43.6100	0.0000	0.0000	110.0000	4797.1000 (32)					
Ground Floor Block			43.1200			75.0000	3234.0000 (32c)					
Ground Floor Stud			29.3800			9.0000	264.4200 (32c)					
First Floor Stud			95.1500			9.0000	856.3500 (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) =		17657.7308 (34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							208.6709 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							12.0633 (36)					
Total fabric heat loss						(33) + (36) =	63.4350 (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	97.9917	97.9917	97.9917	97.9917	97.9917	97.9917	97.9917	97.9917	97.9917	97.9917	97.9917	97.9917 (39)
Average = Sum(39)m / 12 =												97.9917 (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	

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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)
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 =												676.2210 (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)
(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 Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d		Gains W	
East				7.0000	19.6403		0.6300	0.7000	0.7700		42.0162 (76)	
South				6.9400	46.7521		0.6300	0.7000	0.7700		99.1590 (78)	
West				5.6200	19.6403		0.6300	0.7000	0.7700		33.7330 (80)	
Solar gains	174.9083	310.5785	450.8989	589.7113	679.8163	680.9747	654.1820	587.6257	499.9165	350.9903	211.9877	147.9750 (83)
Total gains	743.3630	874.6894	993.0578	1097.7093	1152.7466	1122.4364	1077.1828	1018.9527	950.8294	836.2803	735.5630	700.5939 (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	50.0545	50.0545	50.0545	50.0545	50.0545	50.0545	50.0545	50.0545	50.0545	50.0545	50.0545	50.0545	
alpha	4.3370	4.3370	4.3370	4.3370	4.3370	4.3370	4.3370	4.3370	4.3370	4.3370	4.3370	4.3370	
util living area													
	0.9819	0.9639	0.9253	0.8426	0.7070	0.5381	0.3957	0.4351	0.6552	0.8833	0.9670	0.9857 (86)	
MIT	19.8446	20.0638	20.3601	20.6676	20.8772	20.9704	20.9937	20.9906	20.9323	20.6425	20.1705	19.7819 (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													
	0.9773	0.9550	0.9074	0.8072	0.6486	0.4580	0.3039	0.3396	0.5746	0.8479	0.9572	0.9820 (89)	
MIT 2	18.9245	19.1383	19.4219	19.7025	19.8758	19.9403	19.9520	19.9509	19.9190	19.6892	19.2457	18.8630 (90)	
Living area fraction									fLA = Living area / (4) =				0.1825 (91)
MIT	19.0924	19.3072	19.5931	19.8786	20.0585	20.1283	20.1421	20.1406	20.1039	19.8632	19.4145	19.0307 (92)	
Temperature adjustment												0.0000	
adjusted MIT	19.0924	19.3072	19.5931	19.8786	20.0585	20.1283	20.1421	20.1406	20.1039	19.8632	19.4145	19.0307 (93)	

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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	0.9723	0.9483	0.9002	0.8043	0.6548	0.4718	0.3206	0.3570	0.5869	0.8443	0.9509	0.9777	(94)
Useful gains	722.7794	829.4473	893.9074	882.9408	754.8433	529.5812	345.3615	363.7545	558.0245	706.1046	699.4319	684.9498	(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	1449.5336	1411.7829	1283.0140	1075.8081	819.0668	541.7272	347.0973	366.5513	588.3296	907.7141	1206.7169	1453.2828	(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	540.7051	391.3295	289.4953	138.8645	47.7823	0.0000	0.0000	0.0000	0.0000	149.9974	365.2452	571.6398	(98)
Space heating												2495.0591	(98)
Space heating per m2												29.4855	(99)
												(98) / (4) =	

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													2766.1409 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	540.7051	391.3295	289.4953	138.8645	47.7823	0.0000	0.0000	0.0000	0.0000	149.9974	365.2452	571.6398	(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)	599.4513	433.8464	320.9482	153.9518	52.9737	0.0000	0.0000	0.0000	0.0000	166.2943	404.9282	633.7470	(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	87.1424	87.1404	87.1436	87.5520	89.9227	76.4000	76.4000	76.4000	76.4000	85.1207	86.6044	76.4000	(216)
Fuel for water heating, kWh/month	149.5899	108.3568	80.0495	31.8983	0.9230	0.0000	0.0000	11.6338	41.2840	86.9340	125.8663	148.3513	(219)
Water heating fuel used												784.8868	(219)
Annual totals kWh/year													
Space heating fuel - main system												2766.1409	(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 * 0.73 * 1068 * 1.00) =										-623.7532		-623.7532	(233)
Total delivered energy for all uses												3473.3549	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2766.1409	3.4800	96.2617 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	784.8868	3.4800	27.3141 (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	-623.7532	13.1900	-82.2730 (252)
Total energy cost			233.3307 (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] =	0.7560 (257)
SAP value		89.4531
SAP rating (Section 12)		89 (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	2766.1409	0.2160	597.4864 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	784.8868	0.2160	169.5356 (264)
Space and water heating			767.0220 (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			
Total kg/year	-623.7532	0.5190	-323.7279 (269)
CO2 emissions per m2			726.7098 (272)
EI value			8.5900 (273)
EI rating			92.4873
EI band			92 (274) A

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											4.1000	
Infiltration rate											0.2050 (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) =	0.1743 (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	0.2047	0.1917	0.1917	0.1743	0.1786	0.1699	0.1699	0.1655	0.1655	0.1786	0.1743	0.1786 (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			43.6100	0.0000	0.0000	110.0000	4797.1000 (32)					
Ground Floor Block			43.1200			75.0000	3234.0000 (32c)					
Ground Floor Stud			29.3800			9.0000	264.4200 (32c)					
First Floor Stud			95.1500			9.0000	856.3500 (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) =		17657.7308 (34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							208.6709 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							12.0633 (36)					
Total fabric heat loss						(33) + (36) =	63.4350 (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	97.9917	97.9917	97.9917	97.9917	97.9917	97.9917	97.9917	97.9917	97.9917	97.9917	97.9917	97.9917 (39)
Average = Sum(39)m / 12 =												97.9917 (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 W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W			
East				7.0000	25.1733	0.6300	0.7000	0.7700	53.8529 (76)			
South				6.9400	56.5862	0.6300	0.7000	0.7700	120.0168 (78)			
West				5.6200	25.1733	0.6300	0.7000	0.7700	43.2362 (80)			
Solar gains	217.1059	328.2545	485.6058	638.7759	694.4713	770.6839	710.9464	664.9957	563.9506	400.4002	262.3009	173.8561 (83)
Total gains	785.5606	892.3654	1027.7648	1146.7739	1167.4015	1212.1457	1133.9472	1096.3227	1014.8636	885.6902	785.8763	726.4750 (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	50.0545	50.0545	50.0545	50.0545	50.0545	50.0545	50.0545	50.0545	50.0545	50.0545	50.0545	50.0545
alpha	4.3370	4.3370	4.3370	4.3370	4.3370	4.3370	4.3370	4.3370	4.3370	4.3370	4.3370	4.3370
util living area	0.9709	0.9515	0.8971	0.7827	0.6208	0.4071	0.2843	0.2851	0.5228	0.8063	0.9409	0.9773 (86)
MIT	20.0487	20.2088	20.5015	20.7826	20.9370	20.9919	20.9987	20.9987	20.9768	20.7986	20.3937	19.9940 (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	0.9630	0.9392	0.8726	0.7369	0.5519	0.3260	0.1946	0.1924	0.4326	0.7515	0.9229	0.9709 (89)
MIT 2	19.1252	19.2792	19.5538	19.8002	19.9189	19.9510	19.9535	19.9536	19.9446	19.8212	19.4601	19.0725 (90)
Living area fraction									fLA = Living area / (4) =			0.1825 (91)
MIT	19.2937	19.4488	19.7267	19.9794	20.1046	20.1409	20.1442	20.1443	20.1329	19.9996	19.6305	19.2406 (92)
Temperature adjustment												0.0000
adjusted MIT	19.2937	19.4488	19.7267	19.9794	20.1046	20.1409	20.1442	20.1443	20.1329	19.9996	19.6305	19.2406 (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	0.9569	0.9320	0.8665	0.7382	0.5622	0.3407	0.2110	0.2093	0.4486	0.7542	0.9162	0.9654	(94)
Useful gains	751.6776	831.6776	890.5264	846.4963	656.3691	412.9385	239.2933	229.5119	455.2198	667.9992	720.0261	701.3534	(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	1341.8722	1317.8693	1188.3182	968.1014	686.3952	415.5778	239.5161	229.7187	463.7877	774.0914	1080.8947	1326.8707	(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	439.1048	326.7208	221.5571	87.5557	22.3394	0.0000	0.0000	0.0000	0.0000	78.9326	259.8254	465.3849	(98)
Space heating												1901.4207	(98)
Space heating per m2											(98) / (4) =	22.4701	(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													2108.0052 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	439.1048	326.7208	221.5571	87.5557	22.3394	0.0000	0.0000	0.0000	0.0000	78.9326	259.8254	465.3849	(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)	486.8124	362.2182	245.6287	97.0684	24.7665	0.0000	0.0000	0.0000	0.0000	87.5084	288.0548	515.9477	(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	86.7038	86.6843	86.5002	86.5960	86.9896	76.4000	76.4000	76.4000	76.4000	83.1387	85.7664	86.8310	(216)
Fuel for water heating, kWh/month	145.5529	109.1326	79.4715	30.2710	6.5942	0.0000	0.0000	3.5572	35.0273	84.2642	121.4614	146.6220	(219)
Water heating fuel used												761.9543	(219)
Annual totals kWh/year													
Space heating fuel - main system												2108.0052	(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 * 0.73 * 1184 * 1.00) =										-691.4075		-691.4075	(233)
Total delivered energy for all uses												2724.6323	(238)

10a. Fuel costs - using BEDF prices (551)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2108.0052	7.3800	155.5708 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	761.9543	7.3800	56.2322 (247)
Mechanical ventilation fans	60.8114	28.6600	17.4285 (249)
Pumps and fans for heating	75.0000	28.6600	21.4950 (249)
Pump for solar water heating	50.0000	28.6600	14.3300 (249)
Energy for lighting	360.2689	28.6600	103.2531 (250)
Additional standing charges			107.0000 (251)
Energy saving/generation technologies			
PV Unit	-691.4075	28.6600	-198.1574 (252)
Total energy cost			277.1522 (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	2108.0052	0.2160	455.3291 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	761.9543	0.2160	164.5821 (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			619.9112 (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	-691.4075	0.5190	-358.8405 (269)
Total kg/year			544.4865 (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	2108.0052	1.2200	2571.7663 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	761.9543	1.2200	929.5843 (264)
Space and water heating			3501.3506 (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	-691.4075	3.0700	-2122.6210 (269)
Primary energy kWh/year			3055.1962 (272)
Primary energy kWh/m2/year			36.1049 (273)

U-VALUE CALCULATOR REPORT

Property Reference	SAP 0943 Plot 19	Issued on Date	07/08/2024
Assessment Reference	As Built	Prop Type Ref	Type D
Project	6, Shaw Crescent, West End, Southampton, SO30 3LH		
Calculation Type	New Build (As Built)		

SAP Rating	88 B	DER	12.63	TER	17.63
Environmental	90 B	% DER<TER	28.36		
CO ₂ Emissions (t/year)	0.75	DFEE	43.36	TFEE	50.80
General Requirements Compliance	Pass	% DFEE<TFEE	14.65		

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 19	Issued on Date	07/08/2024
Assessment Reference	As Built	Prop Type Ref	Type D
Project	6, Shaw Crescent, West End, Southampton, SO30 3LH		
Calculation Type	New Build (As Built)		

SAP Rating	88 B	DER	12.63	TER	17.63
Environmental	90 B	% DER<TER	28.36		
CO ₂ Emissions (t/year)	0.75	DFEE	43.36	TFEE	50.80
General Requirements Compliance	Pass	% DFEE<TFEE	14.65		

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 19	Issued on Date	07/08/2024
Assessment Reference	As Built	Prop Type Ref	Type D
Project	6, Shaw Crescent, West End, Southampton, SO30 3LH		
Calculation Type	New Build (As Built)		

SAP Rating	88 B	DER	12.63	TER	17.63
Environmental	90 B	% DER<TER	28.36		
CO ₂ Emissions (t/year)	0.75	DFEE	43.36	TFEE	50.80
General Requirements Compliance	Pass	% DFEE<TFEE	14.65		

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

Floor 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 19			Issued on Date	07/08/2024
Assessment Reference	As Built	Prop Type Ref	Type D		
Property	6, Shaw Crescent, West End, Southampton, SO30 3LH				
SAP Rating	88 B	DER	12.63	TER	17.63
Environmental	90 B	% DER<TER	28.36		
CO ₂ Emissions (t/year)	0.75	DFEE	43.36	TFEE	50.80
General Requirements Compliance	Pass	% DFEE<TFEE	14.65		
Assessor Details	Mr. Tobias Whiting, Abacus Energy (UK) Ltd, Tel: 07798936079, toby@abacusenergyuk.com			Assessor ID	E477-0001
Client	Foreman Homes, FORE				

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

Orientation	South
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	208.67	kJ/m ² K

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

9.1 Party Walls			U-Value (W/m ² K)	Kappa (kJ/m ² K)	Area (m ²)
Description	Type	Construction			
Party Wall 1	Filled Cavity with Edge Sealing	Single plasterboard on dabs both sides, lightweight aggregate blocks, cavity or cavity fill	0.00	110.00	43.61

9.2 Internal Walls			Kappa (kJ/m ² K)	Area (m ²)
Description	Construction			
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	95.15

10.0 External Roofs			U-Value (W/m ² K)	Kappa (kJ/m ² K)	Gross Area (m ²)	Nett Area (m ²)
Description	Type	Construction				
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	South							2.15	
Front Elevation	Window	[1] Brick and Block	South	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

15.0 Draught Proofing

 %

16.0 Draught Lobby

17.0 Thermal Bridging

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)	19.80	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

4.10

m³/(h.m²) @ 50 Pa

19.0 Mechanical Ventilation

Summer Overheating

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

Mechanical Ventilation

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

20.0 Fans, Open Fireplaces, Flues

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

21.0 Fixed Cooling System

No

22.0 Lighting

Internal

Total number of light fittings	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
0.73	South	45°	None Or Little	Yes

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

	Typical Cost	Typical savings per year	Ratings after improvement	
			SAP rating	Environmental Impact
Solar water heating	£4,000 - £6,000	£65	B 89	