

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

Property Reference	Unit 1A Eldon Terrace				Issued on Date	12/07/2021
Assessment Reference	001	Prop Type Ref	GF Flat			
Property						
SAP Rating	85 B	DER	14.44	TER	19.79	
Environmental	90 B	% DER<TER	27.03			
CO ₂ Emissions (t/year)	0.77	DFEE	35.10	TFEE	54.39	
General Requirements Compliance	Pass	% DFEE<TFEE	35.47			
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

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DWELLING AS DESIGNED

Ground-floor flat, total floor area 65 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) 19.79 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 14.44 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 54.4 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE) 35.1 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	(no roof)		
Openings	1.14 (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: 1.26 m², No overhang
Windows facing South: 9.87 m², No overhang
Air change rate: 8.00 ach
Blinds/curtains: None

10 Key features

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	65.3900 (1b)	x 2.6000 (2b)	= 170.0140 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	65.3900		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 170.0140 (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) = 0.1176 (8)
Pressure test					Yes
Measured/design AP50					4.0000
Infiltration rate					0.3176 (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) = 0.2938 (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	0.3746	0.3673	0.3599	0.3232	0.3159	0.2791	0.2791	0.2718	0.2938	0.3159	0.3305	0.3452 (22b)
Effective ac	0.5702	0.5674	0.5648	0.5522	0.5499	0.5390	0.5390	0.5369	0.5432	0.5499	0.5546	0.5596 (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)			11.1300	1.1450	12.7443			(27)				
Heat Loss Floor 1			65.3900	0.1200	7.8468			(28a)				
External Wall 1	97.7600	13.2300	84.5300	0.1800	15.2154			(29a)				
Total net area of external elements Aum(A, m2)			163.1500					(31)				
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	37.5915			(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) = 45.4915 (37)				
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 31.9890	Feb 31.8362	Mar 31.6863	Apr 30.9825	May 30.8509	Jun 30.2379	Jul 30.2379	Aug 30.1244	Sep 30.4740	Oct 30.8509	Nov 31.1172	Dec 31.3957 (38)
Heat transfer coeff	77.4805	77.3276	77.1778	76.4740	76.3423	75.7293	75.7293	75.6158	75.9655	76.3423	76.6087	76.8872 (39)
Average = Sum(39)m / 12 =												76.4734 (39)
HLP	Jan 1.1849	Feb 1.1826	Mar 1.1803	Apr 1.1695	May 1.1675	Jun 1.1581	Jul 1.1581	Aug 1.1564	Sep 1.1617	Oct 1.1675	Nov 1.1716	Dec 1.1758 (40)
HLP (average)												1.1695 (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												2.1292 (42)
Average daily hot water use (litres/day)												84.7693 (43)
Daily hot water use	Jan 93.2462	Feb 89.8555	Mar 86.4647	Apr 83.0739	May 79.6832	Jun 76.2924	Jul 76.2924	Aug 79.6832	Sep 83.0739	Oct 86.4647	Nov 89.8555	Dec 93.2462 (44)
Energy conte	138.2815	120.9419	124.8012	108.8047	104.4007	90.0899	83.4815	95.7962	96.9403	112.9746	123.3206	133.9182 (45)
Energy content (annual)										Total = Sum(45)m =		1333.7514 (45)
Distribution loss (46)m = 0.15 x (45)m	20.7422	18.1413	18.7202	16.3207	15.6601	13.5135	12.5222	14.3694	14.5411	16.9462	18.4981	20.0877 (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												
WWHRS	167.7743	147.5805	154.2940	137.3461	133.8935	118.6313	112.9743	125.2890	125.4817	142.4674	151.8620	163.4110 (62)
Total of WWHRS savings	-33.3656	-29.3541	-29.9615	-24.6741	-22.9221	-18.9178	-16.0258	-19.3985	-19.9576	-24.6554	-28.5377	-32.2443 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	-300.0146
FGHRS	-21.4446	-16.8614	-15.2865	-10.4320	-7.9929	-6.1519	-5.9186	-6.5624	-6.5702	-10.6937	-16.8375	0.0000 (63)
Output from w/h	112.9640	101.3650	109.0459	102.2400	102.9785	93.5615	91.0299	99.3282	98.9539	107.1183	106.4868	0.0000 (63)
								Solar input (sum of months) =	Sum(63)m =			0.0000 (63)
								Total per year (kWh/year) =	Sum(64)m =			1234.5256 (64)
Heat gains from water heating, kWh/month	53.3518	46.8728	48.8696	43.3129	42.0864	37.0902	35.1308	39.2254	39.3680	44.9373	48.1395	51.9010 (65)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	106.4617	106.4617	106.4617	106.4617	106.4617	106.4617	106.4617	106.4617	106.4617	106.4617	106.4617	106.4617 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	17.1267	15.2118	12.3710	9.3657	7.0011	5.9105	6.3865	8.3014	11.1421	14.1475	16.5122	17.6027 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	186.3082	188.2415	183.3697	172.9981	159.9058	147.6010	139.3806	137.4473	142.3191	152.6907	165.7829	178.0878 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.6462	33.6462	33.6462	33.6462	33.6462	33.6462	33.6462	33.6462	33.6462	33.6462	33.6462	33.6462 (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)	-85.1694	-85.1694	-85.1694	-85.1694	-85.1694	-85.1694	-85.1694	-85.1694	-85.1694	-85.1694	-85.1694	-85.1694 (71)
Water heating gains (Table 5)	71.7094	69.7512	65.6849	60.1568	56.5678	51.5142	47.2188	52.7224	54.6778	60.3995	66.8604	69.7594 (72)
Total internal gains	333.0828	331.1430	319.3642	300.4591	281.4131	262.9642	250.9244	256.4096	266.0776	285.1763	307.0941	323.3884 (73)

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
North	1.2600	10.6334	0.6300	0.0000	0.7700	6.4994 (74)
South	9.8700	46.7521	0.6300	0.0000	0.7700	223.8459 (78)

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	58.6079	58.7238	58.8378	59.3793	59.4817	59.9632	59.9632	60.0532	59.7768	59.4817	59.2749	59.0602
alpha	4.9072	4.9149	4.9225	4.9586	4.9654	4.9975	4.9975	5.0035	4.9851	4.9654	4.9517	4.9373
util living area	0.9904	0.9718	0.9347	0.8602	0.7341	0.5601	0.4067	0.4336	0.6390	0.8824	0.9768	0.9932 (86)
MIT	20.1570	20.3506	20.5546	20.7481	20.8744	20.9311	20.9432	20.9424	20.9174	20.7517	20.4110	20.1162 (87)
Th 2	19.9321	19.9340	19.9358	19.9445	19.9461	19.9537	19.9537	19.9551	19.9507	19.9461	19.9428	19.9394 (88)
util rest of house	0.9874	0.9635	0.9164	0.8235	0.6725	0.4754	0.3115	0.3372	0.5549	0.8429	0.9686	0.9910 (89)
MIT 2	18.8244	19.1030	19.3891	19.6527	19.8036	19.8654	19.8733	19.8744	19.8521	19.6657	19.1999	18.7712 (90)
Living area fraction												0.2656 (91)
MIT	19.1784	19.4344	19.6987	19.9437	20.0880	20.1485	20.1575	20.1581	20.1350	19.9542	19.5216	19.1285 (92)
Temperature adjustment												-0.1500
adjusted MIT	19.0284	19.2844	19.5487	19.7937	19.9380	19.9985	20.0075	20.0081	19.9850	19.8042	19.3716	18.9785 (93)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9839	0.9571	0.9084	0.8176	0.6719	0.4792	0.3164	0.3422	0.5578	0.8367	0.9628	0.9882 (94)
Useful gains	554.3524	679.7252	733.5267	704.8869	589.3473	403.0381	257.4816	271.9757	434.6736	581.8076	558.8252	516.0934 (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	1141.1659	1112.3115	1007.0684	833.0815	628.9093	408.8235	258.0490	272.8275	447.0604	702.6700	940.1126	1136.2788 (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	436.5892	290.6980	203.5151	92.3002	29.4341	0.0000	0.0000	0.0000	0.0000	89.9216	274.5270	461.4179 (98)
Space heating												1878.4030 (98)
Space heating per m2										(98) / (4) =		28.7262 (99)

Not applicable

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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												2071.0066 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	436.5892	290.6980	203.5151	92.3002	29.4341	0.0000	0.0000	0.0000	0.0000	89.9216	274.5270	461.4179 (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)	481.3553	320.5049	224.3826	101.7642	32.4522	0.0000	0.0000	0.0000	0.0000	99.1418	302.6758	508.7298 (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	112.9640	101.3650	109.0459	102.2400	102.9785	93.5615	91.0299	99.3282	98.9539	107.1183	106.4868	109.4535 (64)
Efficiency of water heater (217)m	89.9140	89.7136	89.3739	88.7171	87.7961	87.0000	87.0000	87.0000	87.0000	88.6504	89.6346	87.0000 (216)
Fuel for water heating, kWh/month	125.6357	112.9874	122.0109	115.2428	117.2927	107.5420	104.6321	114.1703	113.7401	120.8323	118.8010	121.6604 (219)
Water heating fuel used												1394.5476 (219)
Annual totals kWh/year												
Space heating fuel - main system												2071.0066 (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)												302.4626 (232)
Total delivered energy for all uses												3843.0169 (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	2071.0066	0.2160	447.3374 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1394.5476	0.2160	301.2223 (264)
Space and water heating			748.5597 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	302.4626	0.5190	156.9781 (268)
Total CO2, kg/year			944.4628 (272)
Dwelling Carbon Dioxide Emission Rate (DER)			14.4400 (273)

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

DER		14.4400 ZC1
Total Floor Area	TFA	65.3900
Assumed number of occupants	N	2.1292
CO2 emission factor in Table 12 for electricity displaced from grid	EF	0.5190
CO2 emissions from appliances, equation (L14)		16.8837 ZC2
CO2 emissions from cooking, equation (L16)		2.6013 ZC3
Total CO2 emissions		33.9250 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		33.9250 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	65.3900 (1b)	x 2.6000 (2b)	= 170.0140 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	65.3900		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 170.0140 (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) = 0.1176 (8)
Pressure test					Yes
Measured/design AP50					5.0000
Infiltration rate					0.3676 (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) = 0.3401 (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	0.4336	0.4251	0.4166	0.3741	0.3656	0.3231	0.3231	0.3146	0.3401	0.3656	0.3826	0.3996 (22b)
Effective ac	0.5940	0.5903	0.5868	0.5700	0.5668	0.5522	0.5522	0.5495	0.5578	0.5668	0.5732	0.5798 (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)			11.1300	1.3258	14.7557			(27)					
Heat Loss Floor 1			65.3900	0.1300	8.5007			(28a)					
External Wall 1	97.7600	13.2300	84.5300	0.1800	15.2154			(29a)					
Total net area of external elements Aum(A, m2)			163.1500					(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	40.5718			(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) = 51.5358 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 33.3260	Feb 33.1212	Mar 32.9205	Apr 31.9776	May 31.8012	Jun 30.9801	Jul 30.9801	Aug 30.8280	Sep 31.2964	Oct 31.8012	Nov 32.1581	Dec 32.5312	(38)
Heat transfer coeff	84.8617	84.6570	84.4562	83.5134	83.3370	82.5159	82.5159	82.3638	82.8322	83.3370	83.6939	84.0669	(39)
Average = Sum(39)m / 12 =												83.5126	(39)
HLP	Jan 1.2978	Feb 1.2946	Mar 1.2916	Apr 1.2772	May 1.2745	Jun 1.2619	Jul 1.2619	Aug 1.2596	Sep 1.2667	Oct 1.2745	Nov 1.2799	Dec 1.2856	(40)
HLP (average)												1.2771	(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												2.1292 (42)
Average daily hot water use (litres/day)												84.7693 (43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	93.2462	89.8555	86.4647	83.0739	79.6832	76.2924	76.2924	79.6832	83.0739	86.4647	89.8555	93.2462 (44)
Energy conte	138.2815	120.9419	124.8012	108.8047	104.4007	90.0899	83.4815	95.7962	96.9403	112.9746	123.3206	133.9182 (45)
Energy content (annual)										Total = Sum(45)m =		1333.7514 (45)
Distribution loss (46)m = 0.15 x (45)m	20.7422	18.1413	18.7202	16.3207	15.6601	13.5135	12.5222	14.3694	14.5411	16.9462	18.4981	20.0877 (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	47.5173	41.3581	44.0615	40.9680	40.6057	37.6236	38.8778	40.6057	40.9680	44.0615	44.3123	47.5173 (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	185.7987	162.3000	168.8626	149.7727	145.0064	127.7135	122.3593	136.4019	137.9083	157.0361	167.6329	181.4355 (62)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63)
Output from w/h	185.7987	162.3000	168.8626	149.7727	145.0064	127.7135	122.3593	136.4019	137.9083	157.0361	167.6329	181.4355 (64)
Heat gains from water heating, kWh/month	57.8579	50.5527	52.5118	46.4195	44.8646	39.3608	37.4770	42.0037	42.4747	48.5794	52.0822	56.4071 (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	106.4617	106.4617	106.4617	106.4617	106.4617	106.4617	106.4617	106.4617	106.4617	106.4617	106.4617	106.4617	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	17.1267	15.2118	12.3710	9.3657	7.0010	5.9105	6.3865	8.3014	11.1421	14.1475	16.5122	17.6027	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	186.3082	188.2415	183.3697	172.9981	159.9058	147.6010	139.3806	137.4473	142.3191	152.6907	165.7829	178.0878	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.6462	33.6462	33.6462	33.6462	33.6462	33.6462	33.6462	33.6462	33.6462	33.6462	33.6462	33.6462	(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)	-85.1694	-85.1694	-85.1694	-85.1694	-85.1694	-85.1694	-85.1694	-85.1694	-85.1694	-85.1694	-85.1694	-85.1694	(71)
Water heating gains (Table 5)	77.7660	75.2272	70.5803	64.4716	60.3019	54.6678	50.3724	56.4565	58.9926	65.2949	72.3364	75.8160	(72)
Total internal gains	339.1394	336.6190	324.2596	304.7739	285.1473	266.1177	254.0779	260.1437	270.3923	290.0716	312.5701	329.4451	(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					1.2600	10.6334	0.6300	0.7000			0.7700	4.0946
South					9.8700	46.7521	0.6300	0.7000			0.7700	141.0229 (78)
Solar gains	145.1176	238.7843	307.4978	353.8690	375.2681	364.2565	354.5631	339.2180	323.3147	258.4259	172.2115	125.2703 (83)
Total gains	484.2570	575.4033	631.7573	658.6428	660.4154	630.3743	608.6410	599.3617	593.7070	548.4975	484.7816	454.7153 (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	53.5102	53.6397	53.7672	54.3742	54.4892	55.0315	55.0315	55.1331	54.8214	54.4892	54.2569	54.0161	
alpha	4.5673	4.5760	4.5845	4.6249	4.6326	4.6688	4.6688	4.6755	4.6548	4.6326	4.6171	4.6011	
util living area	0.9951	0.9887	0.9761	0.9471	0.8814	0.7439	0.5737	0.6027	0.8071	0.9523	0.9897	0.9963	(86)
MIT	19.6919	19.8888	20.1488	20.4572	20.7290	20.9167	20.9805	20.9752	20.8701	20.5163	20.0409	19.6554	(87)
Th 2	19.8426	19.8450	19.8474	19.8588	19.8609	19.8708	19.8708	19.8726	19.8670	19.8609	19.8566	19.8521	(88)
util rest of house	0.9935	0.9850	0.9678	0.9274	0.8343	0.6469	0.4378	0.4692	0.7238	0.9304	0.9856	0.9951	(89)
MIT 2	18.1262	18.4135	18.7896	19.2329	19.5953	19.8148	19.8638	19.8628	19.7682	19.3231	18.6445	18.0797	(90)
Living area fraction									fLA = Living area / (4) =			0.2656	(91)
MIT	18.5421	18.8054	19.1506	19.5581	19.8965	20.1075	20.1604	20.1583	20.0609	19.6400	19.0154	18.4983	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.5421	18.8054	19.1506	19.5581	19.8965	20.1075	20.1604	20.1583	20.0609	19.6400	19.0154	18.4983	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9907	0.9803	0.9612	0.9209	0.8360	0.6692	0.4742	0.5048	0.7400	0.9249	0.9813	0.9929	(94)
Ext temp.	479.7776	564.0764	607.2365	606.5243	552.1362	421.8252	288.6384	302.5671	439.3190	507.3201	475.7100	451.4737	(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	1208.6110	1177.1911	1068.4255	890.0973	683.0702	454.4575	293.7905	309.5459	493.7562	753.3697	997.2467	1202.0152	(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 per m2	542.2520	412.0131	343.1246	204.1726	97.4149	0.0000	0.0000	0.0000	0.0000	183.0609	375.5064	558.4029	(98)
												2715.9474	(98)
												41.5346	(99)

8c. Space cooling requirement

Not applicable

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)
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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													2907.8666 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	542.2520	412.0131	343.1246	204.1726	97.4149	0.0000	0.0000	0.0000	0.0000	183.0609	375.5064	558.4029	(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)	580.5696	441.1275	367.3711	218.6002	104.2986	0.0000	0.0000	0.0000	0.0000	195.9967	402.0411	597.8617	(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	185.7987	162.3000	168.8626	149.7727	145.0064	127.7135	122.3593	136.4019	137.9083	157.0361	167.6329	181.4355	(64)
Efficiency of water heater	87.5885	87.2970	86.7992	85.8317	84.0746	80.3000	80.3000	80.3000	80.3000	85.4380	87.0218	87.6950	(216)
Fuel for water heating, kWh/month	212.1268	185.9169	194.5439	174.4956	172.4734	159.0455	152.3777	169.8654	171.7414	183.8012	192.6332	206.8938	(219)
Water heating fuel used												2175.9147	(219)
Annual totals kWh/year													
Space heating fuel - main system												2907.8666	(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)												302.4626	(232)
Total delivered energy for all uses												5461.2439	(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	2907.8666	0.2160	628.0992 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2175.9147	0.2160	469.9976 (264)
Space and water heating			1098.0968 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	302.4626	0.5190	156.9781 (268)
Total CO2, kg/m2/year			1293.9999 (272)
Emissions per m2 for space and water heating			16.7930 (272a)
Fuel factor (mains gas)			1.0000
Emissions per m2 for lighting			2.4006 (272b)
Emissions per m2 for pumps and fans			0.5953 (272c)
Target Carbon Dioxide Emission Rate (TER) = (16.7930 * 1.00) + 2.4006 + 0.5953, rounded to 2 d.p.			19.7900 (273)