

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

Property Reference	Unit 1B Eldon Terrace				Issued on Date	12/07/2021
Assessment Reference	001	Prop Type Ref	FF Flat			
Property						
SAP Rating	84 B	DER	16.39	TER	20.27	
Environmental	89 B	% DER<TER	19.13			
CO ₂ Emissions (t/year)	0.72	DFEE	39.54	TFEE	51.68	
General Requirements Compliance	Pass	% DFEE<TFEE	23.48			
Assessor Details	Mr. Andrew Sadler, Build Pass Ltd, Tel: 01962 657180, andrew@buildpass.co.uk				Assessor ID	P628-0001
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-floor flat, total floor area 54 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) 20.27 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 16.39 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)51.7 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)39.5 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.27 (max. 0.30)	0.30 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	(no floor)		
Roof	(no roof)		
Openings	1.13 (max. 2.00)	1.20 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals: 4.00 (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

Not applicable

9 Summertime temperature

Overheating risk (Thames Valley): Slight OK
Based on:
Overshading: Average
Windows facing North: 2.52 m², No overhang
Windows facing South: 6.30 m², No overhang
Air change rate: 8.00 ach
Blinds/curtains: None

10 Key features

Party wall U-value 0.00 W/m²K
Door U-value 0.85 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	54.0900 (1b)	x 2.6000 (2b)	= 140.6340 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.0900		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 140.6340 (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) = 0.1422 (8)
Pressure test					Yes
Measured/design AP50					4.0000
Infiltration rate					0.3422 (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) = 0.3165 (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	0.4036	0.3957	0.3878	0.3482	0.3403	0.3007	0.3007	0.2928	0.3165	0.3403	0.3561	0.3719 (22b)
Effective ac	0.5814	0.5783	0.5752	0.5606	0.5579	0.5452	0.5452	0.5429	0.5501	0.5579	0.5634	0.5692 (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					
Door			2.1000	0.8500	1.7850			(26)				
Windows (Uw = 1.20)			8.8200	1.1450	10.0992			(27)				
External Wall 1	61.9400	10.9200	51.0200	0.3000	15.3060			(29a)				
Sheltered Wall	18.4000		18.4000	0.1852	3.4074			(29a)				
Total net area of external elements Aum(A, m2)			80.3400					(31)				
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	30.5976			(33)				
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K								250.0000 (35)				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)								7.9000 (36)				
Total fabric heat loss								(33) + (36) = 38.4976 (37)				
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 26.9844	Feb 26.8377	Mar 26.6938	Apr 26.0180	May 25.8916	Jun 25.3031	Jul 25.3031	Aug 25.1941	Sep 25.5298	Oct 25.8916	Nov 26.1474	Dec 26.4148 (38)
Heat transfer coeff	65.4821	65.3353	65.1914	64.5157	64.3893	63.8007	63.8007	63.6917	64.0274	64.3893	64.6450	64.9124 (39)
Average = Sum(39)m / 12 =												64.5151 (39)
HLP	Jan 1.2106	Feb 1.2079	Mar 1.2052	Apr 1.1927	May 1.1904	Jun 1.1795	Jul 1.1795	Aug 1.1775	Sep 1.1837	Oct 1.1904	Nov 1.1951	Dec 1.2001 (40)
HLP (average)												1.1927 (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												1.8106 (42)
Average daily hot water use (litres/day)												77.2029 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	84.9232	81.8351	78.7470	75.6589	72.5707	69.4826	69.4826	72.5707	75.6589	78.7470	81.8351	84.9232 (44)
Energy conte	125.9387	110.1468	113.6616	99.0929	95.0820	82.0486	76.0301	87.2456	88.2876	102.8907	112.3132	121.9649 (45)
Energy content (annual)											Total = Sum(45)m =	1214.7026 (45)
Distribution loss (46)m = 0.15 x (45)m	18.8908	16.5220	17.0492	14.8639	14.2623	12.3073	11.4045	13.0868	13.2431	15.4336	16.8470	18.2947 (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)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Total heat required for water heating calculated for each month													
WWHRS	155.4315	136.7854	143.1544	127.6343	124.5748	110.5900	105.5228	116.7384	116.8290	132.3835	140.8546	151.4577 (62)	
Total of WWHRS savings	-29.2133	-25.6987	-26.2317	-21.6185	-20.0918	-16.5878	-14.0626	-17.0185	-17.5043	-21.6132	-25.0007	-28.2280 eq. (G10)	
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-262.8693	
FGHRS	-19.8356	-16.0542	-14.8491	-10.1764	-7.6593	-5.7407	-5.5234	-6.1181	-6.1239	-10.5777	-15.9277	-19.9536 eq. (G5)	
Output from w/h	106.3825	95.0325	102.0736	95.8394	96.8237	88.2615	85.9369	93.6018	93.2008	100.1926	99.9261	103.2761 (64)	
Heat gains from water heating, kWh/month	49.2478	43.2835	45.1657	40.0838	38.9880	34.4165	32.6532	36.3824	36.4910	41.5843	44.4795	47.9265 (65)	

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

Metabolic gains (Table 5), Watts													
(66)m	90.5325	90.5325	90.5325	90.5325	90.5325	90.5325	90.5325	90.5325	90.5325	90.5325	90.5325	90.5325 (66)	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	14.6262	12.9908	10.5648	7.9983	5.9788	5.0476	5.4541	7.0894	9.5154	12.0819	14.1014	15.0327 (67)	
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	157.8374	159.4753	155.3479	146.5613	135.4697	125.0452	118.0810	116.4432	120.5705	129.3571	140.4487	150.8732 (68)	
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.0532	32.0532	32.0532	32.0532	32.0532	32.0532	32.0532	32.0532	32.0532	32.0532	32.0532	32.0532 (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)	-72.4260	-72.4260	-72.4260	-72.4260	-72.4260	-72.4260	-72.4260	-72.4260	-72.4260	-72.4260	-72.4260	-72.4260 (71)	
Water heating gains (Table 5)	66.1933	64.4099	60.7066	55.6719	52.4032	47.8007	43.8887	48.9010	50.6819	55.8929	61.7771	64.4174 (72)	
Total internal gains	291.8166	290.0357	279.7791	263.3912	247.0114	231.0532	220.5835	225.5933	233.9275	250.4918	269.4869	283.4830 (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				2.5200	10.6334	0.6300		0.0000		0.7700	12.9988 (74)	
South				6.3000	46.7521	0.6300		0.0000		0.7700	142.8804 (78)	
Solar gains	155.8792	258.8427	340.2877	404.6933	442.3973	435.6267	421.3870	392.9971	362.1277	281.9627	185.3977	134.2983 (83)
Total gains	447.6958	548.8784	620.0667	668.0845	689.4088	666.6799	641.9705	618.5904	596.0552	532.4545	454.8846	417.7812 (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	57.3630	57.4919	57.6188	58.2223	58.3366	58.8747	58.8747	58.9755	58.6663	58.3366	58.1058	57.8664	
alpha	4.8242	4.8328	4.8413	4.8815	4.8891	4.9250	4.9250	4.9317	4.9111	4.8891	4.8737	4.8578	
util living area	0.9920	0.9789	0.9512	0.8876	0.7669	0.5900	0.4331	0.4673	0.6881	0.9098	0.9818	0.9941 (86)	
MIT	20.1073	20.2807	20.4857	20.7019	20.8539	20.9255	20.9414	20.9399	20.9038	20.7051	20.3606	20.0729 (87)	
Th 2	19.9115	19.9137	19.9158	19.9258	19.9277	19.9364	19.9364	19.9380	19.9330	19.9277	19.9239	19.9199 (88)	
util rest of house	0.9894	0.9724	0.9364	0.8549	0.7061	0.5014	0.3306	0.3627	0.6014	0.8760	0.9750	0.9922 (89)	
MIT 2	18.7363	18.9875	19.2787	19.5791	19.7651	19.8440	19.8545	19.8556	19.8237	19.5924	19.1132	18.6930 (90)	
Living area fraction	19.3898	19.6039	19.8539	20.1143	20.2840	20.3594	20.3726	20.3724	20.3385	20.1227	19.7077	19.3507 (92)	
MIT	19.3898	19.6039	19.8539	20.1143	20.2840	20.3594	20.3726	20.3724	20.3385	20.1227	19.7077	19.3507 (92)	
Temperature adjustment	19.2398	19.4539	19.7039	19.9643	20.1340	20.2094	20.2226	20.2224	20.1885	19.9727	19.5577	19.2007 (93)	

8. Space heating requirement

Utilisation	0.9874	0.9690	0.9330	0.8562	0.7187	0.5249	0.3585	0.3912	0.6234	0.8777	0.9721	0.9906 (94)
Useful gains	442.0445	531.8878	578.5201	572.0348	495.4899	349.9444	230.1534	241.9625	371.5879	467.3309	442.2097	413.8418 (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	978.2861	950.8817	860.7834	713.8183	543.0608	357.8864	231.1215	243.4542	389.8304	603.5033	805.3279	973.7290 (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	398.9637	281.5639	210.0039	102.0841	35.3928	0.0000	0.0000	0.0000	0.0000	101.3123	261.4451	416.5561 (98)
Space heating												1807.3220 (98)
Space heating per m2												33.4132 (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

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													1992.6373 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	398.9637	281.5639	210.0039	102.0841	35.3928	0.0000	0.0000	0.0000	0.0000	101.3123	261.4451	416.5561	(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)	439.8718	310.4343	231.5369	112.5514	39.0218	0.0000	0.0000	0.0000	0.0000	111.7004	288.2526	459.2680	(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	106.3825	95.0325	102.0736	95.8394	96.8237	88.2615	85.9369	93.6018	93.2008	100.1926	99.9261	103.2761	(64)
Efficiency of water heater (217)m	89.8952	89.7369	89.4557	88.8699	87.9605	87.0000	87.0000	87.0000	87.0000	88.8218	89.6458	87.0000	(216)
Fuel for water heating, kWh/month	118.3406	105.9012	114.1052	107.8424	110.0762	101.4500	98.7780	107.5882	107.1273	112.8019	111.4678	114.8277	(219)
Water heating fuel used												1310.3065	(219)
Annual totals kWh/year													
Space heating fuel - main system												1992.6373	(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)												258.3025	(232)
Total delivered energy for all uses												3636.2462	(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	1992.6373	0.2160	430.4097 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1310.3065	0.2160	283.0262 (264)
Space and water heating			713.4358 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	258.3025	0.5190	134.0590 (268)
Total CO2, kg/year			866.4198 (272)
Dwelling Carbon Dioxide Emission Rate (DER)			16.3900 (273)

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

DER		16.3900 ZC1
Total Floor Area	TFA	54.0900
Assumed number of occupants	N	1.8106
CO2 emission factor in Table 12 for electricity displaced from grid	EF	0.5190
CO2 emissions from appliances, equation (L14)		17.2918 ZC2
CO2 emissions from cooking, equation (L16)		3.0034 ZC3
Total CO2 emissions		36.6852 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		36.6852 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	54.0900 (1b)	x 2.6000 (2b)	= 140.6340 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.0900		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 140.6340 (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) = 0.1422 (8)
Pressure test					Yes
Measured/design AP50					5.0000
Infiltration rate					0.3922 (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) =				0.3628 (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	0.4626	0.4535	0.4444	0.3991	0.3900	0.3447	0.3447	0.3356	0.3628	0.3900	0.4081	0.4263 (22b)
Effective ac	0.6070	0.6028	0.5988	0.5796	0.5761	0.5594	0.5594	0.5563	0.5658	0.5761	0.5833	0.5909 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K					
TER Opaque door			2.1000	1.0000	2.1000			(26)				
TER Opening Type (Uw = 1.40)			8.8200	1.3258	11.6932			(27)				
External Wall 1	61.9400	10.9200	51.0200	0.1800	9.1836			(29a)				
Sheltered Wall	18.4000		18.4000	0.1800	3.3120			(29a)				
Total net area of external elements Aum(A, m2)			80.3400					(31)				
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	26.2888			(33)				
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K								250.0000 (35)				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)								10.9640 (36)				
Total fabric heat loss						(33) + (36) =		37.2528 (37)				
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	28.1696	27.9768	27.7879	26.9002	26.7342	25.9611	25.9611	25.8179	26.2588	26.7342	27.0701	27.4214 (38)
Heat transfer coeff	65.4224	65.2296	65.0406	64.1530	63.9869	63.2138	63.2138	63.0707	63.5116	63.9869	64.3229	64.6741 (39)
Average = Sum(39)m / 12 =												64.1522 (39)
HLP	1.2095	1.2059	1.2025	1.1860	1.1830	1.1687	1.1687	1.1660	1.1742	1.1830	1.1892	1.1957 (40)
HLP (average)												1.1860 (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												1.8106 (42)
Average daily hot water use (litres/day)												77.2029 (43)
Daily hot water use	84.9232	81.8351	78.7470	75.6589	72.5707	69.4826	69.4826	72.5707	75.6589	78.7470	81.8351	84.9232 (44)
Energy conte	125.9387	110.1468	113.6616	99.0929	95.0820	82.0486	76.0301	87.2456	88.2876	102.8907	112.3132	121.9649 (45)
Energy content (annual)										Total = Sum(45)m =		1214.7026 (45)
Distribution loss (46)m = 0.15 x (45)m	18.8908	16.5220	17.0492	14.8639	14.2623	12.3073	11.4045	13.0868	13.2431	15.4336	16.8470	18.2947 (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	43.2759	37.6666	40.1286	37.3112	36.9813	34.2654	35.4076	36.9813	37.3112	40.1286	40.3570	43.2759 (61)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF TARGET EMISSIONS 09 Jan 2014

Total heat required for water heating calculated for each month												
Solar input	169.2146	147.8133	153.7902	136.4042	132.0633	116.3140	111.4376	124.2269	125.5988	143.0193	152.6702	165.2408 (62)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63)
Solar input (sum of months) = Sum (63)m =												0.0000 (63)
Output from w/h												
	169.2146	147.8133	153.7902	136.4042	132.0633	116.3140	111.4376	124.2269	125.5988	143.0193	152.6702	165.2408 (64)
Total per year (kWh/year) = Sum (64)m =												1677.7932 (64)
Heat gains from water heating, kWh/month												
	52.6936	46.0404	47.8246	42.2762	40.8601	35.8475	34.1319	38.2545	38.6834	44.2433	47.4334	51.3723 (65)

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

Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	90.5325	90.5325	90.5325	90.5325	90.5325	90.5325	90.5325	90.5325	90.5325	90.5325	90.5325	90.5325 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	14.6262	12.9908	10.5648	7.9983	5.9788	5.0476	5.4541	7.0894	9.5154	12.0819	14.1014	15.0327 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	157.8374	159.4753	155.3479	146.5613	135.4697	125.0452	118.0810	116.4432	120.5705	129.3571	140.4487	150.8732 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	32.0532	32.0532	32.0532	32.0532	32.0532	32.0532	32.0532	32.0532	32.0532	32.0532	32.0532	32.0532 (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)												
	-72.4260	-72.4260	-72.4260	-72.4260	-72.4260	-72.4260	-72.4260	-72.4260	-72.4260	-72.4260	-72.4260	-72.4260 (71)
Water heating gains (Table 5)												
	70.8247	68.5126	64.2804	58.7170	54.9195	49.7882	45.8762	51.4173	53.7270	59.4668	65.8797	69.0488 (72)
Total internal gains												
	296.4480	294.1384	283.3529	266.4362	249.5277	233.0407	222.5710	228.1096	236.9726	254.0656	273.5896	288.1144 (73)

6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access	Gains
	m2	Table 6a	Specific data	Specific data	factor	W
		W/m2	or Table 6b	or Table 6c	Table 6d	
North	2.5200	10.6334	0.6300	0.7000	0.7700	8.1893 (74)
South	6.3000	46.7521	0.6300	0.7000	0.7700	90.0146 (78)

Solar gains	98.2039	163.0709	214.3812	254.9568	278.7103	274.4448	265.4738	247.5882	228.1404	177.6365	116.8005	84.6079 (83)
Total gains	394.6519	457.2093	497.7342	521.3930	528.2380	507.4855	488.0448	475.6978	465.1130	431.7022	390.3901	372.7223 (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)												
tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	57.4153	57.5850	57.7523	58.5514	58.7034	59.4213	59.4213	59.5562	59.1427	58.7034	58.3968	58.0796
alpha	4.8277	4.8390	4.8502	4.9034	4.9136	4.9614	4.9614	4.9704	4.9428	4.9136	4.8931	4.8720
util living area												
	0.9953	0.9898	0.9782	0.9484	0.8763	0.7263	0.5543	0.5884	0.8060	0.9546	0.9902	0.9964 (86)
MIT												
	19.7980	19.9728	20.2154	20.5140	20.7719	20.9378	20.9868	20.9823	20.8905	20.5627	20.1250	19.7686 (87)
Th 2												
	19.9124	19.9152	19.9180	19.9312	19.9336	19.9451	19.9451	19.9473	19.9407	19.9336	19.9287	19.9235 (88)
util rest of house												
	0.9938	0.9865	0.9707	0.9295	0.8298	0.6334	0.4294	0.4644	0.7262	0.9341	0.9863	0.9952 (89)
MIT 2												
	18.3294	18.5850	18.9367	19.3677	19.7099	19.9034	19.9403	19.9401	19.8566	19.4433	18.8173	18.2943 (90)
Living area fraction												
	fLA = Living area / (4) =											
												0.4766 (91)
MIT												
	19.0294	19.2465	19.5462	19.9140	20.2160	20.3964	20.4391	20.4368	20.3494	19.9768	19.4406	18.9970 (92)
Temperature adjustment												
												0.0000
adjusted MIT												
	19.0294	19.2465	19.5462	19.9140	20.2160	20.3964	20.4391	20.4368	20.3494	19.9768	19.4406	18.9970 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9920	0.9838	0.9675	0.9292	0.8435	0.6755	0.4893	0.5238	0.7597	0.9351	0.9840	0.9938 (94)
Useful gains	391.5033	449.7912	481.5403	484.4665	445.5921	342.7842	238.8131	249.1815	353.3583	403.6775	384.1365	370.4121 (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												
	963.6326	935.8137	848.5302	706.5841	544.9157	366.4127	242.6838	254.6059	396.9094	599.9933	793.7817	956.9801 (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												
	425.6642	326.6072	273.0405	159.9247	73.8967	0.0000	0.0000	0.0000	0.0000	146.0589	294.9446	436.4065 (98)
Space heating												
												2136.5432 (98)
Space heating per m2												39.4998 (99)
												(98) / (4) =

8c. Space cooling requirement

Not applicable

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)
---	--------------

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF TARGET EMISSIONS 09 Jan 2014

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													2287.5195 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	425.6642	326.6072	273.0405	159.9247	73.8967	0.0000	0.0000	0.0000	0.0000	146.0589	294.9446	436.4065	(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)	455.7432	349.6865	292.3346	171.2256	79.1185	0.0000	0.0000	0.0000	0.0000	156.3800	315.7865	467.2447	(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	169.2146	147.8133	153.7902	136.4042	132.0633	116.3140	111.4376	124.2269	125.5988	143.0193	152.6702	165.2408	(64)
Efficiency of water heater	87.2774	86.9910	86.4808	85.4525	83.6533	80.3000	80.3000	80.3000	80.3000	85.1041	86.6814	87.3814	(217)
Fuel for water heating, kWh/month	193.8814	169.9180	177.8316	159.6257	157.8697	144.8493	138.7766	154.7034	156.4120	168.0521	176.1281	189.1029	(219)
Water heating fuel used												1987.1507	(219)
Annual totals kWh/year													
Space heating fuel - main system												2287.5195	(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)												258.3025	(232)
Total delivered energy for all uses												4607.9727	(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	2287.5195	0.2160	494.1042 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1987.1507	0.2160	429.2246 (264)
Space and water heating			923.3288 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	258.3025	0.5190	134.0590 (268)
Total CO2, kg/m2/year			1096.3128 (272)
Emissions per m2 for space and water heating			17.0702 (272a)
Fuel factor (mains gas)			1.0000
Emissions per m2 for lighting			2.4784 (272b)
Emissions per m2 for pumps and fans			0.7196 (272c)
Target Carbon Dioxide Emission Rate (TER) = (17.0702 * 1.00) + 2.4784 + 0.7196, rounded to 2 d.p.			20.2700 (273)