

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	163.6646	216.4766	188.0059	0.0000	0.0000	0.0000	0.0000 (104)
Space cooling												568.1472 (104)
Cooled fraction												1.0000 (105)
Intermittency factor (Table 10b)												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.2500	0.2500	0.2500	0.0000	0.0000	0.0000	0.0000 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	40.9161	54.1192	47.0015	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling												142.0368 (107)
Space cooling per m2												1.7737 (108)
Energy for space heating												54.6731 (99)
Energy for space cooling												1.7737 (108)
Total												56.4468 (109)
Dwelling Fabric Energy Efficiency (DFEE)												56.4 (109)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (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	35.2600 (1b)	x 2.3100 (2b)	= 81.4506 (1b) - (3b)
First floor	44.8200 (1c)	x 2.5600 (2c)	= 114.7392 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	80.0800		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 196.1898 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ 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				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) =	0.1529 (8)							
Pressure test				Yes								
Measured/design AP50					5.0000							
Infiltration rate					0.4029 (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) =	0.3425 (21)							
Wind speed	Jan 5.1000	Feb 5.0000	Mar 4.9000	Apr 4.4000	May 4.3000	Jun 3.8000	Jul 3.8000	Aug 3.7000	Sep 4.0000	Oct 4.3000	Nov 4.5000	Dec 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	0.4367	0.4281	0.4195	0.3767	0.3682	0.3254	0.3254	0.3168	0.3425	0.3682	0.3853	0.4024 (22b)
Effective ac	0.5953	0.5916	0.5880	0.5710	0.5678	0.5529	0.5529	0.5502	0.5586	0.5678	0.5742	0.5810 (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			1.9700	1.0000	1.9700		(26)					
TER Opening Type (Uw = 1.40)			14.5100	1.3258	19.2367		(27)					
150mm TE Platinum GF			35.2600	0.1300	4.5838		(28a)					
Over Garage			9.5700	0.1300	1.2441		(28b)					
BDW Std 50mm AP	118.0500	16.4800	101.5700	0.1800	18.2826		(29a)					
Cavity to garage	2.5400		2.5400	0.1800	0.4572		(29a)					
Solid Wall to Garage	14.3700		14.3700	0.1800	2.5866		(29a)					
400mm MW	44.8200		44.8200	0.1300	5.8266		(30)					
Total net area of external elements Aum(A, m ²)			224.6100				(31)					
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =		54.1876 (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)							15.0165 (36)					
Total fabric heat loss							(33) + (36) = 69.2042 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 38.5435	Feb 38.3039	Mar 38.0689	Apr 36.9655	May 36.7590	Jun 35.7980	Jul 35.7980	Aug 35.6200	Sep 36.1681	Oct 36.7590	Nov 37.1767	Dec 37.6133 (38)
Heat transfer coeff	107.7477	107.5080	107.2731	106.1697	105.9632	105.0021	105.0021	104.8242	105.3723	105.9632	106.3809	106.8175 (39)
Average = Sum(39)m / 12 =												106.1687 (39)
HLP	Jan 1.3455	Feb 1.3425	Mar 1.3396	Apr 1.3258	May 1.3232	Jun 1.3112	Jul 1.3112	Aug 1.3090	Sep 1.3158	Oct 1.3232	Nov 1.3284	Dec 1.3339 (40)
HLP (average)												1.3258 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												2.4644 (42)
Average daily hot water use (litres/day)												92.7290 (43)
Daily hot water use	102.0019	98.2927	94.5835	90.8744	87.1652	83.4561	83.4561	87.1652	90.8744	94.5835	98.2927	102.0019 (44)
Energy conte	151.2658	132.2980	136.5197	119.0212	114.2037	98.5491	91.3202	104.7913	106.0428	123.5827	134.9002	146.4929 (45)
Energy content (annual)												Total = Sum(45)m = 1458.9876 (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:												

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Calculation Type: New Build (As Designed)

CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	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	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	0.0000	(59)
Heat gains from water heating, kWh/month	32.1440	28.1133	29.0104	25.2920	24.2683	20.9417	19.4055	22.2681	22.5341	26.2613	28.6663	31.1297		(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	123.2189	123.2189	123.2189	123.2189	123.2189	123.2189	123.2189	123.2189	123.2189	123.2189	123.2189	123.2189	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	19.9754	17.7420	14.4287	10.9235	8.1654	6.8936	7.4488	9.6822	12.9954	16.5007	19.2587	20.5306	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.6077	221.8865	216.1439	203.9186	188.4863	173.9821	164.2925	162.0136	167.7562	179.9815	195.4138	209.9180	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.3219	35.3219	35.3219	35.3219	35.3219	35.3219	35.3219	35.3219	35.3219	35.3219	35.3219	35.3219	(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)	-98.5751	-98.5751	-98.5751	-98.5751	-98.5751	-98.5751	-98.5751	-98.5751	-98.5751	-98.5751	-98.5751	-98.5751	(71)
Water heating gains (Table 5)	43.2043	41.8353	38.9925	35.1278	32.6187	29.0857	26.0827	29.9303	31.2974	35.2975	39.8143	41.8410	(72)
Total internal gains	342.7530	341.4294	329.5308	309.9355	289.2360	269.9271	257.7896	261.5918	272.0147	291.7454	314.4525	332.2553	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
North	5.4200	10.6334	0.6300	0.7000	0.7700	17.6134 (74)
East	0.6600	19.6403	0.6300	0.7000	0.7700	3.9615 (76)
South	8.4300	46.7521	0.6300	0.7000	0.7700	120.4482 (78)

Solar gains	142.0231	238.6727	321.2373	394.4848	442.5165	440.6472	424.2005	387.4751	346.1020	262.0302	169.4401	122.0195	(83)
Total gains	484.7761	580.1022	650.7682	704.4203	731.7525	710.5743	681.9901	649.0669	618.1167	553.7756	483.8926	454.2747	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation factor for gains for living area, nil,m (see Table 9a)	51.6123	51.7274	51.8407	52.3795	52.4815	52.9619	52.9619	53.0518	52.7758	52.4815	52.2755	52.0618	21.0000 (85)
tau	4.4408	4.4485	4.4560	4.4920	4.4988	4.5308	4.5308	4.5368	4.5184	4.4988	4.4850	4.4708	
util living area	0.9978	0.9948	0.9879	0.9685	0.9162	0.7956	0.6351	0.6814	0.8784	0.9770	0.9955	0.9984	(86)
MIT	19.5101	19.6927	19.9655	20.3154	20.6419	20.8785	20.9671	20.9545	20.7904	20.3622	19.8676	19.4783	(87)
Th 2	19.8054	19.8077	19.8100	19.8207	19.8227	19.8321	19.8321	19.8338	19.8284	19.8227	19.8186	19.8144	(88)
util rest of house	0.9971	0.9930	0.9834	0.9553	0.8777	0.7011	0.4868	0.5369	0.8089	0.9648	0.9936	0.9978	(89)
MIT 2	18.4608	18.6445	18.9168	19.2678	19.5744	19.7737	19.8237	19.8207	19.7105	19.3191	18.8279	18.4361	(90)
Living area fraction									fLA = Living area / (4) =				0.4037 (91)
MIT	18.8844	19.0677	19.3402	19.6907	20.0053	20.2197	20.2853	20.2785	20.1465	19.7402	19.2476	18.8568	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.8844	19.0677	19.3402	19.6907	20.0053	20.2197	20.2853	20.2785	20.1465	19.7402	19.2476	18.8568	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9963	0.9915	0.9810	0.9534	0.8848	0.7359	0.5477	0.5961	0.8310	0.9637	0.9923	0.9972	(94)
Useful gains	482.9652	575.1751	638.4099	671.6266	647.4280	522.9423	373.5351	386.8910	513.6350	533.6674	480.1802	452.9967	(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	1571.4373	1523.1380	1377.4073	1145.6168	880.0599	590.0855	386.9633	406.5557	637.1321	968.5211	1292.2762	1565.6077	(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	809.8232	637.0311	549.8141	341.2945	173.0782	0.0000	0.0000	0.0000	0.0000	323.5337	584.7091	827.7826	(98)
Space heating												4247.0665	(98)
Space heating per m2												(98) / (4) =	53.0353 (99)

8a. 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	987.0201	777.0158	796.6636	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7905	0.8690	0.8451	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	780.2291	675.2252	673.2239	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	922.5749	887.2742	850.3784	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)

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CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	102.4890	157.7645	131.8030	0.0000	0.0000	0.0000	0.0000 (104)
Space cooling												392.0564 (104)
Cooled fraction												1.0000 (105)
Intermittency factor (Table 10b)												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.2500	0.2500	0.2500	0.0000	0.0000	0.0000	0.0000 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	25.6222	39.4411	32.9507	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling												98.0141 (107)
Space cooling per m2												1.2240 (108)
Energy for space heating												53.0353 (99)
Energy for space cooling												1.2240 (108)
Total												54.2592 (109)
Target Fabric Energy Efficiency (TFEE)												62.4 (109)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

Property Reference	Denford End-Terrace			Issued on Date	15/10/2021
Assessment Reference	1	Prop Type Ref			
Property	Plot 049, Chipping Lane , Longridge , PR3				
SAP Rating	83 B	DER	19.17	TER	19.98
Environmental	87 B	% DER<TER	4.05		
CO₂ Emissions (t/year)	1.00	DFEE	49.01	TFEE	52.49
General Requirements Compliance	Pass	% DFEE<TFEE	6.64		
Assessor Details	Mr. William Vincent, William Vincent, Tel: 01582544250, William.Vincent@ee-ltd.co.uk			Assessor ID	T759-0001
Client					

FULL SAP CALCULATION PRINTOUT

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

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

DWELLING AS DESIGNED

End-Terrace House, total floor area 58 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) 19.98 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 19.17 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)52.5 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)49.0 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.27 (max. 0.30)	0.27 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.15 (max. 0.25)	0.15 (max. 0.70)	OK
Roof	0.11 (max. 0.20)	0.11 (max. 0.35)	OK
Openings	1.34 (max. 2.00)	1.41 (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: 5.01 (design value)
Maximum 10.0 OK

4 Heating efficiency

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

Data from database

Ideal LOGIC COMBI ESP1 35

Combi boiler

Efficiency: 89.6% SEDBUK2009

OK

Minimum: 88.0%

Secondary heating system:

None

5 Cylinder insulation

Hot water storage No cylinder

6 Controls

Space heating controls: Time and temperature zone control 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

Not applicable

9 Summertime temperature

Overheating risk (West Pennines (England)):Not significant OK

Based on:

Overshading: Average
Windows facing South East: 6.14 m², No overhang
Windows facing South West: 0.66 m², No overhang
Windows facing North West: 3.30 m², No overhang
Air change rate: 4.00 ach
Blinds/curtains: None

10 Key features

Party wall U-value 0.00 W/m²K
Roof U-value 0.11 W/m²K
Door U-value 1.00 W/m²K

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CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

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

1. Overall dwelling dimensions

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	28.9900 (1b)	x 2.3300 (2b)	= 67.5467 (1b) - (3b)
First floor	28.9900 (1c)	x 2.5600 (2c)	= 74.2144 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	57.9800		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 141.7611 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour							
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)							
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)							
Number of intermittent fans					2 * 10 = 20.0000 (7a)							
Number of passive vents					0 * 10 = 0.0000 (7b)							
Number of flueless gas fires					0 * 40 = 0.0000 (7c)							
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					20.0000 / (5) = 0.1411 (8)							
Pressure test					Yes							
Measured/design AP50					5.0100							
Infiltration rate					0.3916 (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) = 0.3328 (21)							
Wind speed	Jan 5.1000	Feb 5.0000	Mar 4.9000	Apr 4.4000	May 4.3000	Jun 3.8000	Jul 3.8000	Aug 3.7000	Sep 4.0000	Oct 4.3000	Nov 4.5000	Dec 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	0.4244	0.4161	0.4077	0.3661	0.3578	0.3162	0.3162	0.3079	0.3328	0.3578	0.3745	0.3911 (22b)
Effective ac	0.5900	0.5866	0.5831	0.5670	0.5640	0.5500	0.5500	0.5474	0.5554	0.5640	0.5701	0.5765 (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					
Opening Type 1			1.9700	1.0000	1.9700		(26)					
Opening Type 2 (Uw = 1.41)			10.1000	1.3347	13.4807		(27)					
150mm Platinum			28.9900	0.1500	4.3485		(28a)					
50mm A. Platinum	74.4700	12.0700	62.4000	0.2700	16.8480		(29a)					
400mm Mineral wool	28.9900		28.9900	0.1100	3.1889		(30)					
Total net area of external elements Aum(A, m2)			132.4500				(31)					
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 39.8361		(33)					
E-WM-22			35.4600	0.0000	0.0000		(32)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							202.0130 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							7.2469 (36)					
Total fabric heat loss							(33) + (36) = 47.0830 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 27.6031	Feb 27.4396	Mar 27.2792	Apr 26.5261	May 26.3852	Jun 25.7293	Jul 25.7293	Aug 25.6078	Sep 25.9819	Oct 26.3852	Nov 26.6703	Dec 26.9683 (38)
Heat transfer coeff	74.6861	74.5226	74.3622	73.6091	73.4682	72.8123	72.8123	72.6908	73.0649	73.4682	73.7533	74.0513 (39)
Average = Sum(39)m / 12 =												73.6084 (39)
HLP	Jan 1.2881	Feb 1.2853	Mar 1.2825	Apr 1.2696	May 1.2671	Jun 1.2558	Jul 1.2558	Aug 1.2537	Sep 1.2602	Oct 1.2671	Nov 1.2720	Dec 1.2772 (40)
HLP (average)												1.2695 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy	Average daily hot water use (litres/day)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	87.8841	84.6883	81.4925	78.2967	75.1009	71.9051	71.9051	75.1009	78.2967	81.4925	84.6883	87.8841 (44)
Energy conte	130.3295	113.9870	117.6244	102.5478	98.3971	84.9092	84.9092	90.2874	91.3657	106.4780	116.2290	126.2172 (45)
Energy content (annual)												Total = Sum(45)m = 1257.0531 (45)
Distribution loss (46)m = 0.15 x (45)m	19.5494	17.0981	17.6437	15.3822	14.7596	12.7364	11.8021	13.5431	13.7049	15.9717	17.4344	18.9326 (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)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)	
Combi loss	14.0315	12.6570	13.9866	13.5055	13.9339	13.4593	13.8923	13.9193	13.4845	13.9648	13.5490	14.0228	14.0228	14.0228	14.0228	14.0228	14.0228	14.0228	14.0228	14.0228	14.0228	14.0228	14.0228	(61)
Total heat required for water heating calculated for each month	144.3610	126.6440	131.6110	116.0533	112.3310	98.3685	92.5732	104.2067	104.8502	120.4428	129.7780	140.2400	140.2400	140.2400	140.2400	140.2400	140.2400	140.2400	140.2400	140.2400	140.2400	140.2400	140.2400	(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	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	144.3610	126.6440	131.6110	116.0533	112.3310	98.3685	92.5732	104.2067	104.8502	120.4428	129.7780	140.2400	140.2400	140.2400	140.2400	140.2400	140.2400	140.2400	140.2400	140.2400	140.2400	140.2400	140.2400	(64)
Heat gains from water heating, kWh/month	46.8424	41.0649	42.6068	37.4735	36.2005	31.5971	29.6345	33.5004	33.7502	38.8951	42.0334	45.4729	45.4729	45.4729	45.4729	45.4729	45.4729	45.4729	45.4729	45.4729	45.4729	45.4729	45.4729	(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	96.1992	96.1992	96.1992	96.1992	96.1992	96.1992	96.1992	96.1992	96.1992	96.1992	96.1992	96.1992	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	15.3647	13.6468	11.0983	8.4021	6.2807	5.3024	5.7295	7.4474	9.9958	12.6920	14.8135	15.7917	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	167.8252	169.5667	165.1782	155.8356	144.0421	132.9580	125.5531	123.8116	128.2001	137.5428	149.3362	160.4203	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.6199	32.6199	32.6199	32.6199	32.6199	32.6199	32.6199	32.6199	32.6199	32.6199	32.6199	32.6199	(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)	-76.9593	-76.9593	-76.9593	-76.9593	-76.9593	-76.9593	-76.9593	-76.9593	-76.9593	-76.9593	-76.9593	-76.9593	(71)
Water heating gains (Table 5)	62.9603	61.1085	57.2672	52.0466	48.6566	43.8849	39.8313	45.0274	46.8753	52.2784	58.3797	61.1195	(72)
Total internal gains	301.0099	299.1818	288.4034	271.1440	253.8392	237.0051	225.9736	231.1461	239.9310	257.3729	277.3891	292.1913	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	Specific data or Table 6c	FF	Access factor Table 6d	Gains W						
Southeast	6.1400	36.7938	0.7100	0.7000	0.7700	77.8096	(77)						
Southwest	0.6600	36.7938	0.7100	0.7000	0.7700	8.3639	(79)						
Northwest	3.3000	11.2829	0.7100	0.7000	0.7700	12.8241	(81)						
Solar gains	98.9975	172.8891	247.8687	326.0860	382.5535	387.4011	370.3274	327.0360	274.7727	194.1299	119.3520	84.2193	(83)
Total gains	400.0075	472.0709	536.2722	597.2300	636.3926	624.4062	596.3010	558.1822	514.7038	451.5028	396.7411	376.4106	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Thl (C)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation factor for gains for living area, nil,m (see Table 9a)													21.0000	(85)
tau	43.5627	43.6583	43.7525	44.2001	44.2849	44.6838	44.6838	44.7585	44.5293	44.2849	44.1137	43.9362		
alpha	3.9042	3.9106	3.9168	3.9467	3.9523	3.9789	3.9789	3.9839	3.9686	3.9523	3.9409	3.9291		
util living area	0.9920	0.9840	0.9663	0.9210	0.8254	0.6693	0.5153	0.5652	0.7904	0.9448	0.9853	0.9936	(86)	
MIT	19.4228	19.6356	19.9602	20.3659	20.7057	20.9102	20.9755	20.9647	20.8184	20.3713	19.8198	19.3827	(87)	
Th 2	19.8501	19.8524	19.8545	19.8648	19.8667	19.8756	19.8756	19.8773	19.8722	19.8667	19.8628	19.8587	(88)	
util rest of house	0.9897	0.9797	0.9567	0.8977	0.7739	0.5776	0.3936	0.4421	0.7126	0.9236	0.9805	0.9918	(89)	
MIT 2	17.7709	18.0808	18.5492	19.1259	19.5735	19.8114	19.8653	19.8608	19.7219	19.1469	18.3576	17.7183	(90)	
Living area fraction									FLA = Living area / (4) =			0.4172	(91)	
MIT	18.4601	18.7295	19.1379	19.6432	20.0459	20.2698	20.3285	20.3214	20.1794	19.6578	18.9676	18.4127	(92)	
Temperature adjustment												-0.1500		
adjusted MIT	18.3101	18.5795	18.9879	19.4932	19.8959	20.1198	20.1795	20.1714	20.0294	19.5078	18.8176	18.2627	(93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9854	0.9729	0.9473	0.8885	0.7754	0.5989	0.4277	0.4760	0.7248	0.9150	0.9743	0.9882	(94)
Useful gains	394.1686	459.2933	507.9936	530.6230	493.4692	373.9841	255.0261	265.6908	373.0673	413.1096	386.5426	371.9713	(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	1046.3581	1019.4291	928.6256	779.7580	602.1347	401.9107	260.5581	274.1458	433.2308	654.4373	864.2137	1041.3633	(97)
Month fracti	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	1.0000	(97a)
Space heating kWh	485.2290	376.4113	312.9502	179.3772	80.8471	0.0000	0.0000	0.0000	0.0000	179.5478	343.9232	498.0276	(98)
Space heating												2456.3135	(98)
Space heating per m2												47.3648	(99)

8c. Space cooling requirement

Not applicable

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
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 %)													90.5000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													2714.1586 (211)
Space heating requirement	485.2290	376.4113	312.9502	179.3772	80.8471	0.0000	0.0000	0.0000	0.0000	179.5478	343.9232	498.0276	(98)
Space heating efficiency (main heating system 1)	90.5000	90.5000	90.5000	90.5000	90.5000	0.0000	0.0000	0.0000	0.0000	90.5000	90.5000	90.5000	(210)
Space heating fuel (main heating system)	536.1646	415.9241	345.8014	198.2068	89.3339	0.0000	0.0000	0.0000	0.0000	198.3954	380.0256	550.3068	(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	144.3610	126.6440	131.6110	116.0533	112.3310	98.3685	92.5732	104.2067	104.8502	120.4428	129.7780	140.2400	(64)
Efficiency of water heater (217)m	89.7457	89.6725	89.5285	89.2154	88.6113	87.3000	87.3000	87.3000	87.3000	89.1875	89.6002	89.7769	(217)
Fuel for water heating, kWh/month	160.8556	141.2295	147.0047	130.0822	126.7682	112.6787	106.0403	119.3662	120.1033	135.0445	144.8412	156.2093	(219)
Water heating fuel used													1600.2237 (219)
Annual totals kWh/year													
Space heating fuel - main system													2714.1586 (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)													271.3453 (232)
Total delivered energy for all uses													4660.7277 (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	2714.1586	0.2160	586.2583	(261)
Space heating - secondary	0.0000	0.0000	0.0000	(263)
Water heating (other fuel)	1600.2237	0.2160	345.6483	(264)
Space and water heating			931.9066	(265)
Pumps and fans	75.0000	0.5190	38.9250	(267)
Energy for lighting	271.3453	0.5190	140.8282	(268)
Total CO2, kg/year			1111.6598	(272)
Dwelling Carbon Dioxide Emission Rate (DER)			19.1700	(273)

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

DER			19.1700	ZC1
Total Floor Area		TFA	57.9800	
Assumed number of occupants		N	1.9240	
CO2 emission factor in Table 12 for electricity displaced from grid		EF	0.5190	
CO2 emissions from appliances, equation (L14)			17.1524	ZC2
CO2 emissions from cooking, equation (L16)			2.8488	ZC3
Total CO2 emissions			39.1713	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			39.1713	ZC8

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF TARGET EMISSIONS 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (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	28.9900 (1b)	2.3300 (2b)	67.5467 (1b) - (3b)
First floor	28.9900 (1c)	2.5600 (2c)	74.2144 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	57.9800		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 141.7611 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ 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				2 * 10 =	20.0000 (7a)							
Number of passive vents				0 * 10 =	0.0000 (7b)							
Number of flueless gas fires				0 * 40 =	0.0000 (7c)							
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =				20.0000 / (5) =	0.1411 (8)							
Pressure test				Yes								
Measured/design AP50				5.0000								
Infiltration rate				0.3911 (18)								
Number of sides sheltered				2 (19)								
Shelter factor			(20) = 1 - [0.075 x (19)] =		0.8500 (20)							
Infiltration rate adjusted to include shelter factor			(21) = (18) x (20) =		0.3324 (21)							
Wind speed	Jan 5.1000	Feb 5.0000	Mar 4.9000	Apr 4.4000	May 4.3000	Jun 3.8000	Jul 3.8000	Aug 3.7000	Sep 4.0000	Oct 4.3000	Nov 4.5000	Dec 4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4238	0.4155	0.4072	0.3657	0.3574	0.3158	0.3158	0.3075	0.3324	0.3574	0.3740	0.3906 (22b)
Effective ac	0.5898	0.5863	0.5829	0.5669	0.5639	0.5499	0.5499	0.5473	0.5553	0.5639	0.5699	0.5763 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K					
TER Opaque door			1.9700	1.0000	1.9700		(26)					
TER Opening Type (Uw = 1.40)			10.1000	1.3258	13.3902		(27)					
150mm Platinum			28.9900	0.1300	3.7687		(28a)					
50mm A. Platinum	74.4700	12.0700	62.4000	0.1800	11.2320		(29a)					
400mm Mineral wool	28.9900		28.9900	0.1300	3.7687		(30)					
Total net area of external elements Aum(A, m ²)			132.4500				(31)					
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =		34.1296 (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)							7.9955 (36)					
Total fabric heat loss						(33) + (36) =	42.1251 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 27.5924	Feb 27.4292	Mar 27.2693	Apr 26.5181	May 26.3776	Jun 25.7233	Jul 25.7233	Aug 25.6021	Sep 25.9753	Oct 26.3776	Nov 26.6619	Dec 26.9591 (38)
Heat transfer coeff	69.7174	69.5543	69.3943	68.6432	68.5026	67.8484	67.8484	67.7272	68.1004	68.5026	68.7869	69.0842 (39)
Average = Sum(39)m / 12 =												68.6425 (39)
HLP	Jan 1.2024	Feb 1.1996	Mar 1.1969	Apr 1.1839	May 1.1815	Jun 1.1702	Jul 1.1702	Aug 1.1681	Sep 1.1745	Oct 1.1815	Nov 1.1864	Dec 1.1915 (40)
HLP (average)												1.1839 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												1.9240 (42)
Average daily hot water use (litres/day)												79.8946 (43)
Daily hot water use	87.8841	84.6883	81.4925	78.2967	75.1009	71.9051	71.9051	75.1009	78.2967	81.4925	84.6883	87.8841 (44)
Energy conte	130.3295	113.9870	117.6244	102.5478	98.3971	84.9092	78.6808	90.2874	91.3657	106.4780	116.2290	126.2172 (45)
Energy content (annual)												Total = Sum(45)m = 1257.0531 (45)
Distribution loss (46)m = 0.15 x (45)m												
Water storage loss:	19.5494	17.0981	17.6437	15.3822	14.7596	12.7364	11.8021	13.5431	13.7049	15.9717	17.4344	18.9326 (46)
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 Designed)

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	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	44.7848	38.9798	41.5277	38.6121	38.2706	35.4601	36.6421	38.2706	38.6121	41.5277	41.7641	44.7848	44.7848	44.7848	44.7848	44.7848	44.7848	44.7848	44.7848	44.7848	44.7848	44.7848	44.7848	44.7848	(61)
Solar input	175.1143	152.9668	159.1521	141.1599	136.6677	120.3693	115.3229	128.5580	129.9778	148.0056	157.9931	171.0019	171.0019	171.0019	171.0019	171.0019	171.0019	171.0019	171.0019	171.0019	171.0019	171.0019	171.0019	171.0019	(62)
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63)
Heat gains from water heating, kWh/month	175.1143	152.9668	159.1521	141.1599	136.6677	120.3693	115.3229	128.5580	129.9778	148.0056	157.9931	171.0019	171.0019	171.0019	171.0019	171.0019	171.0019	171.0019	171.0019	171.0019	171.0019	171.0019	171.0019	171.0019	(64)
	54.5308	47.6456	49.4920	43.7502	42.2847	37.0973	35.3219	39.5882	40.0321	45.7858	49.0872	53.1634	53.1634	53.1634	53.1634	53.1634	53.1634	53.1634	53.1634	53.1634	53.1634	53.1634	53.1634	53.1634	(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
(66)m	96.1992	96.1992	96.1992	96.1992	96.1992	96.1992	96.1992	96.1992	96.1992	96.1992	96.1992	96.1992	96.1992
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	15.3647	13.6468	11.0983	8.4021	6.2807	5.3024	5.7295	7.4474	9.9958	12.6920	14.8135	15.7917	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	167.8252	169.5667	165.1782	155.8356	144.0421	132.9580	125.5531	123.8116	128.2001	137.5428	149.3362	160.4203	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.6199	32.6199	32.6199	32.6199	32.6199	32.6199	32.6199	32.6199	32.6199	32.6199	32.6199	32.6199	(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)	-76.9593	-76.9593	-76.9593	-76.9593	-76.9593	-76.9593	-76.9593	-76.9593	-76.9593	-76.9593	-76.9593	-76.9593	(71)
Water heating gains (Table b)	73.2940	70.9012	66.5216	60.7641	56.8342	51.5241	47.4757	53.2100	55.6002	61.5401	68.1766	71.4562	(72)
Total internal gains	311.3437	308.9745	297.6578	279.8616	262.0168	244.6442	233.6180	239.3287	248.6559	266.6346	287.1860	302.5280	(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	(77)						
Southeast	6.1400	36.7938	0.6300	0.7000	0.7700	69.0423	(77)						
Southwest	0.6600	36.7938	0.6300	0.7000	0.7700	7.4215	(79)						
Northwest	3.3000	11.2829	0.6300	0.7000	0.7700	11.3791	(81)						
Solar gains	87.8429	153.4086	219.9399	289.3439	339.4488	343.7503	328.6004	290.1869	243.8124	172.2561	105.9038	74.7298	(83)
Total gains	399.1866	462.3831	517.5977	569.2054	601.4657	588.3945	562.2183	529.5156	492.4683	438.8907	393.0899	377.2578	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Thl (C)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	57.7530	57.8884	58.0219	58.6568	58.7772	59.3439	59.3439	59.4501	59.1243	58.7772	58.5342	58.2824	(85)
tau	4.8502	4.8592	4.8681	4.9105	4.9185	4.9563	4.9563	4.9633	4.9416	4.9185	4.9023	4.8855	(86)
util living area	0.9963	0.9920	0.9805	0.9449	0.8540	0.6867	0.5199	0.5702	0.8116	0.9624	0.9924	0.9972	(86)
MIT	19.7701	19.9387	20.1990	20.5287	20.8012	20.9513	20.9900	20.9845	20.8868	20.5329	20.0892	19.7390	(87)
Th 2	19.9180	19.9203	19.9225	19.9329	19.9348	19.9439	19.9439	19.9456	19.9404	19.9348	19.9309	19.9268	(88)
util rest of house	0.9951	0.9893	0.9737	0.9250	0.8033	0.5935	0.4009	0.4486	0.7325	0.9448	0.9894	0.9963	(89)
MIT 2	18.2928	18.5395	18.9170	19.3887	19.7439	19.9123	19.9403	19.9394	19.8530	19.4046	18.7674	18.2535	(90)
Living area fraction	18.9091	19.1232	19.4519	19.8643	20.1850	20.3458	20.3783	20.3754	20.2843	19.8753	19.3189	18.8733	(91)
Temperature adjustment	18.9091	19.1232	19.4519	19.8643	20.1850	20.3458	20.3783	20.3754	20.2843	19.8753	19.3189	18.8733	(92)
adjusted MIT	18.9091	19.1232	19.4519	19.8643	20.1850	20.3458	20.3783	20.3754	20.2843	19.8753	19.3189	18.8733	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(94)
Useful gains	396.5928	456.1976	502.0330	525.6574	491.1086	371.1293	253.4770	264.5498	374.6378	414.1204	387.9894	375.3585	(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	1018.5102	989.2862	898.7872	752.6252	581.2476	389.8416	256.3482	269.2439	421.1525	635.3830	840.4980	1013.6911	(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	462.7065	358.2356	295.1851	163.4168	67.0634	0.0000	0.0000	0.0000	0.0000	164.6193	325.8062	474.9195	(98)
Space heating												2311.9525	(98)
Space heating per m2												39.8750	(99)

8c. Space cooling requirement

Not applicable

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

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													2475.3238 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	462.7065	358.2356	295.1851	163.4168	67.0634	0.0000	0.0000	0.0000	0.0000	164.6193	325.8062	474.9195	(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)	495.4031	383.5499	316.0440	174.9645	71.8024	0.0000	0.0000	0.0000	0.0000	176.2520	348.8289	508.4791	(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	175.1143	152.9668	159.1521	141.1599	136.6677	120.3693	115.3229	128.5580	129.9778	148.0056	157.9931	171.0019	(64)
Efficiency of water heater (217)m	87.3825	87.1211	86.5851	85.4205	83.3660	80.3000	80.3000	80.3000	80.3000	85.3195	86.8333	80.3000	(216)
Fuel for water heating, kWh/month	200.3998	175.5796	183.8100	165.2529	163.9370	149.8994	143.6151	160.0972	161.8653	173.4723	181.9499	195.4603	(219)
Water heating fuel used													2055.3386 (219)
Annual totals kWh/year													
Space heating fuel - main system													2475.3238 (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)													271.3453 (232)
Total delivered energy for all uses													4877.0078 (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	2475.3238	0.2160	534.6700 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2055.3386	0.2160	443.9531 (264)
Space and water heating			978.6231 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	271.3453	0.5190	140.8282 (268)
Total CO2, kg/m2/year			1158.3763 (272)
Emissions per m2 for space and water heating			16.8786 (272a)
Fuel factor (mains gas)			1.0000
Emissions per m2 for lighting			2.4289 (272b)
Emissions per m2 for pumps and fans			0.6714 (272c)
Target Carbon Dioxide Emission Rate (TER) = (16.8786 * 1.00) + 2.4289 + 0.6714, rounded to 2 d.p.			19.9800 (273)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

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

1. Overall dwelling dimensions

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	28.9900 (1b)	x 2.3300 (2b)	= 67.5467 (1b) - (3b)
First floor	28.9900 (1c)	x 2.5600 (2c)	= 74.2144 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	57.9800		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 141.7611 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour							
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)							
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)							
Number of intermittent fans					2 * 10 = 20.0000 (7a)							
Number of passive vents					0 * 10 = 0.0000 (7b)							
Number of flueless gas fires					0 * 40 = 0.0000 (7c)							
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c)					20.0000 / (5) = 0.1411 (8)							
Pressure test					Yes							
Measured/design AP50					5.0100							
Infiltration rate					0.3916 (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) = 0.3328 (21)							
Wind speed	Jan 5.1000	Feb 5.0000	Mar 4.9000	Apr 4.4000	May 4.3000	Jun 3.8000	Jul 3.8000	Aug 3.7000	Sep 4.0000	Oct 4.3000	Nov 4.5000	Dec 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	0.4244	0.4161	0.4077	0.3661	0.3578	0.3162	0.3162	0.3079	0.3328	0.3578	0.3745	0.3911 (22b)
Effective ac	0.5900	0.5866	0.5831	0.5670	0.5640	0.5500	0.5500	0.5474	0.5554	0.5640	0.5701	0.5765 (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					
Opening Type 1			1.9700	1.0000	1.9700		(26)					
Opening Type 2 (Uw = 1.41)			10.1000	1.3347	13.4807		(27)					
150mm Platinum			28.9900	0.1500	4.3485		(28a)					
50mm A. Platinum	74.4700	12.0700	62.4000	0.2700	16.8480		(29a)					
400mm Mineral wool	28.9900		28.9900	0.1100	3.1889		(30)					
Total net area of external elements Aum(A, m2)			132.4500				(31)					
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 39.8361		(33)					
E-WM-22			35.4600	0.0000	0.0000		(32)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							202.0130 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							7.2469 (36)					
Total fabric heat loss							(33) + (36) = 47.0830 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 27.6031	Feb 27.4396	Mar 27.2792	Apr 26.5261	May 26.3852	Jun 25.7293	Jul 25.7293	Aug 25.6078	Sep 25.9819	Oct 26.3852	Nov 26.6703	Dec 26.9683 (38)
Heat transfer coeff	74.6861	74.5226	74.3622	73.6091	73.4682	72.8123	72.8123	72.6908	73.0649	73.4682	73.7533	74.0513 (39)
Average = Sum(39)m / 12 =												73.6084 (39)
HLP	Jan 1.2881	Feb 1.2853	Mar 1.2825	Apr 1.2696	May 1.2671	Jun 1.2558	Jul 1.2558	Aug 1.2537	Sep 1.2602	Oct 1.2671	Nov 1.2720	Dec 1.2772 (40)
HLP (average)												1.2695 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												1.9240 (42)
Average daily hot water use (litres/day)												79.8946 (43)
Daily hot water use	87.8841	84.6883	81.4925	78.2967	75.1009	71.9051	71.9051	75.1009	78.2967	81.4925	84.6883	87.8841 (44)
Energy conte	130.3295	113.9870	117.6244	102.5478	98.3971	84.9092	84.9092	90.2874	91.3657	106.4780	116.2290	126.2172 (45)
Energy content (annual)												Total = Sum(45)m = 1257.0531 (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)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

Space cooling											490.6159 (104)
Cooled fraction										FC - cooled area / (4) -	1.0000 (105)
Intermittency factor (Table 10b)	0.0000	0.0000	0.0000	0.0000	0.2500	0.2500	0.2500	0.0000	0.0000	0.0000	0.0000 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	35.5229	47.7386	39.3924	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling											122.6540 (107)
Space cooling per m2											2.1155 (108)
Energy for space heating											46.8908 (99)
Energy for space cooling											2.1155 (108)
Total											49.0062 (109)
Dwelling Fabric Energy Efficiency (DFEE)											49.0 (109)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (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	28.9900 (1b)	x 2.3300 (2b)	= 67.5467 (1b) - (3b)
First floor	28.9900 (1c)	x 2.5600 (2c)	= 74.2144 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	57.9800		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 141.7611 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					2 * 10 = 20.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					20.0000 / (5) = 0.1411 (8)
Pressure test					Yes
Measured/design AP50					5.0000
Infiltration rate					0.3911 (18)
Number of sides sheltered					2 (19)
Shelter factor				(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor					(21) = (18) x (20) = 0.3324 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4238	0.4155	0.4072	0.3657	0.3574	0.3158	0.3158	0.3075	0.3324	0.3574	0.3740	0.3906 (22b)
Effective ac	0.5898	0.5863	0.5829	0.5669	0.5639	0.5499	0.5499	0.5473	0.5553	0.5639	0.5699	0.5763 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
TER Opaque door			1.9700	1.0000	1.9700		(26)
TER Opening Type (Uw = 1.40)			10.1000	1.3258	13.3902		(27)
150mm Platinum			28.9900	0.1300	3.7687		(28a)
50mm A. Platinum	74.4700	12.0700	62.4000	0.1800	11.2320		(29a)
400mm Mineral wool	28.9900		28.9900	0.1300	3.7687		(30)
Total net area of external elements Aum(A, m ²)			132.4500				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 34.1296		(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K 250.0000 (35)
 Thermal bridges (Sum(L x Psi) calculated using Appendix K) 7.9955 (36)
 Total fabric heat loss (33) + (36) = 42.1251 (37)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	27.5924	27.4292	27.2693	26.5181	26.3776	25.7233	25.7233	25.6021	25.9753	26.3776	26.6619	26.9591 (38)
Heat transfer coeff	69.7174	69.5543	69.3943	68.6432	68.5026	67.8484	67.8484	67.7272	68.1004	68.5026	68.7869	69.0842 (39)
Average = Sum(39)m / 12 =												68.6425 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.2024	1.1996	1.1969	1.1839	1.1815	1.1702	1.1702	1.1681	1.1745	1.1815	1.1864	1.1915 (40)
HLP (average)												1.1839 (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 1.9240 (42)
 Average daily hot water use (litres/day) 79.8946 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	87.8841	84.6883	81.4925	78.2967	75.1009	71.9051	71.9051	75.1009	78.2967	81.4925	84.6883	87.8841 (44)
Energy conte	130.3295	113.9870	117.6244	102.5478	98.3971	84.9092	78.6808	90.2874	91.3657	106.4780	116.2290	126.2172 (45)
Energy content (annual)												Total = Sum(45)m = 1257.0531 (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												

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

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	29.4657	41.9623	34.2700	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling											105.6981 (107)	
Space cooling per m2											1.8230 (108)	
Energy for space heating											43.8213 (99)	
Energy for space cooling											1.8230 (108)	
Total											45.6443 (109)	
Target Fabric Energy Efficiency (TFEE)											52.5 (109)	

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

Property Reference	Denford Mid-Terrace			Issued on Date	15/10/2021
Assessment Reference	1	Prop Type Ref			
Property	Plot 050, Chipping Lane , Longridge , PR3				
SAP Rating	84 B	DER	17.73	TER	18.59
Environmental	88 B	% DER<TER	4.61		
CO₂ Emissions (t/year)	0.90	DFEE	40.78	TFEE	44.69
General Requirements Compliance	Pass	% DFEE<TFEE	8.75		
Assessor Details	Mr. William Vincent, William Vincent, Tel: 01582544250, William.Vincent@ee-ltd.co.uk			Assessor ID	T759-0001
Client					

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

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

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

DWELLING AS DESIGNED

Mid-Terrace House, total floor area 57 m²

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

1a TER and DER

Fuel for main heating:Mains gas
Fuel factor:1.00 (mains gas)
Target Carbon Dioxide Emission Rate (TER) 18.59 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 17.73 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 44.7 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE) 40.8 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.27 (max. 0.30)	0.27 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.13 (max. 0.25)	0.13 (max. 0.70)	OK
Roof	0.11 (max. 0.20)	0.11 (max. 0.35)	OK
Openings	1.34 (max. 2.00)	1.41 (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: 5.01 (design value)
Maximum 10.0 OK

4 Heating efficiency

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

Data from database

Ideal LOGIC COMBI ESP1 35

Combi boiler

Efficiency: 89.6% SEDBUK2009

OK

Minimum: 88.0%

Secondary heating system:

None

5 Cylinder insulation

Hot water storage No cylinder

6 Controls

Space heating controls: Time and temperature zone control 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

Not applicable

9 Summertime temperature

Overheating risk (West Pennines (England)):Not significant OK

Based on:

Overshading:

Average

Windows facing South East:

6.14 m², No overhang

Windows facing North West:

3.30 m², No overhang

Air change rate:

4.00 ach

Blinds/curtains:

Dark-coloured curtain or roller blind, closed 100% of daylight hours

10 Key features

Party wall U-value 0.00 W/m²K
Roof U-value 0.11 W/m²K
Door U-value 1.00 W/m²K

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

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

1. Overall dwelling dimensions

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	28.4200 (1b)	x 2.3100 (2b)	= 65.6502 (1b) - (3b)
First floor	28.4200 (1c)	x 2.5600 (2c)	= 72.7552 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	56.8400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 138.4054 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					3 * 10 = 30.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c)					30.0000 / (5) = 0.2168 (8)
Pressure test					Yes
Measured/design AP50					5.0100
Infiltration rate					0.4673 (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) = 0.3972 (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	0.5064	0.4965	0.4865	0.4369	0.4270	0.3773	0.3773	0.3674	0.3972	0.4270	0.4468	0.4667 (22b)
Effective ac	0.6282	0.6232	0.6184	0.5954	0.5911	0.5712	0.5712	0.5675	0.5789	0.5911	0.5998	0.6089 (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
Opening Type 1 (Uw = 1.41)			9.4400	1.3347	12.5998		(27)
Opening Type 3			1.9700	1.0000	1.9700		(26)
150mm TE Platinum GF			28.4200	0.1300	3.6946		(28a)
50mm AP (60mmCavity)	4.2100	1.9700	2.2400	0.2700	0.6048		(29a)
BDW Std 50mm AP	34.1800	9.4400	24.7400	0.2700	6.6798		(29a)
400mm MW	28.4200		28.4200	0.1100	3.1262		(30)
Total net area of external elements Aum(A, m2)			95.2300				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 28.6752		(33)
E-WM-20/22			70.2300	0.0000	0.0000		(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 193.9100 (35)
 Thermal bridges (Sum(L x Psi) calculated using Appendix K) 8.4401 (36)
 Total fabric heat loss (33) + (36) = 37.1153 (37)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	28.6929	28.4655	28.2426	27.1957	26.9998	26.0880	26.0880	25.9191	26.4392	26.9998	27.3961	27.8103 (38)
Heat transfer coeff	65.8082	65.5808	65.3579	64.3110	64.1151	63.2033	63.2033	63.0344	63.5545	64.1151	64.5114	64.9256 (39)
Average = Sum(39)m / 12 =												64.3100 (39)
HLP	1.1578	1.1538	1.1499	1.1314	1.1280	1.1120	1.1120	1.1090	1.1181	1.1280	1.1350	1.1423 (40)
HLP (average)												1.1314 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												1.8910 (42)
Average daily hot water use (litres/day)												79.1120 (43)
Daily hot water use	87.0232	83.8587	80.6942	77.5297	74.3653	71.2008	71.2008	74.3653	77.5297	80.6942	83.8587	87.0232 (44)
Energy conte	129.0529	112.8705	116.4722	101.5433	97.4332	84.0775	77.9101	89.4030	90.4708	105.4349	115.0905	124.9808 (45)
Energy content (annual)												Total = Sum(45)m = 1244.7396 (45)
Distribution loss (46)m = 0.15 x (45)m												
19.3579	16.9306	17.4708	15.2315	14.6150	12.6116	11.6865	13.4105	13.5706	15.8152	17.2636	18.7471 (46)	
Water storage loss:												
Total storage loss												

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

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	0.0000	0.0000	(56)
Combi loss	14.0261	12.6524	13.9821	13.5017	13.9305	13.4565	13.8897	13.9161	13.4811	13.9608	13.5444	14.0176	14.0176	14.0176	(61)
Total heat required for water heating calculated for each month	143.0790	125.5229	130.4543	115.0450	111.3637	97.5339	91.7998	103.3191	103.9519	119.3957	128.6349	138.9984	138.9984	138.9984	(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	0.0000	0.0000	(63)
Output from w/h	143.0790	125.5229	130.4543	115.0450	111.3637	97.5339	91.7998	103.3191	103.9519	119.3957	128.6349	138.9984	138.9984	138.9984	(64)
Heat gains from water heating, kWh/month	46.4166	40.6925	42.2225	37.1386	35.8792	31.3199	29.3775	33.2055	33.4518	38.5473	41.6537	45.0605	45.0605	45.0605	(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	94.5516	94.5516	94.5516	94.5516	94.5516	94.5516	94.5516	94.5516	94.5516	94.5516	94.5516	94.5516	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	15.2286	13.5259	11.0000	8.3277	6.2251	5.2555	5.6787	7.3814	9.9073	12.5796	14.6822	15.6518	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	164.9131	166.6244	162.3120	153.1315	141.5427	130.6509	123.3745	121.6632	125.9756	135.1561	146.7449	157.6367	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.4552	32.4552	32.4552	32.4552	32.4552	32.4552	32.4552	32.4552	32.4552	32.4552	32.4552	32.4552	(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 b)	-75.6412	-75.6412	-75.6412	-75.6412	-75.6412	-75.6412	-75.6412	-75.6412	-75.6412	-75.6412	-75.6412	-75.6412	(71)
Water heating gains (Table 5)	62.3879	60.5544	56.7507	51.5814	48.2247	43.4998	39.4859	44.6311	46.4608	51.8109	57.8524	60.5652	(72)
Total internal gains	296.8951	295.0701	284.4282	267.4060	250.3579	233.7716	222.9046	228.0411	236.7092	253.9121	273.6449	288.2192	(73)

6. Solar gains

[Jan]		Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
Southeast		6.1400	36.7938	0.7100	0.7000	0.7700	77.8096 (77)
Northwest		3.3000	11.2829	0.7100	0.7000	0.7700	12.8241 (81)
Solar gains	90.6336	158.6423	228.3756	301.9331	355.5002	360.5435	344.4338
Total gains	387.5287	453.7124	512.8038	569.3391	605.8581	594.3151	567.3384
							303.3062
							253.6658
							178.3841
							109.3339
							77.0616 (83)
							365.2808 (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	46.5234	46.6848	46.8440	47.6065	47.7520	48.4409	48.4409	48.5707	48.1732	47.7520	47.4587	47.1559	
alpha	4.1016	4.1123	4.1229	4.1738	4.1835	4.2294	4.2294	4.2380	4.2115	4.1835	4.1639	4.1437	
util living area	0.9910	0.9821	0.9619	0.9091	0.8006	0.6313	0.4776	0.5258	0.7605	0.9358	0.9832	0.9928	(86)
MIT	19.5664	19.7753	20.0872	20.4745	20.7755	20.9407	20.9856	20.9786	20.8673	20.4707	19.9518	19.5351	(87)
Th 2	19.9539	19.9572	19.9603	19.9752	19.9780	19.9911	19.9911	19.9935	19.9861	19.9780	19.9724	19.9665	(88)
util rest of house	0.9886	0.9775	0.9519	0.8852	0.7503	0.5487	0.3739	0.4196	0.6863	0.9137	0.9781	0.9910	(89)
MIT 2	18.0537	18.3583	18.8083	19.3599	19.7528	19.9477	19.9846	19.9830	19.8749	19.3682	18.6270	18.0166	(90)
Living area fraction	18.6946	18.9586	19.3501	19.8321	20.1861	20.3684	20.4087	20.4048	20.2953	19.8353	19.1882	18.6599	(92)
Temperature adjustment												-0.1500	
adjusted MIT	18.5446	18.8086	19.2001	19.6821	20.0361	20.2184	20.2587	20.2548	20.1453	19.6853	19.0382	18.5099	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9842	0.9707	0.9427	0.8771	0.7534	0.5683	0.4021	0.4481	0.6991	0.9059	0.9718	0.9872
Ext temp.	381.3911	440.4320	483.3994	498.3665	456.4714	337.7378	228.1336	238.1158	342.8384	391.6106	372.1867	360.6109
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
Month fracti	937.4099	912.1363	830.0524	693.4070	534.4684	355.0987	231.2392	242.9834	384.2064	582.5045	770.1510	929.0809
Space heating kWh	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Space heating	413.6780	316.9853	257.9098	139.7097	58.0298	0.0000	0.0000	0.0000	0.0000	142.0250	286.5343	422.9416
Space heating per m2												2037.8136
												35.8518 (94)

8c. Space cooling requirement

Not applicable

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
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 %)													90.5000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													2251.7277 (211)
Space heating requirement	413.6780	316.9853	257.9098	139.7097	58.0298	0.0000	0.0000	0.0000	0.0000	142.0250	286.5343	422.9416	(98)
Space heating efficiency (main heating system 1)	90.5000	90.5000	90.5000	90.5000	90.5000	0.0000	0.0000	0.0000	0.0000	90.5000	90.5000	90.5000	(210)
Space heating fuel (main heating system)	457.1028	350.2600	284.9832	154.3754	64.1213	0.0000	0.0000	0.0000	0.0000	156.9337	316.6125	467.3388	(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	143.0790	125.5229	130.4543	115.0450	111.3637	97.5339	91.7998	103.3191	103.9519	119.3957	128.6349	138.9984	(64)
Efficiency of water heater (217)m	89.6555	89.5687	89.3992	89.0263	88.3704	87.3000	87.3000	87.3000	87.3000	89.0099	89.4837	89.6868	(217)
Fuel for water heating, kWh/month	159.5876	140.1415	145.9233	129.2259	126.0191	111.7227	105.1544	118.3495	119.0743	134.1376	143.7523	154.9820	(219)
Water heating fuel used													1588.0702 (219)
Annual totals kWh/year													
Space heating fuel - main system													2251.7277 (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)													268.9418 (232)
Total delivered energy for all uses													4183.7397 (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	2251.7277	0.2160	486.3732	(261)
Space heating - secondary	0.0000	0.0000	0.0000	(263)
Water heating (other fuel)	1588.0702	0.2160	343.0232	(264)
Space and water heating			829.3964	(265)
Pumps and fans	75.0000	0.5190	38.9250	(267)
Energy for lighting	268.9418	0.5190	139.5808	(268)
Total CO2, kg/year			1007.9021	(272)
Dwelling Carbon Dioxide Emission Rate (DER)			17.7300	(273)

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

DER			17.7300	ZC1
Total Floor Area		TFA	56.8400	
Assumed number of occupants		N	1.8910	
CO2 emission factor in Table 12 for electricity displaced from grid		EF	0.5190	
CO2 emissions from appliances, equation (L14)			17.1928	ZC2
CO2 emissions from cooking, equation (L16)			2.8921	ZC3
Total CO2 emissions			37.8149	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			37.8149	ZC8

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF TARGET EMISSIONS 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (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	28.4200 (1b)	x 2.3100 (2b)	= 65.6502 (1b) - (3b)
First floor	28.4200 (1c)	x 2.5600 (2c)	= 72.7552 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	56.8400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 138.4054 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour							
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)							
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)							
Number of intermittent fans					2 * 10 = 20.0000 (7a)							
Number of passive vents					0 * 10 = 0.0000 (7b)							
Number of flueless gas fires					0 * 40 = 0.0000 (7c)							
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c)					20.0000 / (5) = 0.1445 (8)							
Pressure test					Yes							
Measured/design AP50					5.0000							
Infiltration rate					0.3945 (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) = 0.3353 (21)							
Wind speed	Jan 5.1000	Feb 5.0000	Mar 4.9000	Apr 4.4000	May 4.3000	Jun 3.8000	Jul 3.8000	Aug 3.7000	Sep 4.0000	Oct 4.3000	Nov 4.5000	Dec 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	0.4275	0.4192	0.4108	0.3689	0.3605	0.3186	0.3186	0.3102	0.3353	0.3605	0.3772	0.3940 (22b)
Effective ac	0.5914	0.5878	0.5844	0.5680	0.5650	0.5507	0.5507	0.5481	0.5562	0.5650	0.5712	0.5776 (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			1.9700	1.0000	1.9700		(26)					
TER Opening Type (Uw = 1.40)			9.4400	1.3258	12.5152		(27)					
150mm TE Platinum GF			28.4200	0.1300	3.6946		(28a)					
50mm AP (60mmCavity)	4.2100	1.9700	2.2400	0.1800	0.4032		(29a)					
BDW Std 50mm AP	34.1800	9.4400	24.7400	0.1800	4.4532		(29a)					
400mm MW	28.4200		28.4200	0.1300	3.6946		(30)					
Total net area of external elements Aum, m ²			95.2300				(31)					
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 26.7308		(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)							7.3423 (36)					
Total fabric heat loss							(33) + (36) = 34.0730 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 27.0113	Feb 26.8492	Mar 26.6903	Apr 25.9440	May 25.8044	Jun 25.1544	Jul 25.1544	Aug 25.0340	Sep 25.4048	Oct 25.8044	Nov 26.0869	Dec 26.3822 (38)
Heat transfer coeff	61.0843	60.9222	60.7634	60.0171	59.8774	59.2274	59.2274	59.1071	59.4778	59.8774	60.1599	60.4552 (39)
Average = Sum(39)m / 12 =												60.0164 (39)
HLP	Jan 1.0747	Feb 1.0718	Mar 1.0690	Apr 1.0559	May 1.0534	Jun 1.0420	Jul 1.0420	Aug 1.0399	Sep 1.0464	Oct 1.0534	Nov 1.0584	Dec 1.0636 (40)
HLP (average)												1.0559 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												1.8910 (42)
Average daily hot water use (litres/day)												79.1120 (43)
Daily hot water use	87.0232	83.8587	80.6942	77.5297	74.3653	71.2008	71.2008	74.3653	77.5297	80.6942	83.8587	87.0232 (44)
Energy conte	129.0529	112.8705	116.4722	101.5433	97.4332	84.0775	77.9101	89.4030	90.4708	105.4349	115.0905	124.9808 (45)
Energy content (annual)												Total = Sum(45)m = 1244.7396 (45)
Distribution loss (46)m = 0.15 x (45)m	19.3579	16.9306	17.4708	15.2315	14.6150	12.6116	11.6865	13.4105	13.5706	15.8152	17.2636	18.7471 (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)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF TARGET EMISSIONS 09 Jan 2014

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	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	44.3461	38.5980	41.1209	38.2338	37.8957	35.1127	36.2831	37.8957	38.2338	41.1209	41.3550	44.3461	44.3461	44.3461	44.3461	44.3461	44.3461	44.3461	44.3461	44.3461	44.3461	44.3461	44.3461	44.3461	(61)
Total heat required for water heating calculated for each month	173.3989	151.4684	157.5931	139.7771	135.3289	119.1902	114.1933	127.2987	128.7046	146.5558	156.4455	169.3269	169.3269	169.3269	169.3269	169.3269	169.3269	169.3269	169.3269	169.3269	169.3269	169.3269	169.3269	169.3269	(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	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	173.3989	151.4684	157.5931	139.7771	135.3289	119.1902	114.1933	127.2987	128.7046	146.5558	156.4455	169.3269	169.3269	169.3269	169.3269	169.3269	169.3269	169.3269	169.3269	169.3269	169.3269	169.3269	169.3269	169.3269	(64)
Heat gains from water heating, kWh/month	53.9966	47.1789	49.0072	43.3216	41.8705	36.7339	34.9759	39.2004	39.6400	45.3373	48.6063	52.6426	52.6426	52.6426	52.6426	52.6426	52.6426	52.6426	52.6426	52.6426	52.6426	52.6426	52.6426	52.6426	(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	94.5516	94.5516	94.5516	94.5516	94.5516	94.5516	94.5516	94.5516	94.5516	94.5516	94.5516	94.5516	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	15.2286	13.5259	11.0000	8.3277	6.2251	5.2555	5.6787	7.3814	9.9073	12.5796	14.6822	15.6518	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	164.9131	166.6244	162.3120	153.1315	141.5427	130.6509	123.3745	121.6632	125.9756	135.1561	146.7449	157.6367	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.4552	32.4552	32.4552	32.4552	32.4552	32.4552	32.4552	32.4552	32.4552	32.4552	32.4552	32.4552	(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)	-75.6412	-75.6412	-75.6412	-75.6412	-75.6412	-75.6412	-75.6412	-75.6412	-75.6412	-75.6412	-75.6412	-75.6412	(71)
Water heating gains (Table 5)	72.5761	70.2067	65.8699	60.1689	56.2775	51.0194	47.0106	52.6887	55.0555	60.9373	67.5088	70.7562	(72)
Total internal gains	307.0832	304.7225	293.5474	275.9935	258.4107	241.2911	230.4293	236.0988	245.3039	263.0384	283.3014	298.4102	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	Specific data or Table 6c	FF	Access factor Table 6d	Gains W						
Southeast	6.1400	36.7938	0.6300	0.7000	0.7700	69.0423	(77)						
Northwest	3.3000	11.2829	0.6300	0.7000	0.7700	11.3791	(81)						
Solar gains	80.4214	140.7671	202.6432	267.9124	315.4438	319.9189	305.6243	269.1309	225.0838	158.2845	97.0146	68.3786	(83)
Total gains	387.5046	445.4896	496.1906	543.9060	573.8546	561.2100	536.0536	505.2297	470.3876	421.3230	380.3160	366.7888	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation factor for gains for living area, nil,m (see Table 9a)	0.9964	0.9917	0.9790	0.9371	0.8307	0.6473	0.4812	0.5295	0.7815	0.9572	0.9920	0.9973	(86)
MIT	19.9378	20.0965	20.3371	20.6361	20.8652	20.9734	20.9955	20.9926	20.9280	20.6309	20.2288	19.9091	(87)
Th 2	20.0216	20.0239	20.0262	20.0370	20.0390	20.0485	20.0485	20.0502	20.0448	20.0390	20.0349	20.0307	(88)
util rest of house	0.9952	0.9891	0.9720	0.9161	0.7796	0.5626	0.3798	0.4247	0.7045	0.9384	0.9890	0.9964	(89)
MIT 2	18.6114	18.8437	19.1920	19.6181	19.9110	20.0313	20.0468	20.0473	19.9900	19.6207	19.0455	18.5761	(90)
Living area fraction	19.1733	19.3744	19.6771	20.0494	20.3152	20.4304	20.4487	20.4478	20.3874	20.0487	19.5468	19.1408	(92)
Temperature adjustment	19.1733	19.3744	19.6771	20.0494	20.3152	20.4304	20.4487	20.4478	20.3874	20.0487	19.5468	19.1408	(93)
adjusted MIT	19.1733	19.3744	19.6771	20.0494	20.3152	20.4304	20.4487	20.4478	20.3874	20.0487	19.5468	19.1408	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	385.0806	439.5780	480.7203	498.4454	456.4662	335.4399	226.6985	237.0951	345.3102	395.4680	375.3405	365.0328	(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	908.5287	881.8136	800.6852	669.1514	515.8587	345.3214	227.9509	239.2518	373.9598	565.7636	748.7992	903.2499	(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	389.4454	297.1823	238.0539	122.9084	44.1880	0.0000	0.0000	0.0000	0.0000	126.7000	268.8903	400.4335	(98)
Space heating												1887.8018	(98)
Space heating per m2												33.2126	(99)

8c. Space cooling requirement

Not applicable

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

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													2021.2011 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	389.4454	297.1823	238.0539	122.9084	44.1880	0.0000	0.0000	0.0000	0.0000	126.7000	268.8903	400.4335	(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)	416.9651	318.1824	254.8757	131.5935	47.3105	0.0000	0.0000	0.0000	0.0000	135.6531	287.8911	428.7297	(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	173.3989	151.4684	157.5931	139.7771	135.3289	119.1902	114.1933	127.2987	128.7046	146.5558	156.4455	169.3269	(64)
Efficiency of water heater (217)m	87.0277	86.7176	86.0871	84.7293	82.5708	80.3000	80.3000	80.3000	80.3000	84.6871	86.4027	87.1426	(217)
Fuel for water heating, kWh/month	199.2456	174.6686	183.0625	164.9691	163.8944	148.4311	142.2083	158.5289	160.2797	173.0557	181.0654	194.3101	(219)
Water heating fuel used													2043.7194 (219)
Annual totals kWh/year													
Space heating fuel - main system													2021.2011 (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)													268.9418 (232)
Total delivered energy for all uses													4408.8623 (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	2021.2011	0.2160	436.5794 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2043.7194	0.2160	441.4434 (264)
Space and water heating			878.0228 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	268.9418	0.5190	139.5808 (268)
Total CO2, kg/m2/year			1056.5286 (272)
Emissions per m2 for space and water heating			15.4473 (272a)
Fuel factor (mains gas)			1.0000
Emissions per m2 for lighting			2.4557 (272b)
Emissions per m2 for pumps and fans			0.6848 (272c)
Target Carbon Dioxide Emission Rate (TER) = (15.4473 * 1.00) + 2.4557 + 0.6848, rounded to 2 d.p.			18.5900 (273)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

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

1. Overall dwelling dimensions

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	28.4200 (1b)	x 2.3100 (2b)	= 65.6502 (1b) - (3b)
First floor	28.4200 (1c)	x 2.5600 (2c)	= 72.7552 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	56.8400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 138.4054 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour							
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)							
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)							
Number of intermittent fans					2 * 10 = 20.0000 (7a)							
Number of passive vents					0 * 10 = 0.0000 (7b)							
Number of flueless gas fires					0 * 40 = 0.0000 (7c)							
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c)					20.0000 / (5) = 0.1445 (8)							
Pressure test					Yes							
Measured/design AP50					5.0100							
Infiltration rate					0.3950 (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) = 0.3358 (21)							
Wind speed	Jan 5.1000	Feb 5.0000	Mar 4.9000	Apr 4.4000	May 4.3000	Jun 3.8000	Jul 3.8000	Aug 3.7000	Sep 4.0000	Oct 4.3000	Nov 4.5000	Dec 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	0.4281	0.4197	0.4113	0.3693	0.3609	0.3190	0.3190	0.3106	0.3358	0.3609	0.3777	0.3945 (22b)
Effective ac	0.5916	0.5881	0.5846	0.5682	0.5651	0.5509	0.5509	0.5482	0.5564	0.5651	0.5713	0.5778 (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					
Opening Type 1 (Uw = 1.41)			9.4400	1.3347	12.5998		(27)					
Opening Type 3			1.9700	1.0000	1.9700		(26)					
150mm TE Platinum GF			28.4200	0.1300	3.6946		(28a)					
50mm AP (60mmCavity)	4.2100	1.9700	2.2400	0.2700	0.6048		(29a)					
BDW Std 50mm AP	34.1800	9.4400	24.7400	0.2700	6.6798		(29a)					
400mm MW	28.4200		28.4200	0.1100	3.1262		(30)					
Total net area of external elements Aum(A, m2)			95.2300				(31)					
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 28.6752		(33)					
E-WM-20/22			70.2300	0.0000	0.0000		(32)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							193.9100 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							8.4401 (36)					
Total fabric heat loss						(33) + (36) =	37.1153 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 27.0219	Feb 26.8594	Mar 26.7001	Apr 25.9519	May 25.8119	Jun 25.1603	Jul 25.1603	Aug 25.0396	Sep 25.4113	Oct 25.8119	Nov 26.0951	Dec 26.3912 (38)
Heat transfer coeff	64.1372	63.9747	63.8154	63.0672	62.9272	62.2756	62.2756	62.1549	62.5266	62.9272	63.2104	63.5064 (39)
Average = Sum(39)m / 12 =												63.0665 (39)
HLP	Jan 1.1284	Feb 1.1255	Mar 1.1227	Apr 1.1096	May 1.1071	Jun 1.0956	Jul 1.0956	Aug 1.0935	Sep 1.1000	Oct 1.1071	Nov 1.1121	Dec 1.1173 (40)
HLP (average)												1.1095 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												1.8910 (42)
Average daily hot water use (litres/day)												79.1120 (43)
Daily hot water use	87.0232	83.8587	80.6942	77.5297	74.3653	71.2008	71.2008	74.3653	77.5297	80.6942	83.8587	87.0232 (44)
Energy conte	129.0529	112.8705	116.4722	101.5433	97.4332	84.0775	77.9101	89.4030	90.4708	105.4349	115.0905	124.9808 (45)
Energy content (annual)												Total = Sum(45)m = 1244.7396 (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												

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

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	0.0000	0.0000	(56)
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	0.0000	(57)
Heat gains from water heating, kWh/month	27.4237	23.9850	24.7503	21.5780	20.7046	17.8665	16.5559	18.9981	19.2250	22.4049	24.4567	26.5584	26.5584	26.5584	(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	94.5516	94.5516	94.5516	94.5516	94.5516	94.5516	94.5516	94.5516	94.5516	94.5516	94.5516	94.5516	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	15.2286	13.5259	11.0000	8.3277	6.2251	5.2555	5.6787	7.3814	9.9073	12.5796	14.6822	15.6518	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	164.9131	166.6244	162.3120	153.1315	141.5427	130.6509	123.3745	121.6632	125.9756	135.1561	146.7449	157.6367	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.4552	32.4552	32.4552	32.4552	32.4552	32.4552	32.4552	32.4552	32.4552	32.4552	32.4552	32.4552	(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)	-75.6412	-75.6412	-75.6412	-75.6412	-75.6412	-75.6412	-75.6412	-75.6412	-75.6412	-75.6412	-75.6412	-75.6412	(71)
Water heating gains (Table 5)	36.8599	35.6919	33.2666	29.9694	27.8287	24.8145	22.2526	25.5351	26.7014	30.1141	33.9677	35.6968	(72)
Total internal gains	268.3670	267.2077	257.9441	242.7940	226.9619	212.0863	202.6712	205.9452	213.9498	229.2153	246.7603	260.3508	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	g	Specific data or Table 6c	FF	Access factor Table 6d	Gains W					
Southeast	6.1400	36.7938	0.7100		0.7000		0.7700	77.8096 (77)					
Northwest	3.3000	11.2829	0.7100		0.7000		0.7700	12.8241 (81)					
Solar gains	90.6336	158.6423	228.3756	301.9331	355.5002	360.5435	344.4338	303.3062	253.6658	178.3841	109.3339	77.0616	(83)
Total gains	359.0007	425.8499	486.3197	544.7271	582.4621	572.6298	547.1050	509.2514	467.6156	407.5994	356.0942	337.4124	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation factor for gains for living area, nll,m (see Table 9a)													21.0000 (85)
tau	47.7356	47.8568	47.9763	48.5454	48.6534	49.1625	49.1625	49.2580	48.9652	48.6534	48.4354	48.2096	
alpha	4.1824	4.1905	4.1984	4.2364	4.2436	4.2775	4.2775	4.2839	4.2643	4.2436	4.2290	4.2140	
util living area	0.9931	0.9854	0.9670	0.9172	0.8112	0.6433	0.4875	0.5396	0.7761	0.9448	0.9868	0.9946	(86)
MIT	19.5579	19.7674	20.0804	20.4660	20.7714	20.9387	20.9852	20.9774	20.8608	20.4538	19.9321	19.5204	(87)
Th 2	19.9777	19.9800	19.9823	19.9930	19.9950	20.0044	20.0044	20.0061	20.0008	19.9950	19.9910	19.9867	(88)
util rest of house	0.9913	0.9816	0.9582	0.8950	0.7625	0.5612	0.3834	0.4327	0.7040	0.9253	0.9828	0.9932	(89)
MIT 2	18.6666	18.8759	19.1854	19.5632	19.8372	19.9735	19.9998	19.9985	19.9201	19.5610	19.0494	18.6364	(90)
Living area fraction										fLA = Living area / (4) =			0.4236 (91)
MIT	19.0442	19.2536	19.5646	19.9457	20.2330	20.3824	20.4172	20.4132	20.3186	19.9392	19.4233	19.0109	(92)
Temperature adjustment													0.0000
adjusted MIT	19.0442	19.2536	19.5646	19.9457	20.2330	20.3824	20.4172	20.4132	20.3186	19.9392	19.4233	19.0109	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9891	0.9782	0.9539	0.8938	0.7750	0.5937	0.4275	0.4778	0.7289	0.9240	0.9798	0.9914	(94)
Useful gains	355.0979	416.5530	463.8770	486.8675	451.4127	339.9849	233.8718	243.3164	340.8287	376.6141	348.9180	334.5213	(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	945.6505	918.2657	833.7203	696.6198	536.9553	360.1010	237.7212	249.4392	388.8279	587.6919	778.9621	940.5890	(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	439.3711	337.1509	275.1635	151.0216	63.6437	0.0000	0.0000	0.0000	0.0000	157.0418	309.6318	450.9143	(98)
Space heating												2183.9388	(98)
Space heating per m2										(98) / (4) =		38.4226	(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	585.3903	460.8392	472.3771	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8921	0.9383	0.9203	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	522.2493	432.3895	434.7423	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	740.4268	709.2331	666.1471	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	157.0878	205.9716	172.1652	0.0000	0.0000	0.0000	0.0000	(104)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

Space cooling											535.2247 (104)
Cooled fraction										FC - cooled area / (4) -	1.0000 (105)
Intermittency factor (Table 10b)											
	0.0000	0.0000	0.0000	0.0000	0.2500	0.2500	0.2500	0.0000	0.0000	0.0000	0.0000 (106)
Space cooling kWh											
	0.0000	0.0000	0.0000	0.0000	39.2720	51.4929	43.0413	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling											133.8062 (107)
Space cooling per m2											2.3541 (108)
Energy for space heating											38.4226 (99)
Energy for space cooling											2.3541 (108)
Total											40.7767 (109)
Dwelling Fabric Energy Efficiency (DFEE)											40.8 (109)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

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

1. Overall dwelling dimensions

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	28.4200 (1b)	x 2.3100 (2b)	= 65.6502 (1b) - (3b)
First floor	28.4200 (1c)	x 2.5600 (2c)	= 72.7552 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	56.8400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 138.4054 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour							
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)							
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)							
Number of intermittent fans					2 * 10 = 20.0000 (7a)							
Number of passive vents					0 * 10 = 0.0000 (7b)							
Number of flueless gas fires					0 * 40 = 0.0000 (7c)							
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c)					20.0000 / (5) = 0.1445 (8)							
Pressure test					Yes							
Measured/design AP50					5.0000							
Infiltration rate					0.3945 (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) =	0.3353 (21)							
Wind speed	Jan 5.1000	Feb 5.0000	Mar 4.9000	Apr 4.4000	May 4.3000	Jun 3.8000	Jul 3.8000	Aug 3.7000	Sep 4.0000	Oct 4.3000	Nov 4.5000	Dec 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	0.4275	0.4192	0.4108	0.3689	0.3605	0.3186	0.3186	0.3102	0.3353	0.3605	0.3772	0.3940 (22b)
Effective ac	0.5914	0.5878	0.5844	0.5680	0.5650	0.5507	0.5507	0.5481	0.5562	0.5650	0.5712	0.5776 (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			1.9700	1.0000	1.9700		(26)					
TER Opening Type (Uw = 1.40)			9.4400	1.3258	12.5152		(27)					
150mm TE Platinum GF			28.4200	0.1300	3.6946		(28a)					
50mm AP (60mmCavity)	4.2100	1.9700	2.2400	0.1800	0.4032		(29a)					
BDW Std 50mm AP	34.1800	9.4400	24.7400	0.1800	4.4532		(29a)					
400mm MW	28.4200		28.4200	0.1300	3.6946		(30)					
Total net area of external elements Aum, m2			95.2300				(31)					
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	26.7308	(33)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							7.3423 (36)					
Total fabric heat loss						(33) + (36) =	34.0730 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 27.0113	Feb 26.8492	Mar 26.6903	Apr 25.9440	May 25.8044	Jun 25.1544	Jul 25.1544	Aug 25.0340	Sep 25.4048	Oct 25.8044	Nov 26.0869	Dec 26.3822 (38)
Heat transfer coeff	61.0843	60.9222	60.7634	60.0171	59.8774	59.2274	59.2274	59.1071	59.4778	59.8774	60.1599	60.4552 (39)
Average = Sum(39)m / 12 =												60.0164 (39)
HLP	Jan 1.0747	Feb 1.0718	Mar 1.0690	Apr 1.0559	May 1.0534	Jun 1.0420	Jul 1.0420	Aug 1.0399	Sep 1.0464	Oct 1.0534	Nov 1.0584	Dec 1.0636 (40)
HLP (average)												1.0559 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												1.8910 (42)
Average daily hot water use (litres/day)												79.1120 (43)
Daily hot water use	87.0232	83.8587	80.6942	77.5297	74.3653	71.2008	71.2008	74.3653	77.5297	80.6942	83.8587	87.0232 (44)
Energy conte	129.0529	112.8705	116.4722	101.5433	97.4332	84.0775	84.0775	89.4030	90.4708	105.4349	115.0905	124.9808 (45)
Energy content (annual)												Total = Sum(45)m = 1244.7396 (45)
Distribution loss (46)m = 0.15 x (45)m												0.0000 (46)
Water storage loss:												0.0000 (46)
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)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

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	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	0.0000	0.0000	(59)
Heat gains from water heating, kWh/month	27.4237	23.9850	24.7503	21.5780	20.7046	17.8665	16.5559	18.9981	19.2250	22.4049	24.4567	26.5584	26.5584		(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	94.5516	94.5516	94.5516	94.5516	94.5516	94.5516	94.5516	94.5516	94.5516	94.5516	94.5516	94.5516	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	15.2286	13.5259	11.0000	8.3277	6.2251	5.2555	5.6787	7.3814	9.9073	12.5796	14.6822	15.6518	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	164.9131	166.6244	162.3120	153.1315	141.5427	130.6509	123.3745	121.6632	125.9756	135.1561	146.7449	157.6367	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.4552	32.4552	32.4552	32.4552	32.4552	32.4552	32.4552	32.4552	32.4552	32.4552	32.4552	32.4552	(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)	-75.6412	-75.6412	-75.6412	-75.6412	-75.6412	-75.6412	-75.6412	-75.6412	-75.6412	-75.6412	-75.6412	-75.6412	(71)
Water heating gains (Table 5)	36.8599	35.6919	33.2666	29.9694	27.8287	24.8145	22.2526	25.5351	26.7014	30.1141	33.9677	35.6968	(72)
Total internal gains	268.3670	267.2077	257.9441	242.7940	226.9619	212.0863	202.6712	205.9452	213.9498	229.2153	246.7603	260.3508	(73)

6. Solar gains

[Jan]	Area	Solar flux	Specific data	FF	Access	Gains							
	m ²	Table 6a	g		factor	W							
		W/m ²	or Table 6b	Specific data	Table 6d								
				or Table 6c									
Southeast	6.1400	36.7938	0.6300	0.7000	0.7700	69.0423 (77)							
Northwest	3.3000	11.2829	0.6300	0.7000	0.7700	11.3791 (81)							
Solar gains	80.4214	140.7671	202.6432	267.9124	315.4438	319.9189	305.6243	269.1309	225.0838	158.2845	97.0146	68.3786	(83)
Total gains	348.7884	407.9747	460.5872	510.7065	542.4058	532.0052	508.2955	475.0761	439.0335	387.4998	343.7749	328.7294	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Thl (C)													
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	64.6192	64.7912	64.9606	65.7683	65.9217	66.6452	66.6452	66.7809	66.3646	65.9217	65.6122	65.2917	(85)
alpha	5.3079	5.3194	5.3307	5.3846	5.3948	5.4430	5.4430	5.4521	5.4243	5.3948	5.3741	5.3528	
util living area	0.9978	0.9945	0.9847	0.9502	0.8545	0.6760	0.5060	0.5603	0.8145	0.9693	0.9950	0.9984	(86)
MIT	19.8741	20.0360	20.2830	20.5949	20.8430	20.9673	20.9943	20.9904	20.9111	20.5844	20.1697	19.8460	(87)
Th 2	20.0216	20.0239	20.0262	20.0370	20.0390	20.0485	20.0485	20.0502	20.0448	20.0390	20.0349	20.0307	(88)
util rest of house	0.9970	0.9926	0.9794	0.9325	0.8067	0.5902	0.4001	0.4508	0.7409	0.9549	0.9930	0.9978	(89)
MIT 2	18.9953	19.1583	19.4044	19.7139	19.9352	20.0338	20.0470	20.0475	19.9971	19.7108	19.3010	18.9747	(90)
Living area fraction	fLA = Living area / (4) =												
MIT	19.3676	19.5302	19.7766	20.0872	20.3198	20.4293	20.4483	20.4470	20.3843	20.0809	19.6690	19.3438	(92)
Temperature adjustment	0.0000												
adjusted MIT	19.3676	19.5302	19.7766	20.0872	20.3198	20.4293	20.4483	20.4470	20.3843	20.0809	19.6690	19.3438	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9964	0.9914	0.9777	0.9336	0.8219	0.6259	0.4453	0.4975	0.7693	0.9557	0.9921	0.9973	(94)
Useful gains	347.5301	404.4865	450.3323	476.7743	445.8245	332.9771	226.3200	236.3517	337.7575	370.3309	341.0455	327.8519	(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	920.3944	891.3018	806.7319	671.4207	516.1287	345.2532	227.9268	239.2041	373.7782	567.6919	756.1503	915.5230	(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	426.2111	327.1399	265.1614	140.1455	52.3063	0.0000	0.0000	0.0000	0.0000	146.8366	298.8755	137.2273	(98)
Space heating													
Space heating per m ²												(98) / (4) =	36.8386 (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	556.7379	438.2830	449.2137	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9210	0.9619	0.9477	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	512.7478	421.5933	425.6991	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	692.9435	663.8714	626.2019	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	129.7409	180.2549	149.1741	0.0000	0.0000	0.0000	0.0000	(104)
Space cooling													
Space cooling per m ²												459.1699 (104)	

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

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	32.4352	45.0637	37.2935	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling											114.7925 (107)	
Space cooling per m2											2.0196 (108)	
Energy for space heating											36.8386 (99)	
Energy for space cooling											2.0196 (108)	
Total											38.8581 (109)	
Target Fabric Energy Efficiency (TFEE)											44.7 (109)	

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

Property Reference	Ellerton End-Terrace BeamBlock			Issued on Date	15/10/2021
Assessment Reference	1	Prop Type Ref			
Property	Plot 054, Chipping Lane , Longridge , PR3				
SAP Rating	84 B	DER	17.06	TER	18.09
Environmental	87 B	% DER<TER	5.70		
CO₂ Emissions (t/year)	1.18	DFEE	44.71	TFEE	49.31
General Requirements Compliance	Pass	% DFEE<TFEE	9.33		
Assessor Details	Mr. William Vincent, William Vincent, Tel: 01582544250, William.Vincent@ee-ltd.co.uk			Assessor ID	T759-0001
Client					

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

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

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

DWELLING AS DESIGNED

Semi-Detached House, total floor area 77 m²

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

1a TER and DER

Fuel for main heating:Mains gas
Fuel factor:1.00 (mains gas)
Target Carbon Dioxide Emission Rate (TER) 18.09 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 17.06 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)49.3 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)44.7 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.27 (max. 0.30)	0.27 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.14 (max. 0.25)	0.14 (max. 0.70)	OK
Roof	0.11 (max. 0.20)	0.11 (max. 0.35)	OK
Openings	1.35 (max. 2.00)	1.41 (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: 5.01 (design value)
Maximum 10.0 OK

4 Heating efficiency

Main heating system: Boiler system with radiators or underfloor - Mains gas
Data from database
Ideal LOGIC COMBI ESP1 35
Combi boiler
Efficiency: 89.6% SEDBUK2009
Minimum: 88.0% OK

Secondary heating system:

None

5 Cylinder insulation

Hot water storage No cylinder

6 Controls

Space heating controls: Time and temperature zone control 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

Not applicable

9 Summertime temperature

Overheating risk (West Pennines (England)):Not significant OK

Based on:

Overshading: Average
Windows facing South East: 6.45 m², No overhang
Windows facing South West: 1.32 m², No overhang
Windows facing North West: 4.23 m², No overhang
Air change rate: 4.00 ach
Blinds/curtains: None

10 Key features

Party wall U-value 0.00 W/m²K
Roof U-value 0.11 W/m²K
Door U-value 1.00 W/m²K

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (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	38.5600 (1b)	x 2.3300 (2b)	= 89.8448 (1b) - (3b)
First floor	38.5600 (1c)	x 2.5600 (2c)	= 98.7136 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	77.1200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 188.5584 (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) = 0.1591 (8)							
Pressure test					Yes							
Measured/design AP50					5.0100							
Infiltration rate					0.4096 (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) = 0.3482 (21)							
Wind speed	Jan 5.1000	Feb 5.0000	Mar 4.9000	Apr 4.4000	May 4.3000	Jun 3.8000	Jul 3.8000	Aug 3.7000	Sep 4.0000	Oct 4.3000	Nov 4.5000	Dec 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	0.4439	0.4352	0.4265	0.3830	0.3743	0.3308	0.3308	0.3220	0.3482	0.3743	0.3917	0.4091 (22b)
Effective ac	0.5985	0.5947	0.5910	0.5733	0.5700	0.5547	0.5547	0.5519	0.5606	0.5700	0.5767	0.5837 (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					
Opening Type 1			1.9700	1.0000	1.9700		(26)					
Opening Type 2 (Uw = 1.41)			12.0000	1.3347	16.0167		(27)					
150mm B&B			38.5600	0.1400	5.3984		(28a)					
50 mm A. Platinum	85.9300	13.9700	71.9600	0.2700	19.4292		(29a)					
400mm Mineral wool	38.5600		38.5600	0.1100	4.2416		(30)					
Total net area of external elements Aum(A, m ²)			163.0500				(31)					
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 47.0559		(33)					
E-WM-22			40.5200	0.0000	0.0000		(32)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							201.0900 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							7.5375 (36)					
Total fabric heat loss							(33) + (36) = 54.5934 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 37.2429	Feb 37.0048	Mar 36.7714	Apr 35.6754	May 35.4703	Jun 34.5157	Jul 34.5157	Aug 34.3390	Sep 34.8834	Oct 35.4703	Nov 35.8852	Dec 36.3189 (38)
Heat transfer coeff	91.8363	91.5982	91.3649	90.2688	90.0638	89.1091	89.1091	88.9324	89.4768	90.0638	90.4786	90.9123 (39)
Average = Sum(39)m / 12 =												90.2678 (39)
HLP	Jan 1.1908	Feb 1.1877	Mar 1.1847	Apr 1.1705	May 1.1678	Jun 1.1555	Jul 1.1555	Aug 1.1532	Sep 1.1602	Oct 1.1678	Nov 1.1732	Dec 1.1788 (40)
HLP (average)												1.1705 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												2.4059 (42)
Average daily hot water use (litres/day)												91.3412 (43)
Daily hot water use	100.4753	96.8216	93.1680	89.5143	85.8607	82.2071	82.2071	85.8607	89.5143	93.1680	96.8216	100.4753 (44)
Energy conte	149.0020	130.3181	134.4766	117.2399	112.4945	97.0742	89.9535	103.2230	104.4558	121.7331	132.8812	144.3004 (45)
Energy content (annual)												Total = Sum(45)m = 1437.1523 (45)
Distribution loss (46)m = 0.15 x (45)m	22.3503	19.5477	20.1715	17.5860	16.8742	14.5611	13.4930	15.4834	15.6684	18.2600	19.9322	21.6451 (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)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

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	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Combi loss	14.1142	12.7281	14.0573	13.5647	13.9884	13.5043	13.9340	13.9693	13.5372	14.0288	13.6216	14.1029	14.1029	14.1029	14.1029	14.1029	14.1029	(61)
Total heat required for water heating calculated for each month	163.1161	143.0462	148.5338	130.8046	126.4829	110.5785	103.8876	117.1922	117.9930	135.7619	146.5028	158.4033	158.4033	158.4033	158.4033	158.4033	158.4033	(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	0.0000	0.0000	0.0000	0.0000	0.0000	(63)
Output from w/h	163.1161	143.0462	148.5338	130.8046	126.4829	110.5785	103.8876	117.1922	117.9930	135.7619	146.5028	158.4033	158.4033	158.4033	158.4033	158.4033	158.4033	(64)
Heat gains from water heating, kWh/month	53.0717	46.5128	48.2278	42.3734	40.9015	35.6533	33.3931	37.8140	38.1159	43.9835	47.5884	51.5056	51.5056	51.5056	51.5056	51.5056	51.5056	(65)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	120.2972	120.2972	120.2972	120.2972	120.2972	120.2972	120.2972	120.2972	120.2972	120.2972	120.2972	120.2972	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	19.9515	17.7207	14.4115	10.9104	8.1557	6.8853	7.4399	9.6706	12.9799	16.4809	19.2357	20.5060	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	213.3163	215.5298	209.9517	198.0767	183.0865	168.9978	159.5858	157.3722	162.9503	174.8254	189.8156	203.9042	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.0297	35.0297	35.0297	35.0297	35.0297	35.0297	35.0297	35.0297	35.0297	35.0297	35.0297	35.0297	(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)	-96.2378	-96.2378	-96.2378	-96.2378	-96.2378	-96.2378	-96.2378	-96.2378	-96.2378	-96.2378	-96.2378	-96.2378	(71)
Water heating gains (Table 5)	71.3329	69.2154	64.8223	58.8520	54.9752	49.5184	44.8831	50.8252	52.9387	59.1176	66.0950	69.2280	(72)
Total internal gains	366.6898	364.5552	351.2746	329.9282	308.3065	287.4908	273.9979	279.9572	290.9580	312.5130	337.2354	355.7273	(73)

6. Solar gains

[Jan]	Area m ²	Solar flux Table 6a W/m ²	α Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W							
Southeast	6.4500	36.7938	0.7100	0.7000	0.7700	81.7381 (77)							
Southwest	1.3200	36.7938	0.7100	0.7000	0.7700	16.7278 (79)							
Northwest	4.2300	11.2829	0.7100	0.7000	0.7700	16.4381 (81)							
Solar gains	114.9040	201.1841	289.7718	383.3505	451.5727	458.0671	437.5639	385.1749	321.9438	226.2616	138.6228	97.6905	(83)
Total gains	481.5938	565.7392	641.0464	713.2787	759.8792	745.5578	711.5619	665.1321	612.9019	538.7747	475.8582	453.4178	(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	46.9073	47.0293	47.1494	47.2218	47.8305	48.3429	48.3429	48.4390	48.1442	47.8305	47.6112	47.3841	
alpha	4.1272	4.1353	4.1433	4.1815	4.1887	4.2229	4.2229	4.2293	4.2096	4.1887	4.1741	4.1589	
util living area	0.9942	0.9882	0.9739	0.9344	0.8444	0.6879	0.5301	0.5822	0.8110	0.9556	0.9892	0.9955	(86)
MIT	19.4936	19.6915	19.9984	20.3893	20.7188	20.9174	20.9786	20.9685	20.8270	20.3947	19.8720	19.4596	(87)
Th 2	19.9273	19.9298	19.9323	19.9437	19.9458	19.9558	19.9558	19.9576	19.9519	19.9458	19.9415	19.9370	(88)
util rest of house	0.9926	0.9849	0.9664	0.9148	0.7979	0.6013	0.4139	0.4647	0.7397	0.9384	0.9856	0.9942	(89)
MIT 2	17.9255	18.2147	18.6595	19.2202	19.6592	19.8948	19.9463	19.9422	19.8041	19.2393	18.4869	17.8822	(90)
Living area fraction									FLA = Living area / (4) =			0.1859	(91)
MIT	18.2171	18.4893	18.9085	19.4376	19.8563	20.0850	20.1383	20.1331	19.9943	19.4541	18.7444	18.1755	(92)
Temperature adjustment												-0.1500	
adjusted MIT	18.0671	18.3393	18.7585	19.2876	19.7063	19.9350	19.9893	19.9831	19.8443	19.3041	18.5944	18.0255	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9884	0.9779	0.9551	0.8994	0.7855	0.5994	0.4177	0.4677	0.7311	0.9242	0.9789	0.9907	(94)
Ext temp.	476.0024	553.2316	612.2532	641.4934	596.9217	446.9210	297.2163	311.1023	448.1096	497.9132	465.8081	449.2218	(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	1264.3174	1231.0161	1119.9919	937.6764	721.0747	475.3957	301.9241	318.6497	513.9794	783.9249	1039.9985	1256.9104	(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	586.5063	455.4712	377.7576	213.2518	92.3699	0.0000	0.0000	0.0000	0.0000	212.7927	413.4171	600.9203	(98)
Space heating per m ²												2952.4868	(98)
												38.2843	(99)

8c. Space cooling requirement

Not applicable

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
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 %)													90.5000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													3262.4164 (211)
Space heating requirement	586.5063	455.4712	377.7576	213.2518	92.3699	0.0000	0.0000	0.0000	0.0000	212.7927	413.4171	600.9203	(98)
Space heating efficiency (main heating system 1)	90.5000	90.5000	90.5000	90.5000	90.5000	0.0000	0.0000	0.0000	0.0000	90.5000	90.5000	90.5000	(210)
Space heating fuel (main heating system)	648.0733	503.2831	417.4117	235.6373	102.0661	0.0000	0.0000	0.0000	0.0000	235.1301	456.8144	664.0004	(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	163.1161	143.0462	148.5338	130.8046	126.4829	110.5785	103.8876	117.1922	117.9930	135.7619	146.5028	158.4033	(64)
Efficiency of water heater (217)m	89.7839	89.7140	89.5734	89.2562	88.6226	87.3000	87.3000	87.3000	87.3000	89.2261	89.6403	89.8132	(217)
Fuel for water heating, kWh/month	181.6764	159.4468	165.8237	146.5497	142.7208	126.6650	119.0006	134.2408	135.1581	152.1549	163.4342	176.3697	(219)
Water heating fuel used													1803.2406 (219)
Annual totals kWh/year													
Space heating fuel - main system													3262.4164 (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)													352.3493 (232)
Total delivered energy for all uses													5493.0063 (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	3262.4164	0.2160	704.6819 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1803.2406	0.2160	389.5000 (264)
Space and water heating			1094.1819 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	352.3493	0.5190	182.8693 (268)
Total CO2, kg/year			1315.9762 (272)
Dwelling Carbon Dioxide Emission Rate (DER)			17.0600 (273)

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

DER			17.0600 ZC1
Total Floor Area		TFA	77.1200
Assumed number of occupants		N	2.4059
CO2 emission factor in Table 12 for electricity displaced from grid		EF	0.5190
CO2 emissions from appliances, equation (L14)			16.3909 ZC2
CO2 emissions from cooking, equation (L16)			2.2918 ZC3
Total CO2 emissions			35.7427 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			35.7427 ZC8

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF TARGET EMISSIONS 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (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	38.5600 (1b)	x 2.3300 (2b)	= 89.8448 (1b) - (3b)
First floor	38.5600 (1c)	x 2.5600 (2c)	= 98.7136 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	77.1200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 188.5584 (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) = 0.1591 (8)							
Pressure test					Yes							
Measured/design AP50					5.0000							
Infiltration rate					0.4091 (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) =	0.3477 (21)							
Wind speed	Jan 5.1000	Feb 5.0000	Mar 4.9000	Apr 4.4000	May 4.3000	Jun 3.8000	Jul 3.8000	Aug 3.7000	Sep 4.0000	Oct 4.3000	Nov 4.5000	Dec 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	0.4434	0.4347	0.4260	0.3825	0.3738	0.3303	0.3303	0.3217	0.3477	0.3738	0.3912	0.4086 (22b)
Effective ac	0.5983	0.5945	0.5907	0.5732	0.5699	0.5546	0.5546	0.5517	0.5605	0.5699	0.5765	0.5835 (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			1.9700	1.0000	1.9700		(26)					
TER Opening Type (Uw = 1.40)			12.0000	1.3258	15.9091		(27)					
150mm B&B			38.5600	0.1300	5.0128		(28a)					
50 mm A. Platinum	85.9300	13.9700	71.9600	0.1800	12.9528		(29a)					
400mm Mineral wool	38.5600		38.5600	0.1300	5.0128		(30)					
Total net area of external elements Aum(A, m ²)			163.0500				(31)					
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	40.8575	(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)							9.2829 (36)					
Total fabric heat loss						(33) + (36) =	50.1404 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 37.2279	Feb 36.9904	Mar 36.7576	Apr 35.6643	May 35.4597	Jun 34.5074	Jul 34.5074	Aug 34.3311	Sep 34.8742	Oct 35.4597	Nov 35.8735	Dec 36.3062 (38)
Heat transfer coeff	87.3683	87.1308	86.8980	85.8047	85.6001	84.6478	84.6478	84.4715	85.0146	85.6001	86.0139	86.4466 (39)
Average = Sum(39)m / 12 =												85.8037 (39)
HLP	Jan 1.1329	Feb 1.1298	Mar 1.1268	Apr 1.1126	May 1.1100	Jun 1.0976	Jul 1.0976	Aug 1.0953	Sep 1.1024	Oct 1.1100	Nov 1.1153	Dec 1.1209 (40)
HLP (average)												1.1126 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												2.4059 (42)
Average daily hot water use (litres/day)												91.3412 (43)
Daily hot water use	100.4753	96.8216	93.1680	89.5143	85.8607	82.2071	82.2071	85.8607	89.5143	93.1680	96.8216	100.4753 (44)
Energy content (annual)	149.0020	130.3181	134.4766	117.2399	112.4945	97.0742	89.9535	103.2230	104.4558	121.7331	132.8812	144.3004 (45)
Distribution loss (46)m = 0.15 x (45)m	22.3503	19.5477	20.1715	17.5860	16.8742	14.5611	13.4930	15.4834	15.6684	18.2600	19.9322	21.6451 (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 Designed)

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	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	44.5645	47.4774	44.1441	43.7537	40.5405	41.8918	43.7537	44.1441	47.4774	47.7477	47.7477	47.7477	47.7477	47.7477	47.7477	47.7477	47.7477	47.7477	47.7477	47.7477	47.7477	47.7477	(61)	
Solar input	199.9609	174.8825	181.9540	161.3840	156.2482	137.6147	131.8453	146.9766	148.5998	169.2105	180.6289	180.6289	180.6289	180.6289	180.6289	180.6289	180.6289	180.6289	180.6289	180.6289	180.6289	180.6289	180.6289	180.6289	(62)
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63)	
Heat gains from water heating, kWh/month	199.9609	174.8825	181.9540	161.3840	156.2482	137.6147	131.8453	146.9766	148.5998	169.2105	180.6289	180.6289	180.6289	180.6289	180.6289	180.6289	180.6289	180.6289	180.6289	180.6289	180.6289	180.6289	180.6289	180.6289	(64)
	62.2829	54.4719	56.5828	50.0183	48.3428	42.4123	40.3825	45.2601	45.7676	52.3456	56.1199	56.1199	56.1199	56.1199	56.1199	56.1199	56.1199	56.1199	56.1199	56.1199	56.1199	56.1199	56.1199	56.1199	(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	120.2972	120.2972	120.2972	120.2972	120.2972	120.2972	120.2972	120.2972	120.2972	120.2972	120.2972	120.2972	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	19.9515	17.7207	14.4115	10.9104	8.1557	6.8853	7.4399	9.6706	12.9799	16.4809	19.2357	20.5060	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	213.3163	215.5298	209.9517	198.0767	183.0865	168.9978	159.5858	157.3722	162.9503	174.8254	189.8156	203.9042	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.0297	35.0297	35.0297	35.0297	35.0297	35.0297	35.0297	35.0297	35.0297	35.0297	35.0297	35.0297	(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)	-96.2378	-96.2378	-96.2378	-96.2378	-96.2378	-96.2378	-96.2378	-96.2378	-96.2378	-96.2378	-96.2378	-96.2378	(71)
Water heating gains (Table 5)	83.7135	81.0593	76.0522	69.4698	64.9769	58.9060	54.2776	60.8334	63.5661	70.3570	77.9443	81.6124	(72)
Total internal gains	379.0705	376.3991	362.5045	340.5461	318.3082	296.8783	283.3923	289.9654	301.5854	323.7525	349.0848	368.1117	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	(77)						
Southeast	6.4500	36.7938	0.6300	0.7000	0.7700	72.5281	(77)						
Southwest	1.3200	36.7938	0.6300	0.7000	0.7700	14.8430	(79)						
Northwest	4.2300	11.2829	0.6300	0.7000	0.7700	14.5859	(81)						
Solar gains	101.9571	178.5154	257.1214	340.1560	400.6913	406.4539	388.2610	341.7749	285.6685	200.7674	123.0033	86.6831	(83)
Total gains	481.0275	554.9145	619.6260	680.7021	718.9995	703.3322	671.6533	631.7403	587.2539	524.5199	472.0881	454.7948	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, T _{hi} (C)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(85)
Utilisation factor for gains for living area, n _{il,m} (see Table 9a)	61.2986	61.4657	61.6303	62.4157	62.5648	63.2687	63.2687	63.4008	62.9957	62.5648	62.2638	61.9522	(85)
tau	5.0866	5.0977	5.1087	5.1610	5.1710	5.2179	5.2179	5.2267	5.1997	5.1710	5.1509	5.1301	(86)
util living area	0.9976	0.9946	0.9863	0.9579	0.8774	0.7138	0.5428	0.5955	0.8382	0.9723	0.9949	0.9982	(86)
MIT	19.8039	19.9600	20.2064	20.5265	20.7973	20.9512	20.9903	20.9848	20.8841	20.5335	20.1104	19.7778	(87)
Th 2	19.9741	19.9766	19.9790	19.9905	19.9927	20.0028	20.0028	20.0047	19.9989	19.9927	19.9883	19.9838	(88)
util rest of house	0.9968	0.9928	0.9814	0.9421	0.8325	0.6244	0.4259	0.4764	0.7660	0.9589	0.9929	0.9976	(89)
MIT 2	18.3818	18.6112	18.9702	19.4333	19.7928	19.9700	19.9992	19.9983	19.9060	19.4518	18.8398	18.3507	(90)
Living area fraction	18.6462	18.8620	19.2001	19.6366	19.9796	20.1525	20.1835	20.1817	20.0879	19.6529	19.0761	18.6161	(92)
Temperature adjustment	18.6462	18.8620	19.2001	19.6366	19.9796	20.1525	20.1835	20.1817	20.0879	19.6529	19.0761	18.6161	(92)
adjusted MIT	18.6462	18.8620	19.2001	19.6366	19.9796	20.1525	20.1835	20.1817	20.0879	19.6529	19.0761	18.6161	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(94)
Useful gains	478.7494	549.3481	604.9559	636.5797	598.1117	449.2837	300.6877	314.9114	454.1905	499.7683	467.4543	453.1517	(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	1253.4064	1216.5177	1103.6127	921.2469	708.7339	470.0053	303.3348	319.4494	509.0572	774.9301	1030.1106	1246.2190	(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	576.3448	448.3379	371.0007	204.9604	82.3029	0.0000	0.0000	0.0000	0.0000	204.7204	405.1126	590.0420	(98)
Space heating												2882.8216	(98)
Space heating per m2												37.3810	(99)

8c. Space cooling requirement

Not applicable

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

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													3086.5328 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	576.3448	448.3379	371.0007	204.9604	82.3029	0.0000	0.0000	0.0000	0.0000	204.7204	405.1126	590.0420	(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)	617.0715	480.0192	397.2170	219.4437	88.1188	0.0000	0.0000	0.0000	0.0000	219.1867	433.7394	631.7366	(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	199.9609	174.8825	181.9540	161.3840	156.2482	137.6147	131.8453	146.9766	148.5998	169.2105	180.6289	195.2593	(64)
Efficiency of water heater (217)m	87.5631	87.3181	86.8072	85.6540	83.5194	80.3000	80.3000	80.3000	80.3000	85.5318	87.0246	80.3000	(216)
Fuel for water heating, kWh/month	228.3619	200.2821	209.6070	188.4138	187.0801	171.3757	164.1909	183.0344	185.0559	197.8335	207.5608	222.7498	(219)
Water heating fuel used													2345.5459 (219)
Annual totals kWh/year													
Space heating fuel - main system													3086.5328 (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)													352.3493 (232)
Total delivered energy for all uses													5859.4281 (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	3086.5328	0.2160	666.6911 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2345.5459	0.2160	506.6379 (264)
Space and water heating			1173.3290 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	352.3493	0.5190	182.8693 (268)
Total CO2, kg/m2/year			1395.1233 (272)
Emissions per m2 for space and water heating			15.2143 (272a)
Fuel factor (mains gas)			1.0000
Emissions per m2 for lighting			2.3712 (272b)
Emissions per m2 for pumps and fans			0.5047 (272c)
Target Carbon Dioxide Emission Rate (TER) = (15.2143 * 1.00) + 2.3712 + 0.5047, rounded to 2 d.p.			18.0900 (273)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (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	38.5600 (1b)	x 2.3300 (2b)	= 89.8448 (1b) - (3b)
First floor	38.5600 (1c)	x 2.5600 (2c)	= 98.7136 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	77.1200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 188.5584 (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) = 0.1591 (8)							
Pressure test					Yes							
Measured/design AP50					5.0100							
Infiltration rate					0.4096 (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) = 0.3482 (21)							
Wind speed	Jan 5.1000	Feb 5.0000	Mar 4.9000	Apr 4.4000	May 4.3000	Jun 3.8000	Jul 3.8000	Aug 3.7000	Sep 4.0000	Oct 4.3000	Nov 4.5000	Dec 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	0.4439	0.4352	0.4265	0.3830	0.3743	0.3308	0.3308	0.3220	0.3482	0.3743	0.3917	0.4091 (22b)
Effective ac	0.5985	0.5947	0.5910	0.5733	0.5700	0.5547	0.5547	0.5519	0.5606	0.5700	0.5767	0.5837 (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					
Opening Type 1			1.9700	1.0000	1.9700		(26)					
Opening Type 2 (Uw = 1.41)			12.0000	1.3347	16.0167		(27)					
150mm B&B			38.5600	0.1400	5.3984		(28a)					
50 mm A. Platinum	85.9300	13.9700	71.9600	0.2700	19.4292		(29a)					
400mm Mineral wool	38.5600		38.5600	0.1100	4.2416		(30)					
Total net area of external elements Aum(A, m ²)			163.0500				(31)					
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 47.0559		(33)					
E-WM-22			40.5200	0.0000	0.0000		(32)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							201.0900 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							7.5375 (36)					
Total fabric heat loss							(33) + (36) = 54.5934 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 37.2429	Feb 37.0048	Mar 36.7714	Apr 35.6754	May 35.4703	Jun 34.5157	Jul 34.5157	Aug 34.3390	Sep 34.8834	Oct 35.4703	Nov 35.8852	Dec 36.3189 (38)
Heat transfer coeff	91.8363	91.5982	91.3649	90.2688	90.0638	89.1091	89.1091	88.9324	89.4768	90.0638	90.4786	90.9123 (39)
Average = Sum(39)m / 12 =												90.2678 (39)
HLP	Jan 1.1908	Feb 1.1877	Mar 1.1847	Apr 1.1705	May 1.1678	Jun 1.1555	Jul 1.1555	Aug 1.1532	Sep 1.1602	Oct 1.1678	Nov 1.1732	Dec 1.1788 (40)
HLP (average)												1.1705 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												2.4059 (42)
Average daily hot water use (litres/day)												91.3412 (43)
Daily hot water use	100.4753	96.8216	93.1680	89.5143	85.8607	82.2071	82.2071	85.8607	89.5143	93.1680	96.8216	100.4753 (44)
Energy conte	149.0020	130.3181	134.4766	117.2399	112.4945	97.0742	89.9535	103.2230	104.4558	121.7331	132.8812	144.3004 (45)
Energy content (annual)												Total = Sum(45)m = 1437.1523 (45)
Distribution loss (46)m = 0.15 x (45)m												0.0000 (46)
Water storage loss:												0.0000 (46)
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)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

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	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	0.0000	0.0000	0.0000	0.0000	(59)
Heat gains from water heating, kWh/month	31.6629	27.6926	28.5763	24.9135	23.9051	20.6283	19.1151	21.9349	22.1969	25.8683	28.2373	30.6638	(65)				

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

Metabolic gains (Table 5), Watts													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	120.2972	120.2972	120.2972	120.2972	120.2972	120.2972	120.2972	120.2972	120.2972	120.2972	120.2972	120.2972	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	19.9515	17.7207	14.4115	10.9104	8.1557	6.8853	7.4399	9.6706	12.9799	16.4809	19.2357	20.5060	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	213.3163	215.5298	209.9517	198.0767	183.0865	168.9978	159.5858	157.3722	162.9503	174.8254	189.8156	203.9042	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.0297	35.0297	35.0297	35.0297	35.0297	35.0297	35.0297	35.0297	35.0297	35.0297	35.0297	35.0297	(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)	-96.2378	-96.2378	-96.2378	-96.2378	-96.2378	-96.2378	-96.2378	-96.2378	-96.2378	-96.2378	-96.2378	-96.2378	(71)
Water heating gains (Table 5)	42.5577	41.2092	38.4090	34.6021	32.1305	28.6504	25.6924	29.4824	30.8290	34.7692	39.2184	41.2148	(72)
Total internal gains	334.9146	333.5489	321.8613	302.6783	282.4618	263.6227	251.8072	255.6144	265.8483	285.1647	307.3588	324.7142	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W							
Southeast	6.4500	36.7938	0.7100	0.7000	0.7700	81.7381 (77)							
Southwest	1.3200	36.7938	0.7100	0.7000	0.7700	16.7278 (79)							
Northwest	4.2300	11.2829	0.7100	0.7000	0.7700	16.4381 (81)							
Solar gains	114.9040	201.1841	289.7718	383.3505	451.5727	458.0671	437.5639	385.1749	321.9438	226.2616	138.6228	97.6905	(83)
Total gains	449.8186	534.7330	611.6331	686.0287	734.0345	721.6898	689.3711	640.7893	587.7921	511.4263	445.9816	422.4047	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													
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	46.9073	47.0293	47.1494	47.7218	47.8305	48.3429	48.3429	48.4390	48.1442	47.8305	47.6112	47.3841	(85)
alpha	4.1272	4.1353	4.1433	4.1815	4.1887	4.2229	4.2229	4.2293	4.2096	4.1887	4.1741	4.1589	(85)
util living area	0.9955	0.9903	0.9777	0.9416	0.8565	0.7035	0.5449	0.6002	0.8274	0.9624	0.9914	0.9965	(86)
MIT	19.4494	19.6494	19.9607	20.3599	20.7003	20.9100	20.9763	20.9647	20.8116	20.3621	19.8311	19.4160	(87)
Th 2	19.9273	19.9298	19.9323	19.9437	19.9458	19.9558	19.9558	19.9576	19.9519	19.9458	19.9415	19.9370	(88)
util rest of house	0.9943	0.9877	0.9712	0.9236	0.8120	0.6171	0.4265	0.4808	0.7587	0.9473	0.9886	0.9956	(89)
MIT 2	18.5166	18.7172	19.0268	19.4227	19.7354	19.9099	19.9485	19.9457	19.8403	19.4332	18.9080	18.4907	(90)
Living area fraction	FLA = Living area / (4) = 0.1859 (91)												
MIT	18.6900	18.8906	19.2005	19.5969	19.9148	20.0959	20.1396	20.1352	20.0209	19.6059	19.0796	18.6628	(92)
Temperature adjustment	0.0000												
adjusted MIT	18.6900	18.8906	19.2005	19.5969	19.9148	20.0959	20.1396	20.1352	20.0209	19.6059	19.0796	18.6628	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9922	0.9841	0.9654	0.9165	0.8104	0.6297	0.4482	0.5024	0.7639	0.9411	0.9854	0.9939	(94)
Useful gains	446.3320	526.2447	590.4784	628.7133	594.8964	454.4649	309.0079	321.9097	449.0201	481.2967	439.4702	419.8478	(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	1321.5252	1281.5103	1160.3760	965.5996	739.8539	489.7345	315.4152	332.1777	529.7849	811.1062	1083.9016	1314.8451	(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	651.1437	507.5385	424.0039	242.5581	107.8484	0.0000	0.0000	0.0000	0.0000	245.3783	463.9905	665.8780	(98)
Space heating	3308.3394 (98)												
Space heating per m2	(98) / (4) = 42.8986 (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	837.6259	659.4076	675.8859	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8496	0.9088	0.8848	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	711.6637	599.2646	598.0387	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	933.4629	893.8786	838.7078	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	159.6954	219.1928	179.0578	0.0000	0.0000	0.0000	0.0000	(104)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

Space cooling												557.9460 (104)
Cooled fraction											FC - cooled area / (4) -	1.0000 (105)
Intermittency factor (Table 10b)	0.0000	0.0000	0.0000	0.0000	0.2500	0.2500	0.2500	0.0000	0.0000	0.0000		0.0000 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	39.9239	54.7982	44.7644	0.0000	0.0000	0.0000		0.0000 (107)
Space cooling												139.4865 (107)
Space cooling per m2												1.8087 (108)
Energy for space heating												42.8986 (99)
Energy for space cooling												1.8087 (108)
Total												44.7073 (109)
Dwelling Fabric Energy Efficiency (DFEE)												44.7 (109)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (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	38.5600 (1b)	2.3300 (2b)	89.8448 (1b) - (3b)
First floor	38.5600 (1c)	2.5600 (2c)	98.7136 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	77.1200		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 188.5584 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ 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				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) =	0.1591 (8)							
Pressure test					Yes							
Measured/design AP50					5.0000							
Infiltration rate					0.4091 (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) =		0.3477 (21)							
Wind speed	Jan 5.1000	Feb 5.0000	Mar 4.9000	Apr 4.4000	May 4.3000	Jun 3.8000	Jul 3.8000	Aug 3.7000	Sep 4.0000	Oct 4.3000	Nov 4.5000	Dec 4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate												
Effective ac	0.4434	0.4347	0.4260	0.3825	0.3738	0.3303	0.3303	0.3217	0.3477	0.3738	0.3912	0.4086 (22b)
	0.5983	0.5945	0.5907	0.5732	0.5699	0.5546	0.5546	0.5517	0.5605	0.5699	0.5765	0.5835 (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			1.9700	1.0000	1.9700		(26)					
TER Opening Type (Uw = 1.40)			12.0000	1.3258	15.9091		(27)					
150mm B&B			38.5600	0.1300	5.0128		(28a)					
50 mm A. Platinum	85.9300	13.9700	71.9600	0.1800	12.9528		(29a)					
400mm Mineral wool	38.5600		38.5600	0.1300	5.0128		(30)					
Total net area of external elements Aum(A, m ²)			163.0500				(31)					
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 40.8575		(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)							9.2829 (36)					
Total fabric heat loss						(33) + (36) =	50.1404 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 37.2279	Feb 36.9904	Mar 36.7576	Apr 35.6643	May 35.4597	Jun 34.5074	Jul 34.5074	Aug 34.3311	Sep 34.8742	Oct 35.4597	Nov 35.8735	Dec 36.3062 (38)
Heat transfer coeff	87.3683	87.1308	86.8980	85.8047	85.6001	84.6478	84.6478	84.4715	85.0146	85.6001	86.0139	86.4466 (39)
Average = Sum(39)m / 12 =												85.8037 (39)
HLP	Jan 1.1329	Feb 1.1298	Mar 1.1268	Apr 1.1126	May 1.1100	Jun 1.0976	Jul 1.0976	Aug 1.0953	Sep 1.1024	Oct 1.1100	Nov 1.1153	Dec 1.1209 (40)
HLP (average)												1.1126 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												2.4059 (42)
Average daily hot water use (litres/day)												91.3412 (43)
Daily hot water use	100.4753	96.8216	93.1680	89.5143	85.8607	82.2071	82.2071	85.8607	89.5143	93.1680	96.8216	100.4753 (44)
Energy conte	149.0020	130.3181	134.4766	117.2399	112.4945	97.0742	89.9535	103.2230	104.4558	121.7331	132.8812	144.3004 (45)
Energy content (annual)												Total = Sum(45)m = 1437.1523 (45)
Distribution loss (46)m = 0.15 x (45)m												
Water 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 (46)
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 (46)
If cylinder contains dedicated solar storage												

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	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)
	31.6629	27.6926	28.5763	24.9135	23.9051	20.6283	19.1151	21.9349	22.1969	25.8683	28.2373	30.6638	(65)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	120.2972	120.2972	120.2972	120.2972	120.2972	120.2972	120.2972	120.2972	120.2972	120.2972	120.2972	120.2972	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	19.9515	17.7207	14.4115	10.9104	8.1557	6.8853	7.4399	9.6706	12.9799	16.4809	19.2357	20.5060	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	213.3163	215.5298	209.9517	198.0767	183.0865	168.9978	159.5858	157.3722	162.9503	174.8254	189.8156	203.9042	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.0297	35.0297	35.0297	35.0297	35.0297	35.0297	35.0297	35.0297	35.0297	35.0297	35.0297	35.0297	(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)	-96.2378	-96.2378	-96.2378	-96.2378	-96.2378	-96.2378	-96.2378	-96.2378	-96.2378	-96.2378	-96.2378	-96.2378	(71)
Water heating gains (Table 5)	42.5577	41.2092	38.4090	34.6021	32.1305	28.6504	25.6924	29.4824	30.8290	34.7692	39.2184	41.2148	(72)
Total internal gains	334.9146	333.5489	321.8613	302.6783	282.4618	263.6227	251.8072	255.6144	265.8483	285.1647	307.3588	324.7142	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	g	Specific data or Table 6c	FF	Access factor Table 6d	Gains W					
Southeast	6.4500	36.7938	0.6300	0.6300	0.7000	0.7700	72.5281	(77)					
Southwest	1.3200	36.7938	0.6300	0.6300	0.7000	0.7700	14.8430	(79)					
Northwest	4.2300	11.2829	0.6300	0.6300	0.7000	0.7700	14.5859	(81)					
Solar gains	101.9571	178.5154	257.1214	340.1560	400.6913	406.4539	388.2610	341.7749	285.6685	200.7674	123.0033	86.6831	(83)
Total gains	436.8717	512.0644	578.9828	642.8343	683.1531	670.0766	640.0681	597.3893	551.5168	485.9321	430.3622	411.3973	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Thl (C)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation factor for gains for living area, nil,m (see Table 9a)													21.0000 (85)
tau	61.2986	61.4657	61.6303	62.4157	62.5648	63.2687	63.2687	63.4008	62.9957	62.5648	62.2638	61.9522	
alpha	5.0866	5.0977	5.1087	5.1610	5.1710	5.2179	5.2179	5.2267	5.1997	5.1710	5.1509	5.1301	
util living area	0.9985	0.9963	0.9897	0.9662	0.8947	0.7389	0.5670	0.6247	0.8634	0.9797	0.9967	0.9989	(86)
MIT	19.7505	19.9089	20.1598	20.4885	20.7733	20.9426	20.9882	20.9811	20.8644	20.4919	20.0604	19.7251	(87)
Th 2	19.9741	19.9766	19.9790	19.9905	19.9927	20.0028	20.0028	20.0047	19.9989	19.9927	19.9883	19.9838	(88)
util rest of house	0.9980	0.9950	0.9860	0.9530	0.8536	0.6500	0.4461	0.5022	0.7964	0.9694	0.9953	0.9985	(89)
MIT 2	18.8338	18.9937	19.2447	19.5749	19.8372	19.9760	19.9997	19.9991	19.9224	19.5842	19.1547	18.8162	(90)
Living area fraction									FLA = Living area / (4) =			0.1859	(91)
MIT	19.0042	19.1639	19.4149	19.7447	20.0113	20.1557	20.1835	20.1817	20.0975	19.7530	19.3231	18.9852	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.0042	19.1639	19.4149	19.7447	20.0113	20.1557	20.1835	20.1817	20.0975	19.7530	19.3231	18.9852	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9973	0.9936	0.9832	0.9489	0.8545	0.6647	0.4688	0.5251	0.8041	0.9661	0.9940	0.9980	(94)
Useful gains	435.6757	508.7714	569.2805	610.0097	583.7232	445.4253	300.0659	313.6327	443.4590	469.4606	427.7987	410.5649	(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	1284.6843	1242.8215	1122.2774	930.5292	711.4470	470.2787	303.3395	319.4481	509.8781	783.4987	1051.3577	1278.1318	(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	631.6624	493.2817	411.4297	230.7741	95.0221	0.0000	0.0000	0.0000	0.0000	233.6144	448.9625	645.1698	(98)
Space heating												3190.2465	(98)
Space heating per m2													(98) / (4) = 41.3673 (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	795.6896	626.3939	641.9832	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8755	0.9334	0.9119	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	696.6073	584.6687	585.4392	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	873.1358	836.2517	787.9805	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	127.1005	187.1778	150.6907	0.0000	0.0000	0.0000	0.0000	(104)
Space cooling													464.9690 (104)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

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	31.7751	46.7944	37.6727	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling											116.2423 (107)	
Space cooling per m2											1.5073 (108)	
Energy for space heating											41.3673 (99)	
Energy for space cooling											1.5073 (108)	
Total											42.8746 (109)	
Target Fabric Energy Efficiency (TFEE)											49.3 (109)	

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

Property Reference	Ellerton End-Terrace			Issued on Date	15/10/2021
Assessment Reference	1	Prop Type Ref			
Property	50 PRIMROSE ROAD, LONGRIDGE, PRESTON, PR3 2RG				
SAP Rating	84 B	DER	17.18	TER	18.09
Environmental	87 B	% DER<TER	5.03		
CO₂ Emissions (t/year)	1.19	DFEE	45.21	TFEE	49.31
General Requirements Compliance	Pass	% DFEE<TFEE	8.31		
Assessor Details	Mr. William Vincent, William Vincent, Tel: 01582544250, William.Vincent@ee-ltd.co.uk			Assessor ID	T759-0001
Client					

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

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

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

DWELLING AS BUILT

Semi-Detached House, total floor area 77 m²

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

1a TER and DER

Fuel for main heating:Mains gas
Fuel factor:1.00 (mains gas)
Target Carbon Dioxide Emission Rate (TER) 18.09 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 17.18 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)49.3 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)45.2 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.27 (max. 0.30)	0.27 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.15 (max. 0.25)	0.15 (max. 0.70)	OK
Roof	0.11 (max. 0.20)	0.11 (max. 0.35)	OK
Openings	1.35 (max. 2.00)	1.41 (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: 4.41 (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

Ideal LOGIC COMBI ESP1 35

Combi boiler

Efficiency: 89.6% SEDBUK2009

OK

Minimum: 88.0%

Secondary heating system:

None

5 Cylinder insulation

Hot water storage No cylinder

6 Controls

Space heating controls: Time and temperature zone control 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

Not applicable

9 Summertime temperature

Overheating risk (West Pennines (England)):Not significant OK

Based on:

Overshading:

Average

Windows facing North East: 4.23 m², No overhang

Windows facing South East: 1.32 m², No overhang

Windows facing South West: 6.45 m², No overhang

Air change rate: 4.00 ach

Blinds/curtains: None

10 Key features

Party wall U-value 0.00 W/m²K

Roof U-value 0.11 W/m²K

Door U-value 1.00 W/m²K

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	38.5600 (1b)	x 2.3300 (2b)	= 89.8448 (1b) - (3b)
First floor	38.5600 (1c)	x 2.5600 (2c)	= 98.7136 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	77.1200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 188.5584 (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) = 0.1591 (8)							
Pressure test					Yes							
Measured/design AP50					4.4100							
Infiltration rate					0.3796 (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) = 0.3227 (21)							
Wind speed	Jan 5.1000	Feb 5.0000	Mar 4.9000	Apr 4.4000	May 4.3000	Jun 3.8000	Jul 3.8000	Aug 3.7000	Sep 4.0000	Oct 4.3000	Nov 4.5000	Dec 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	0.4114	0.4033	0.3953	0.3549	0.3469	0.3065	0.3065	0.2985	0.3227	0.3469	0.3630	0.3791 (22b)
Effective ac	0.5846	0.5813	0.5781	0.5630	0.5602	0.5470	0.5470	0.5445	0.5521	0.5602	0.5659	0.5719 (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					
Opening Type 1			1.9700	1.0000	1.9700		(26)					
Opening Type 2 (Uw = 1.41)			12.0000	1.3347	16.0167		(27)					
150mm Platinum			38.5600	0.1500	5.7840		(28a)					
50 mm A. Platinum	85.9300	13.9700	71.9600	0.2700	19.4292		(29a)					
400mm Mineral wool	38.5600		38.5600	0.1100	4.2416		(30)					
Total net area of external elements Aum(A, m ²)			163.0500				(31)					
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 47.4415		(33)					
E-WM-22			40.5200	0.0000	0.0000		(32)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							201.0900 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							8.6242 (36)					
Total fabric heat loss							(33) + (36) = 56.0656 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 36.3777	Feb 36.1732	Mar 35.9728	Apr 35.0314	May 34.8553	Jun 34.0354	Jul 34.0354	Aug 33.8836	Sep 34.3512	Oct 34.8553	Nov 35.2116	Dec 35.5841 (38)
Heat transfer coeff	92.4433	92.2389	92.0384	91.0971	90.9209	90.1010	90.1010	89.9492	90.4169	90.9209	91.2772	91.6497 (39)
Average = Sum(39)m / 12 =												91.0962 (39)
HLP	Jan 1.1987	Feb 1.1960	Mar 1.1934	Apr 1.1812	May 1.1790	Jun 1.1683	Jul 1.1683	Aug 1.1664	Sep 1.1724	Oct 1.1790	Nov 1.1836	Dec 1.1884 (40)
HLP (average)												1.1812 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												2.4059 (42)
Average daily hot water use (litres/day)												91.3412 (43)
Daily hot water use	100.4753	96.8216	93.1680	89.5143	85.8607	82.2071	82.2071	85.8607	89.5143	93.1680	96.8216	100.4753 (44)
Energy conte	149.0020	130.3181	134.4766	117.2399	112.4945	97.0742	89.9535	103.2230	104.4558	121.7331	132.8812	144.3004 (45)
Energy content (annual)												Total = Sum(45)m = 1437.1523 (45)
Distribution loss (46)m = 0.15 x (45)m	22.3503	19.5477	20.1715	17.5860	16.8742	14.5611	13.4930	15.4834	15.6684	18.2600	19.9322	21.6451 (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)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)	
Combi loss	14.1142	12.7281	14.0573	13.5647	13.9884	13.5043	13.9340	13.9693	13.5372	14.0288	13.6216	14.1029	14.1029	14.1029	14.1029	14.1029	14.1029	14.1029	14.1029	14.1029	14.1029	14.1029	(61)
Total heat required for water heating calculated for each month	163.1161	143.0462	148.5338	130.8046	126.4829	110.5785	103.8876	117.1922	117.9930	135.7619	146.5028	158.4033	158.4033	158.4033	158.4033	158.4033	158.4033	158.4033	158.4033	158.4033	158.4033	158.4033	(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	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	163.1161	143.0462	148.5338	130.8046	126.4829	110.5785	103.8876	117.1922	117.9930	135.7619	146.5028	158.4033	158.4033	158.4033	158.4033	158.4033	158.4033	158.4033	158.4033	158.4033	158.4033	158.4033	(64)
Heat gains from water heating, kWh/month	53.0717	46.5128	48.2278	42.3734	40.9015	35.6533	33.3931	37.8140	38.1159	43.9835	47.5884	51.5056	51.5056	51.5056	51.5056	51.5056	51.5056	51.5056	51.5056	51.5056	51.5056	51.5056	(65)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	120.2972	120.2972	120.2972	120.2972	120.2972	120.2972	120.2972	120.2972	120.2972	120.2972	120.2972	120.2972	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	19.9515	17.7207	14.4115	10.9104	8.1557	6.8853	7.4399	9.6706	12.9799	16.4809	19.2357	20.5060	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	213.3163	215.5298	209.9517	198.0767	183.0865	168.9978	159.5858	157.3722	162.9503	174.8254	189.8156	203.9042	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.0297	35.0297	35.0297	35.0297	35.0297	35.0297	35.0297	35.0297	35.0297	35.0297	35.0297	35.0297	(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)	-96.2378	-96.2378	-96.2378	-96.2378	-96.2378	-96.2378	-96.2378	-96.2378	-96.2378	-96.2378	-96.2378	-96.2378	(71)
Water heating gains (Table 5)	71.3329	69.2154	64.8223	58.8520	54.9752	49.5184	44.8831	50.8252	52.9387	59.1176	66.0950	69.2280	(72)
Total internal gains	366.6898	364.5552	351.2746	329.9282	308.3065	287.4908	273.9979	279.9572	290.9580	312.5130	337.2354	355.7273	(73)

6. Solar gains

[Jan]	Area m ²	Solar flux Table 6a W/m ²	α Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W							
Northeast	4.2300	11.2829	0.7100	0.7000	0.7700	16.4381 (75)							
Southeast	1.3200	36.7938	0.7100	0.7000	0.7700	16.7278 (77)							
Southwest	6.4500	36.7938	0.7100	0.7000	0.7700	81.7381 (79)							
Solar gains	114.9040	201.1841	289.7718	383.3505	451.5727	458.0671	437.5639	385.1749	321.9438	226.2616	138.6228	97.6905	(83)
Total gains	481.5938	565.7392	641.0464	713.2787	759.8792	745.5578	711.5619	665.1321	612.9019	538.7747	475.8582	453.4178	(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	46.5993	46.7026	46.8043	47.2880	47.3796	47.8107	47.8107	47.8914	47.6437	47.3796	47.1946	47.0028	
alpha	4.1066	4.1135	4.1203	4.1525	4.1586	4.1874	4.1874	4.1928	4.1762	4.1586	4.1463	4.1335	
util living area	0.9942	0.9882	0.9741	0.9352	0.8466	0.6923	0.5348	0.5870	0.8139	0.9561	0.9892	0.9955	(86)
MIT	19.4817	19.6792	19.9865	20.3772	20.7105	20.9132	20.9771	20.9665	20.8207	20.3837	19.8586	19.4450	(87)
Th 2	19.9210	19.9232	19.9252	19.9350	19.9369	19.9454	19.9454	19.9470	19.9421	19.9369	19.9332	19.9293	(88)
util rest of house	0.9926	0.9850	0.9666	0.9158	0.8002	0.6051	0.4168	0.4680	0.7426	0.9390	0.9857	0.9942	(89)
MIT 2	17.9040	18.1923	18.6376	19.1971	19.6416	19.8813	19.9353	19.9306	19.7887	19.2176	18.4619	17.8559	(90)
Living area fraction	fLA = Living area / (4) =												0.1859 (91)
MIT	18.1973	18.4688	18.8884	19.4166	19.8404	20.0732	20.1290	20.1232	19.9806	19.4345	18.7216	18.1514	(92)
Temperature adjustment													-0.1500
adjusted MIT	18.0473	18.3188	18.7384	19.2666	19.6904	19.9232	19.9790	19.9732	19.8306	19.2845	18.5716	18.0014	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9884	0.9779	0.9553	0.9002	0.7876	0.6030	0.4208	0.4711	0.7338	0.9247	0.9789	0.9907	(94)
Ext temp.	475.9925	553.2447	612.3702	642.0905	598.4985	449.6011	299.4126	313.3523	449.7453	498.2107	465.8185	449.2081	(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	1270.8491	1237.7323	1126.4041	944.3650	726.4903	479.6215	304.4535	321.4086	518.1435	789.5999	1047.0987	1264.8959	(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	591.3733	459.9757	382.4412	217.6376	95.2259	0.0000	0.0000	0.0000	0.0000	216.7935	418.5217	606.8717	(98)
Space heating per m ²												2988.8406 (98)	
												(98) / (4) =	38.7557 (99)

8c. Space cooling requirement

Not applicable

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
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 %)													90.5000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													3302.5863 (211)
Space heating requirement	591.3733	459.9757	382.4412	217.6376	95.2259	0.0000	0.0000	0.0000	0.0000	216.7935	418.5217	606.8717	(98)
Space heating efficiency (main heating system 1)	90.5000	90.5000	90.5000	90.5000	90.5000	0.0000	0.0000	0.0000	0.0000	90.5000	90.5000	90.5000	(210)
Space heating fuel (main heating system)	653.4512	508.2604	422.5869	240.4835	105.2220	0.0000	0.0000	0.0000	0.0000	239.5509	462.4549	670.5765	(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	163.1161	143.0462	148.5338	130.8046	126.4829	110.5785	103.8876	117.1922	117.9930	135.7619	146.5028	158.4033	(64)
Efficiency of water heater (217)m	89.7885	89.7199	89.5814	89.2716	88.6463	87.3000	87.3000	87.3000	87.3000	89.2404	89.6480	89.8185	(217)
Fuel for water heating, kWh/month	181.6671	159.4364	165.8087	146.5243	142.6827	126.6650	119.0006	134.2408	135.1581	152.1306	163.4201	176.3593	(219)
Water heating fuel used													1803.0938 (219)
Annual totals kWh/year													
Space heating fuel - main system													3302.5863 (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)													352.3493 (232)
Total delivered energy for all uses													5533.0294 (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	3302.5863	0.2160	713.3586	(261)
Space heating - secondary	0.0000	0.0000	0.0000	(263)
Water heating (other fuel)	1803.0938	0.2160	389.4683	(264)
Space and water heating			1102.8269	(265)
Pumps and fans	75.0000	0.5190	38.9250	(267)
Energy for lighting	352.3493	0.5190	182.8693	(268)
Total CO2, kg/year			1324.6212	(272)
Dwelling Carbon Dioxide Emission Rate (DER)			17.1800	(273)

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

DER			17.1800	ZC1
Total Floor Area		TFA	77.1200	
Assumed number of occupants		N	2.4059	
CO2 emission factor in Table 12 for electricity displaced from grid		EF	0.5190	
CO2 emissions from appliances, equation (L14)			16.3909	ZC2
CO2 emissions from cooking, equation (L16)			2.2918	ZC3
Total CO2 emissions			35.8627	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			35.8627	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	38.5600 (1b)	x 2.3300 (2b)	= 89.8448 (1b) - (3b)
First floor	38.5600 (1c)	x 2.5600 (2c)	= 98.7136 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	77.1200		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 188.5584 (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) = 0.1591 (8)							
Pressure test					Yes							
Measured/design AP50					5.0000							
Infiltration rate					0.4091 (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) =	0.3477 (21)							
Wind speed	Jan 5.1000	Feb 5.0000	Mar 4.9000	Apr 4.4000	May 4.3000	Jun 3.8000	Jul 3.8000	Aug 3.7000	Sep 4.0000	Oct 4.3000	Nov 4.5000	Dec 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	0.4434	0.4347	0.4260	0.3825	0.3738	0.3303	0.3303	0.3217	0.3477	0.3738	0.3912	0.4086 (22b)
Effective ac	0.5983	0.5945	0.5907	0.5732	0.5699	0.5546	0.5546	0.5517	0.5605	0.5699	0.5765	0.5835 (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			1.9700	1.0000	1.9700		(26)					
TER Opening Type (Uw = 1.40)			12.0000	1.3258	15.9091		(27)					
150mm Platinum			38.5600	0.1300	5.0128		(28a)					
50 mm A. Platinum	85.9300	13.9700	71.9600	0.1800	12.9528		(29a)					
400mm Mineral wool	38.5600		38.5600	0.1300	5.0128		(30)					
Total net area of external elements Aum(A, m ²)			163.0500				(31)					
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	40.8575	(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)							9.2829 (36)					
Total fabric heat loss						(33) + (36) =	50.1404 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 37.2279	Feb 36.9904	Mar 36.7576	Apr 35.6643	May 35.4597	Jun 34.5074	Jul 34.5074	Aug 34.3311	Sep 34.8742	Oct 35.4597	Nov 35.8735	Dec 36.3062 (38)
Heat transfer coeff	87.3683	87.1308	86.8980	85.8047	85.6001	84.6478	84.6478	84.4715	85.0146	85.6001	86.0139	86.4466 (39)
Average = Sum(39)m / 12 =												85.8037 (39)
HLP	Jan 1.1329	Feb 1.1298	Mar 1.1268	Apr 1.1126	May 1.1100	Jun 1.0976	Jul 1.0976	Aug 1.0953	Sep 1.1024	Oct 1.1100	Nov 1.1153	Dec 1.1209 (40)
HLP (average)												1.1126 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												2.4059 (42)
Average daily hot water use (litres/day)												91.3412 (43)
Daily hot water use	100.4753	96.8216	93.1680	89.5143	85.8607	82.2071	82.2071	85.8607	89.5143	93.1680	96.8216	100.4753 (44)
Energy content (annual)	149.0020	130.3181	134.4766	117.2399	112.4945	97.0742	89.9535	103.2230	104.4558	121.7331	132.8812	144.3004 (45)
Distribution loss (46)m = 0.15 x (45)m	22.3503	19.5477	20.1715	17.5860	16.8742	14.5611	13.4930	15.4834	15.6684	18.2600	19.9322	21.6451 (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	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	44.5645	47.4774	44.1441	43.7537	40.5405	41.8918	43.7537	44.1441	47.4774	47.7477	50.9589	50.9589	50.9589	50.9589	50.9589	50.9589	50.9589	50.9589	50.9589	50.9589	50.9589	50.9589	50.9589	(61)	
Solar input	199.9609	174.8825	181.9540	161.3840	156.2482	137.6147	131.8453	146.9766	148.5998	169.2105	180.6289	195.2593	195.2593	195.2593	195.2593	195.2593	195.2593	195.2593	195.2593	195.2593	195.2593	195.2593	195.2593	195.2593	195.2593	(62)
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63)	
Heat gains from water heating, kWh/month	199.9609	174.8825	181.9540	161.3840	156.2482	137.6147	131.8453	146.9766	148.5998	169.2105	180.6289	195.2593	195.2593	195.2593	195.2593	195.2593	195.2593	195.2593	195.2593	195.2593	195.2593	195.2593	195.2593	195.2593	195.2593	(64)
	62.2829	54.4719	56.5828	50.0183	48.3428	42.4123	40.3825	45.2601	45.7676	52.3456	56.1199	60.7196	60.7196	60.7196	60.7196	60.7196	60.7196	60.7196	60.7196	60.7196	60.7196	60.7196	60.7196	60.7196	60.7196	(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
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	120.2972	120.2972	120.2972	120.2972	120.2972	120.2972	120.2972	120.2972	120.2972	120.2972	120.2972	120.2972	120.2972
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	19.9515	17.7207	14.4115	10.9104	8.1557	6.8853	7.4399	9.6706	12.9799	16.4809	19.2357	20.5060	(67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	213.3163	215.5298	209.9517	198.0767	183.0865	168.9978	159.5858	157.3722	162.9503	174.8254	189.8156	203.9042	(68)
Pumps, fans	35.0297	35.0297	35.0297	35.0297	35.0297	35.0297	35.0297	35.0297	35.0297	35.0297	35.0297	35.0297	(69)
Losses e.g. evaporation (negative values) (Table 5)	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)
Water heating gains (Table 5)	-96.2378	-96.2378	-96.2378	-96.2378	-96.2378	-96.2378	-96.2378	-96.2378	-96.2378	-96.2378	-96.2378	-96.2378	(71)
Total internal gains	379.0705	376.3991	362.5045	340.5461	318.3082	296.8783	283.3923	289.9654	301.5854	323.7525	349.0848	368.1117	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W							
Northeast	4.2300	11.2829	0.6300	0.7000	0.7700	14.5859 (75)							
Southeast	1.3200	36.7938	0.6300	0.7000	0.7700	14.8430 (77)							
Southwest	6.4500	36.7938	0.6300	0.7000	0.7700	72.5281 (79)							
Solar gains	101.9571	178.5154	257.1214	340.1560	400.6913	406.4539	388.2610	341.7749	285.6685	200.7674	123.0033	86.6831	(83)
Total gains	481.0275	554.9145	619.6260	680.7021	718.9995	703.3322	671.6533	631.7403	587.2539	524.5199	472.0881	454.7948	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, T _{hi} (C)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(85)
Utilisation factor for gains for living area, n _{l,m} (see Table 9a)	61.2986	61.4657	61.6303	62.4157	62.5648	63.2687	63.2687	63.4008	62.9957	62.5648	62.2638	61.9522	
tau	5.0866	5.0977	5.1087	5.1610	5.1710	5.2179	5.2179	5.2267	5.1997	5.1710	5.1509	5.1301	
util living area	0.9976	0.9946	0.9863	0.9579	0.8774	0.7138	0.5428	0.5955	0.8382	0.9723	0.9949	0.9982	(86)
MIT	19.8039	19.9600	20.2064	20.5265	20.7973	20.9512	20.9903	20.9848	20.8841	20.5335	20.1104	19.7778	(87)
Th 2	19.9741	19.9766	19.9790	19.9905	19.9927	20.0028	20.0028	20.0047	19.9989	19.9927	19.9883	19.9838	(88)
util rest of house	0.9968	0.9928	0.9814	0.9421	0.8325	0.6244	0.4259	0.4764	0.7660	0.9589	0.9929	0.9976	(89)
MIT 2	18.3818	18.6112	18.9702	19.4333	19.7928	19.9700	19.9992	19.9983	19.9060	19.4518	18.8398	18.3507	(90)
Living area fraction	18.6462	18.8620	19.2001	19.6366	19.9796	20.1525	20.1835	20.1817	20.0879	19.6529	19.0761	18.6161	(92)
Temperature adjustment	18.6462	18.8620	19.2001	19.6366	19.9796	20.1525	20.1835	20.1817	20.0879	19.6529	19.0761	18.6161	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(91)
Useful gains	478.7494	549.3481	604.9559	636.5797	598.1117	449.2837	300.6877	314.9114	454.1905	499.7683	467.4543	453.1517	(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	1253.4064	1216.5177	1103.6127	921.2469	708.7339	470.0053	303.3348	319.4494	509.0572	774.9301	1030.1106	1246.2190	(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	576.3448	448.3379	371.0007	204.9604	82.3029	0.0000	0.0000	0.0000	0.0000	204.7204	405.1126	590.0420	(98)
Space heating												2882.8216	(98)
Space heating per m2												37.3810	(99)

8c. Space cooling requirement

Not applicable

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF TARGET EMISSIONS 09 Jan 2014

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													93.4000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													3086.5328 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	576.3448	448.3379	371.0007	204.9604	82.3029	0.0000	0.0000	0.0000	0.0000	204.7204	405.1126	590.0420	(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)	617.0715	480.0192	397.2170	219.4437	88.1188	0.0000	0.0000	0.0000	0.0000	219.1867	433.7394	631.7366	(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	199.9609	174.8825	181.9540	161.3840	156.2482	137.6147	131.8453	146.9766	148.5998	169.2105	180.6289	195.2593	(64)
Efficiency of water heater (217)m	87.5631	87.3181	86.8072	85.6540	83.5194	80.3000	80.3000	80.3000	80.3000	85.5318	87.0246	80.3000	(216)
Fuel for water heating, kWh/month	228.3619	200.2821	209.6070	188.4138	187.0801	171.3757	164.1909	183.0344	185.0559	197.8335	207.5608	222.7498	(219)
Water heating fuel used													2345.5459 (219)
Annual totals kWh/year													
Space heating fuel - main system													3086.5328 (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)													352.3493 (232)
Total delivered energy for all uses													5859.4281 (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	3086.5328	0.2160	666.6911 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2345.5459	0.2160	506.6379 (264)
Space and water heating			1173.3290 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	352.3493	0.5190	182.8693 (268)
Total CO2, kg/m2/year			1395.1233 (272)
Emissions per m2 for space and water heating			15.2143 (272a)
Fuel factor (mains gas)			1.0000
Emissions per m2 for lighting			2.3712 (272b)
Emissions per m2 for pumps and fans			0.5047 (272c)
Target Carbon Dioxide Emission Rate (TER) = (15.2143 * 1.00) + 2.3712 + 0.5047, rounded to 2 d.p.			18.0900 (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	38.5600 (1b)	x 2.3300 (2b)	= 89.8448 (1b) - (3b)
First floor	38.5600 (1c)	x 2.5600 (2c)	= 98.7136 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	77.1200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 188.5584 (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) = 0.1591 (8)							
Pressure test					Yes							
Measured/design AP50					4.4100							
Infiltration rate					0.3796 (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) = 0.3227 (21)							
Wind speed	Jan 5.1000	Feb 5.0000	Mar 4.9000	Apr 4.4000	May 4.3000	Jun 3.8000	Jul 3.8000	Aug 3.7000	Sep 4.0000	Oct 4.3000	Nov 4.5000	Dec 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	0.4114	0.4033	0.3953	0.3549	0.3469	0.3065	0.3065	0.2985	0.3227	0.3469	0.3630	0.3791 (22b)
Effective ac	0.5846	0.5813	0.5781	0.5630	0.5602	0.5470	0.5470	0.5445	0.5521	0.5602	0.5659	0.5719 (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					
Opening Type 1			1.9700	1.0000	1.9700		(26)					
Opening Type 2 (Uw = 1.41)			12.0000	1.3347	16.0167		(27)					
150mm Platinum			38.5600	0.1500	5.7840		(28a)					
50 mm A. Platinum	85.9300	13.9700	71.9600	0.2700	19.4292		(29a)					
400mm Mineral wool	38.5600		38.5600	0.1100	4.2416		(30)					
Total net area of external elements Aum(A, m ²)			163.0500				(31)					
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 47.4415		(33)					
E-WM-22			40.5200	0.0000	0.0000		(32)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							201.0900 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							8.6242 (36)					
Total fabric heat loss							(33) + (36) = 56.0656 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 36.3777	Feb 36.1732	Mar 35.9728	Apr 35.0314	May 34.8553	Jun 34.0354	Jul 34.0354	Aug 33.8836	Sep 34.3512	Oct 34.8553	Nov 35.2116	Dec 35.5841 (38)
Heat transfer coeff	92.4433	92.2389	92.0384	91.0971	90.9209	90.1010	90.1010	89.9492	90.4169	90.9209	91.2772	91.6497 (39)
Average = Sum(39)m / 12 =												91.0962 (39)
HLP	Jan 1.1987	Feb 1.1960	Mar 1.1934	Apr 1.1812	May 1.1790	Jun 1.1683	Jul 1.1683	Aug 1.1664	Sep 1.1724	Oct 1.1790	Nov 1.1836	Dec 1.1884 (40)
HLP (average)												1.1812 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												2.4059 (42)
Average daily hot water use (litres/day)												91.3412 (43)
Daily hot water use	100.4753	96.8216	93.1680	89.5143	85.8607	82.2071	82.2071	85.8607	89.5143	93.1680	96.8216	100.4753 (44)
Energy conte	149.0020	130.3181	134.4766	117.2399	112.4945	97.0742	89.9535	103.2230	104.4558	121.7331	132.8812	144.3004 (45)
Energy content (annual)												Total = Sum(45)m = 1437.1523 (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)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

Space cooling											549.8571 (104)
Cooled fraction										FC - cooled area / (4) -	1.0000 (105)
Intermittency factor (Table 10b)											
	0.0000	0.0000	0.0000	0.0000	0.2500	0.2500	0.2500	0.0000	0.0000	0.0000	0.0000 (106)
Space cooling kWh											
	0.0000	0.0000	0.0000	0.0000	39.3036	54.0617	44.0989	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling											137.4643 (107)
Space cooling per m2											1.7825 (108)
Energy for space heating											43.4236 (99)
Energy for space cooling											1.7825 (108)
Total											45.2060 (109)
Dwelling Fabric Energy Efficiency (DFEE)											45.2 (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 (m2)	Storey height (m)	Volume (m3)
Ground floor	38.5600 (1b)	2.3300 (2b)	89.8448 (1b) - (3b)
First floor	38.5600 (1c)	2.5600 (2c)	98.7136 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	77.1200		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 188.5584 (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				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) =	0.1591 (8)							
Pressure test				Yes								
Measured/design AP50				5.0000								
Infiltration rate				0.4091 (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) =		0.3477 (21)							
Wind speed	Jan 5.1000	Feb 5.0000	Mar 4.9000	Apr 4.4000	May 4.3000	Jun 3.8000	Jul 3.8000	Aug 3.7000	Sep 4.0000	Oct 4.3000	Nov 4.5000	Dec 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	0.4434	0.4347	0.4260	0.3825	0.3738	0.3303	0.3303	0.3217	0.3477	0.3738	0.3912	0.4086 (22b)
Effective ac	0.5983	0.5945	0.5907	0.5732	0.5699	0.5546	0.5546	0.5517	0.5605	0.5699	0.5765	0.5835 (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			1.9700	1.0000	1.9700		(26)					
TER Opening Type (Uw = 1.40)			12.0000	1.3258	15.9091		(27)					
150mm Platinum			38.5600	0.1300	5.0128		(28a)					
50 mm A. Platinum	85.9300	13.9700	71.9600	0.1800	12.9528		(29a)					
400mm Mineral wool	38.5600		38.5600	0.1300	5.0128		(30)					
Total net area of external elements Aum(A, m2)			163.0500				(31)					
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 40.8575		(33)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							9.2829 (36)					
Total fabric heat loss							(33) + (36) = 50.1404 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 37.2279	Feb 36.9904	Mar 36.7576	Apr 35.6643	May 35.4597	Jun 34.5074	Jul 34.5074	Aug 34.3311	Sep 34.8742	Oct 35.4597	Nov 35.8735	Dec 36.3062 (38)
Heat transfer coeff	87.3683	87.1308	86.8980	85.8047	85.6001	84.6478	84.6478	84.4715	85.0146	85.6001	86.0139	86.4466 (39)
Average = Sum(39)m / 12 =												85.8037 (39)
HLP	Jan 1.1329	Feb 1.1298	Mar 1.1268	Apr 1.1126	May 1.1100	Jun 1.0976	Jul 1.0976	Aug 1.0953	Sep 1.1024	Oct 1.1100	Nov 1.1153	Dec 1.1209 (40)
HLP (average)												1.1126 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												2.4059 (42)
Average daily hot water use (litres/day)												91.3412 (43)
Daily hot water use	100.4753	96.8216	93.1680	89.5143	85.8607	82.2071	82.2071	85.8607	89.5143	93.1680	96.8216	100.4753 (44)
Energy content (annual)	149.0020	130.3181	134.4766	117.2399	112.4945	97.0742	89.9535	103.2230	104.4558	121.7331	132.8812	144.3004 (45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 1437.1523 (45)
Water storage loss:												0.0000 (46)
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 (46)
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 (56)

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	31.7751	46.7944	37.6727	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling											116.2423 (107)	
Space cooling per m2											1.5073 (108)	
Energy for space heating											41.3673 (99)	
Energy for space cooling											1.5073 (108)	
Total											42.8746 (109)	
Target Fabric Energy Efficiency (TFEE)											49.3 (109)	