

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

Property Reference	Unit 4 Eldon Terrace			Issued on Date	03/06/2021
Assessment Reference	001	Prop Type Ref			
Property					
SAP Rating	86 B	DER	13.02	TER	17.03
Environmental	90 B	% DER<TER	23.54		
CO ₂ Emissions (t/year)	0.87	DFEE	29.94	TFEE	44.65
General Requirements Compliance	Pass	% DFEE<TFEE	32.94		
Assessor Details	Mr. Andrew Sadler, Build Pass Ltd, Tel: 01962 657180, andrew@buildpass.co.uk			Assessor ID	P628-0001
Client					

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

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DWELLING AS DESIGNED

Semi-Detached House, total floor area 80 m²

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

1a TER and DER

Fuel for main heating:Mains gas
Fuel factor:1.00 (mains gas)
Target Carbon Dioxide Emission Rate (TER) 17.03 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 13.02 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)44.6 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)29.9 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.18 (max. 0.30)	0.18 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.12 (max. 0.25)	0.12 (max. 0.70)	OK
Roof	0.13 (max. 0.20)	0.17 (max. 0.35)	OK
Openings	1.17 (max. 2.00)	1.40 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals: 4.00 (design value)
Maximum 10.0 OK

4 Heating efficiency

Main heating system: Boiler system with radiators or underfloor - Mains gas
Data from database
Worcester Greenstar 25Si Compact ErP
Combi boiler
Efficiency: 89.8% SEDBUK2009
Minimum: 88.0% OK

Secondary heating system: None

5 Cylinder insulation

Hot water storage No cylinder

6 Controls

Space heating controls: 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

Continuous extract system (decentralised)
Specific fan power: 0.1600 0.1600
Maximum 0.7 OK

9 Summertime temperature

Overheating risk (Thames Valley): Not significant OK
Based on:
Overshading: Average
Windows facing North: 3.36 m², No overhang
Windows facing South: 7.56 m², No overhang
Air change rate: 8.00 ach
Blinds/curtains: None

10 Key features

External wall U-value 0.13 W/m²K
Party wall U-value 0.00 W/m²K
Floor U-value 0.12 W/m²K
Door U-value 0.85 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 (m ²)	Storey height (m)	Volume (m ³)
Ground floor	28.9000 (1b)	x 2.2000 (2b)	= 63.5800 (1b) - (3b)
First floor	28.9000 (1c)	x 2.6000 (2c)	= 75.1400 (1c) - (3c)
Second floor	22.1600 (1d)	x 2.1700 (2d)	= 48.0872 (1d) - (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	79.9600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 186.8072 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					0 * 10 = 0.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					Air changes per hour 0.0000 / (5) = 0.0000 (8)
Pressure test					Yes
Measured/design AP50					4.0000
Infiltration rate					0.2000 (18)
Number of sides sheltered					1 (19)
Shelter factor			(20) = 1 - [0.075 x (19)] =		0.9250 (20)
Infiltration rate adjusted to include shelter factor			(21) = (18) x (20) =		0.1850 (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	0.2359	0.2313	0.2266	0.2035	0.1989	0.1758	0.1758	0.1711	0.1850	0.1989	0.2081	0.2174 (22b)
Mechanical extract ventilation - decentralised												0.5000 (23a)
If mechanical ventilation:												
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Door			2.1000	0.8500	1.7850		(26)
Windows (Uw = 1.20)			10.9200	1.1450	12.5038		(27)
Roof Lights (Uw = 1.40)			1.5200	1.3258	2.0152		(27a)
Heat Loss Floor 1			28.9000	0.1200	3.4680		(28a)
External Wall 1	86.8600	12.0200	74.8400	0.1800	13.4712		(29a)
Dormer Cheeks	2.0000	1.0000	1.0000	0.1300	0.1300		(29a)
External Roof 1	28.3000	1.5200	26.7800	0.1300	3.4814		(30)
Dormer Roof	0.6000		0.6000	0.1700	0.1020		(30)
Total net area of external elements Aum(A, m ²)			146.6600				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		36.9566		(33)
Party Wall 1			40.3900	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							6.9800 (36)
Total fabric heat loss						(33) + (36) =	43.9366 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	30.8232	30.8232	30.8232	30.8232	30.8232	30.8232	30.8232	30.8232	30.8232	30.8232	30.8232	30.8232 (38)
Heat transfer coeff	74.7598	74.7598	74.7598	74.7598	74.7598	74.7598	74.7598	74.7598	74.7598	74.7598	74.7598	74.7598 (39)
Average = Sum(39)m / 12 =												74.7598 (39)
HLP	0.9350	0.9350	0.9350	0.9350	0.9350	0.9350	0.9350	0.9350	0.9350	0.9350	0.9350	0.9350 (40)
HLP (average)												0.9350 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.4621 (42)
Average daily hot water use (litres/day)												92.6749 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	101.9424	98.2354	94.5284	90.8214	87.1144	83.4074	83.4074	87.1144	90.8214	94.5284	98.2354	101.9424 (44)

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CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Energy content (annual)	151.1776	132.2209	136.4402	118.9518	114.1371	98.4917	91.2670	104.7302	105.9810	123.5107	134.8216	146.4075 (45)
Distribution loss (46)m = 0.15 x (45)m	22.6766	19.8331	20.4660	17.8428	17.1206	14.7737	13.6900	15.7095	15.8972	18.5266	20.2232	21.9611 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	29.4928	26.6386	29.4928	28.5414	29.4928	28.5414	29.4928	29.4928	28.5414	29.4928	28.5414	29.4928 (61)
Total heat required for water heating calculated for each month	180.6704	158.8596	165.9329	147.4932	143.6299	127.0331	120.7598	134.2230	134.5224	153.0034	163.3630	175.9003 (62)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63)
FGHRS	-21.6741	-18.6476	-18.2760	-14.6338	-13.3657	-11.5018	-10.8134	-12.1866	-12.2657	-15.3333	-18.9537	-21.3884 eq. (G5)
Output from w/h	158.9964	140.2120	147.6569	132.8595	130.2642	115.5313	109.9464	122.0364	122.2568	137.6702	144.4092	154.5119 (64)
Heat gains from water heating, kWh/month	57.6398	50.6231	52.7395	46.6868	45.3238	39.8838	37.7195	42.1960	42.3740	48.4405	51.9635	56.0537 (65)
Total per year (kWh/year) = Sum(64)m =												1616.3511 (64)

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

Metabolic gains (Table 5), Watts												
(66)m	123.1051	123.1051	123.1051	123.1051	123.1051	123.1051	123.1051	123.1051	123.1051	123.1051	123.1051	123.1051 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	20.4156	18.1329	14.7467	11.1642	8.3454	7.0455	7.6129	9.8956	13.2818	16.8643	19.6831	20.9830 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.3569	221.6332	215.8971	203.6857	188.2711	173.7835	164.1049	161.8286	167.5647	179.7761	195.1907	209.6783 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.3105	35.3105	35.3105	35.3105	35.3105	35.3105	35.3105	35.3105	35.3105	35.3105	35.3105	35.3105 (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)	-98.4841	-98.4841	-98.4841	-98.4841	-98.4841	-98.4841	-98.4841	-98.4841	-98.4841	-98.4841	-98.4841	-98.4841 (71)
Water heating gains (Table 5)	77.4728	75.3320	70.8865	64.8428	60.9191	55.3942	50.6982	56.7150	58.8528	65.1082	72.1716	75.3410 (72)
Total internal gains	380.1768	378.0296	364.4618	342.6243	320.4670	299.1547	285.3475	291.3708	302.6308	324.6801	349.9769	368.9338 (73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g		FF		Access		Gains	
						Specific data or Table 6b		Specific data or Table 6c		factor Table 6d		W	
North				3.3600	10.6334	0.6300		0.0000		0.7700		17.3317 (74)	
South				7.5600	46.7521	0.6300		0.0000		0.7700		171.4565 (78)	
North				0.6400	16.1759	0.6300		0.7000		1.0000		4.1089 (82)	
South				0.8800	43.9921	0.6300		0.7000		1.0000		15.3652 (82)	
Solar gains	208.2623	349.7415	470.4958	578.0937	649.2865	647.0327	622.6701	568.0848	506.9489	383.8639	248.4110	178.9707 (83)	
Total gains	588.4392	727.7711	834.9576	920.7180	969.7536	946.1874	908.0177	859.4556	809.5797	708.5440	598.3879	547.9045 (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	74.2750	74.2750	74.2750	74.2750	74.2750	74.2750	74.2750	74.2750	74.2750	74.2750	74.2750	74.2750
Feb	5.9517	5.9517	5.9517	5.9517	5.9517	5.9517	5.9517	5.9517	5.9517	5.9517	5.9517	5.9517
Mar	0.9940	0.9796	0.9420	0.8485	0.6859	0.5013	0.3617	0.3991	0.6206	0.8927	0.9838	0.9959 (86)
MIT	20.3459	20.5044	20.6815	20.8412	20.9267	20.9505	20.9538	20.9535	20.9420	20.8214	20.5413	20.3031 (87)
Th 2	20.1379	20.1379	20.1379	20.1379	20.1379	20.1379	20.1379	20.1379	20.1379	20.1379	20.1379	20.1379 (88)
util rest of house	0.9921	0.9737	0.9265	0.8142	0.6320	0.4358	0.2912	0.3249	0.5498	0.8588	0.9781	0.9947 (89)
MIT 2	19.2649	19.4929	19.7407	19.9494	20.0468	20.0687	20.0708	20.0706	20.0625	19.9306	19.5480	19.2028 (90)
Living area fraction	19.4998	19.7126	19.9451	20.1431	20.2380	20.2602	20.2626	20.2624	20.2536	20.1241	19.7638	19.4188 (92)
Temperature adjustment												-0.1500
adjusted MIT	19.3498	19.5626	19.7951	19.9931	20.0880	20.1102	20.1126	20.1124	20.1036	19.9741	19.6138	19.2918 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9898	0.9688	0.9193	0.8078	0.6287	0.4336	0.2891	0.3227	0.5469	0.8514	0.9736	0.9930 (94)
Ext temp.	582.4458	705.0892	767.5630	743.7741	609.6981	410.2898	262.4869	277.3149	442.7510	603.2593	582.5916	544.0515 (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	1125.1168	1096.1724	993.9363	829.3198	627.0827	411.9439	262.6028	277.5401	448.8264	700.8068	935.5290	1128.2611 (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	403.7472	262.8079	168.4218	61.5929	12.9342	0.0000	0.0000	0.0000	0.0000	72.5753	254.1149	434.6519 (98)
Space heating per m2												1670.8461 (98)
												(98) / (4) = 20.8960 (99)

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CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

8c. Space cooling requirement

Not applicable

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													90.7000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													1842.1677 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	403.7472	262.8079	168.4218	61.5929	12.9342	0.0000	0.0000	0.0000	0.0000	72.5753	254.1149	434.6519	(98)
Space heating efficiency (main heating system 1)	90.7000	90.7000	90.7000	90.7000	90.7000	0.0000	0.0000	0.0000	0.0000	90.7000	90.7000	90.7000	(210)
Space heating fuel (main heating system)	445.1458	289.7551	185.6910	67.9083	14.2604	0.0000	0.0000	0.0000	0.0000	80.0169	280.1708	479.2193	(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	158.9964	140.2120	147.6569	132.8595	130.2642	115.5313	109.9464	122.0364	122.2568	137.6702	144.4092	154.5119	(64)
Efficiency of water heater (217)m	89.6231	89.3776	88.9331	88.1389	87.3217	87.0000	87.0000	87.0000	87.0000	88.2426	89.3235	87.0000	(216)
Fuel for water heating, kWh/month	177.4056	156.8760	166.0314	150.7388	149.1773	132.7946	126.3752	140.2717	140.5250	156.0133	161.6700	172.2549	(219)
Water heating fuel used												1830.1337	(219)
Annual totals kWh/year													
Space heating fuel - main system												1842.1677	(211)
Space heating fuel - secondary												0.0000	(215)
Electricity for pumps and fans:													
(MEV)Decentralised, Database: total watage = 8.2800, total flow = 45.0000, SFP = 0.1840)													
mechanical ventilation fans (SFP = 0.1840)													41.9345 (230a)
central heating pump													30.0000 (230c)
main heating flue fan													45.0000 (230e)
Total electricity for the above, kWh/year													116.9345 (231)
Electricity for lighting (calculated in Appendix L)													360.5451 (232)
Total delivered energy for all uses													4149.7810 (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	1842.1677	0.2160	397.9082	(261)
Space heating - secondary	0.0000	0.0000	0.0000	(263)
Water heating (other fuel)	1830.1337	0.2160	395.3089	(264)
Space and water heating			793.2171	(265)
Pumps and fans	116.9345	0.5190	60.6890	(267)
Energy for lighting	360.5451	0.5190	187.1229	(268)
Total CO2, kg/year			1041.0290	(272)
Dwelling Carbon Dioxide Emission Rate (DER)			13.0200	(273)

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

DER			13.0200	ZC1
Total Floor Area		TFA	79.9600	
Assumed number of occupants		N	2.4621	
CO2 emission factor in Table 12 for electricity displaced from grid		EF	0.5190	
CO2 emissions from appliances, equation (L14)			16.2564	ZC2
CO2 emissions from cooking, equation (L16)			2.2272	ZC3
Total CO2 emissions			31.5037	ZC4
Residual CO2 emissions offset from biofuel CHP			0.0000	ZC5
Additional allowable electricity generation, kWh/m²/year			0.0000	ZC6
Resulting CO2 emissions offset from additional allowable electricity generation			0.0000	ZC7
Net CO2 emissions			31.5037	ZC8

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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	28.9000 (1b)	x 2.2000 (2b)	= 63.5800 (1b) - (3b)
First floor	28.9000 (1c)	x 2.6000 (2c)	= 75.1400 (1c) - (3c)
Second floor	22.1600 (1d)	x 2.1700 (2d)	= 48.0872 (1d) - (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	79.9600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 186.8072 (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) =					Air changes per hour 30.0000 / (5) = 0.1606 (8)
Pressure test					Yes
Measured/design AP50					5.0000
Infiltration rate					0.4106 (18)
Number of sides sheltered					1 (19)
Shelter factor			(20) = 1 - [0.075 x (19)] =		0.9250 (20)
Infiltration rate adjusted to include shelter factor			(21) = (18) x (20) =		0.3798 (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	0.4842	0.4747	0.4653	0.4178	0.4083	0.3608	0.3608	0.3513	0.3798	0.4083	0.4273	0.4463 (22b)
Effective ac	0.6172	0.6127	0.6082	0.5873	0.5833	0.5651	0.5651	0.5617	0.5721	0.5833	0.5913	0.5996 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
TER Opaque door			2.1000	1.0000	2.1000		(26)
TER Opening Type (Uw = 1.40)			10.9200	1.3258	14.4773		(27)
TER Room Window (Uw = 1.70)			1.5200	1.5918	2.4195		(27a)
Heat Loss Floor 1			28.9000	0.1300	3.7570		(28a)
External Wall 1	86.8600	12.0200	74.8400	0.1800	13.4712		(29a)
Dormer Cheeks	2.0000	1.0000	1.0000	0.1800	0.1800		(29a)
External Roof 1	28.3000	1.5200	26.7800	0.1300	3.4814		(30)
Dormer Roof	0.6000		0.6000	0.1300	0.0780		(30)
Total net area of external elements Aum(A, m ²)			146.6600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	39.9643		(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)							9.4270 (36)
Total fabric heat loss						(33) + (36) =	49.3913 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	38.0510	37.7703	37.4952	36.2030	35.9613	34.8358	34.8358	34.6274	35.2693	35.9613	36.4504	36.9617 (38)
Heat transfer coeff	87.4423	87.1617	86.8866	85.5944	85.3526	84.2272	84.2272	84.0188	84.6607	85.3526	85.8417	86.3530 (39)
Average = Sum(39)m / 12 =												85.5932 (39)
HLP	1.0936	1.0901	1.0866	1.0705	1.0674	1.0534	1.0534	1.0508	1.0588	1.0674	1.0736	1.0800 (40)
HLP (average)												1.0705 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.4621 (42)
Average daily hot water use (litres/day)												92.6749 (43)
Daily hot water use	101.9424	98.2354	94.5284	90.8214	87.1144	83.4074	83.4074	87.1144	90.8214	94.5284	98.2354	101.9424 (44)
Energy conte	151.1776	132.2209	136.4402	118.9518	114.1371	98.4917	91.2670	104.7302	105.9810	123.5107	134.8216	146.4075 (45)
Energy content (annual)										Total = Sum(45)m =		1458.1373 (45)
Distribution loss (46)m = 0.15 x (45)m	22.6766	19.8331	20.4660	17.8428	17.1206	14.7737	13.6900	15.7095	15.8972	18.5266	20.2232	21.9611 (46)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF TARGET EMISSIONS 09 Jan 2014

Not applicable

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000	(201)
Fraction of space heat from main system(s)													1.0000	(202)
Efficiency of main space heating system 1 (in %)													93.4000	(206)
Efficiency of secondary/supplementary heating system, %													0.0000	(208)
Space heating requirement													2874.5314	(211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Space heating requirement	556.0099	419.4061	337.2669	178.6001	67.4846	0.0000	0.0000	0.0000	0.0000	175.2248	379.8796	570.9404	(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)	595.2996	449.0430	361.0995	191.2206	72.2533	0.0000	0.0000	0.0000	0.0000	187.6068	406.7233	611.2852	(211)	
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)	
Water heating														
Water heating requirement	202.1365	177.4361	184.6108	163.7405	158.5297	139.6241	133.7705	149.1228	150.7697	171.6813	183.2664	197.3664	(64)	
Efficiency of water heater (217)m	87.4668	87.1415	86.5491	85.2702	83.0712	80.3000	80.3000	80.3000	80.3000	85.1026	86.8452	87.5705	(216)	
Fuel for water heating, kWh/month	231.1009	203.6183	213.3017	192.0255	190.8358	173.8781	166.5884	185.7071	187.7580	201.7344	211.0265	225.3799	(219)	
Water heating fuel used												2382.9545	(219)	
Annual totals kWh/year														
Space heating fuel - main system												2874.5314	(211)	
Space heating fuel - secondary												0.0000	(215)	
Electricity for pumps and fans:														
central heating pump													30.0000	(230c)
main heating flue fan													45.0000	(230e)
Total electricity for the above, kWh/year													75.0000	(231)
Electricity for lighting (calculated in Appendix L)													360.5451	(232)
Total delivered energy for all uses													5693.0311	(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	2874.5314	0.2160	620.8988 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2382.9545	0.2160	514.7182 (264)
Space and water heating			1135.6170 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	360.5451	0.5190	187.1229 (268)
Total CO2, kg/m2/year			1361.6649 (272)
Emissions per m2 for space and water heating			14.2023 (272a)
Fuel factor (mains gas)			1.0000
Emissions per m2 for lighting			2.3402 (272b)
Emissions per m2 for pumps and fans			0.4868 (272c)
Target Carbon Dioxide Emission Rate (TER) = (14.2023 * 1.00) + 2.3402 + 0.4868, rounded to 2 d.p.			17.0300 (273)