

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

Property Reference	Unit 1C Eldon Terrace				Issued on Date	12/07/2021
Assessment Reference	001	Prop Type Ref	SF Flat			
Property						
SAP Rating	86 B	DER	14.24	TER	17.78	
Environmental	90 B	% DER<TER	19.90			
CO ₂ Emissions (t/year)	0.85	DFEE	34.19	TFEE	42.55	
General Requirements Compliance	Pass	% DFEE<TFEE	19.64			
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

Top-floor flat, total floor area 75 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) 17.78 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 14.24 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)42.5 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)34.2 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	1.11 (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 South: 2.00 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
Exposed floor U-value 0.12 W/m²K
Door U-value 0.85 W/m²K
Thermal bridging y-value 0.030 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	7.6800 (1b)	x 2.5000 (2b)	= 19.2000 (1b) - (3b)
First floor	67.3700 (1c)	x 2.6000 (2c)	= 175.1620 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	75.0500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 194.3620 (5)

2. Ventilation rate

					main heating	secondary heating	other		total	m3 per hour		
Number of chimneys					0	+	0	+	0	=	0 * 40 =	0.0000 (6a)
Number of open flues					0	+	0	+	0	=	0 * 20 =	0.0000 (6b)
Number of intermittent fans											0 * 10 =	0.0000 (7a)
Number of passive vents											0 * 10 =	0.0000 (7b)
Number of flueless gas fires											0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =											0.0000 / (5) =	0.0000 (8)
Pressure test											Yes	
Measured/design AP50												4.0000
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)
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate												
	0.2359	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												
If mechanical ventilation:												0.5000 (23a)
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (25)

3. Heat losses and heat loss parameter

Element	Gross 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)			2.0000	1.1450	2.2901		(27)
Roof Lights (Uw = 1.40)			1.2800	1.3258	1.6970		(27a)
Heat Loss Floor 1			7.6800	0.1161	0.8916		(28b)
External Wall 1	50.9500	2.1000	48.8500	0.1800	8.7930		(29a)
Dormer Cheeks	2.0000	2.0000	0.0000	0.1300	0.0000		(29a)
External Roof 1	34.3100	1.2800	33.0300	0.1300	4.2939		(30)
Dormer Roof	0.6000		0.6000	0.1700	0.1020		(30)
Flat Roof	43.4500		43.4500	0.1300	5.6485		(30)
Total net area of external elements Aum(A, m ²)			138.9900				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		25.5011		(33)
Party Wall 1			23.8000	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)							4.1410 (36)
Total fabric heat loss						(33) + (36) =	29.6421 (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	32.0697	32.0697	32.0697	32.0697	32.0697	32.0697	32.0697	32.0697	32.0697	32.0697	32.0697	32.0697 (38)
Heat transfer coeff	61.7118	61.7118	61.7118	61.7118	61.7118	61.7118	61.7118	61.7118	61.7118	61.7118	61.7118	61.7118 (39)
Average = Sum(39)m / 12 =												61.7118 (39)
HLP	0.8223	0.8223	0.8223	0.8223	0.8223	0.8223	0.8223	0.8223	0.8223	0.8223	0.8223	0.8223 (40)
HLP (average)												0.8223 (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												2.3622 (42)
Average daily hot water use (litres/day)												90.3033 (43)
Daily hot water use	Jan 99.3336	Feb 95.7215	Mar 92.1093	Apr 88.4972	May 84.8851	Jun 81.2729	Jul 81.2729	Aug 84.8851	Sep 88.4972	Oct 92.1093	Nov 95.7215	Dec 99.3336 (44)

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CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Energy content (annual)	147.3088	128.8373	132.9485	115.9077	111.2162	95.9711	88.9314	102.0501	103.2689	120.3499	131.3713	142.6607 (45)
Distribution loss (46)m = 0.15 x (45)m	22.0963	19.3256	19.9423	17.3862	16.6824	14.3957	13.3397	15.3075	15.4903	18.0525	19.7057	21.3991 (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	176.8016	155.4759	162.4413	144.4491	140.7090	124.5125	118.4242	131.5428	131.8103	149.8427	159.9127	172.1535 (62)
WWHRS	-36.4025	-32.0277	-32.6894	-26.9088	-24.9921	-20.6220	-17.4616	-21.1391	-21.7519	-26.8804	-31.1246	-35.1818 eq. (G10)
Total of WWHRS savings												-327.1822
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	-20.8108	-17.6458	-16.9973	-12.9700	-9.4554	-6.4526	-6.2076	-6.8873	-6.8967	-12.7154	-17.2473	-20.8905 eq. (G5)
Output from w/h	119.5882	105.8024	112.7545	104.5703	106.2615	97.4379	94.7550	103.5164	103.1616	110.2468	111.5408	116.0811 (64)
Heat gains from water heating, kWh/month	56.3534	49.4980	51.5786	45.6747	44.3526	39.0458	36.9429	41.3048	41.4722	47.3895	50.8163	54.8079 (65)
Total per year (kWh/year) = Sum(64)m = 1285.7166 (64)												

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

Metabolic gains (Table 5), Watts												
(66)m	118.1121	118.1121	118.1121	118.1121	118.1121	118.1121	118.1121	118.1121	118.1121	118.1121	118.1121	118.1121 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	24.3738	21.6486	17.6058	13.3287	9.9634	8.4115	9.0889	11.8141	15.8569	20.1340	23.4993	25.0512 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	208.7858	210.9523	205.4927	193.8698	179.1980	165.4086	156.1964	154.0299	159.4895	171.1124	185.7842	199.5736 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.8112	34.8112	34.8112	34.8112	34.8112	34.8112	34.8112	34.8112	34.8112	34.8112	34.8112	34.8112 (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)	-94.4897	-94.4897	-94.4897	-94.4897	-94.4897	-94.4897	-94.4897	-94.4897	-94.4897	-94.4897	-94.4897	-94.4897 (71)
Water heating gains (Table 5)	75.7438	73.6578	69.3260	63.4370	59.6137	54.2302	49.6544	55.5173	57.6003	63.6956	70.5782	73.6665 (72)
Total internal gains	370.3370	367.6924	353.8582	332.0693	310.2088	289.4840	276.3734	282.7949	294.3804	316.3756	341.2954	359.7250 (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
South				2.0000	46.7521	0.6300	0.0000			0.7700			45.3589 (78)
North				1.2800	16.1759	0.6300	0.7000			1.0000			8.2179 (82)

Solar gains	53.5767	89.8496	122.9267	158.4048	187.4092	191.6256	182.3418	159.0705	134.5445	98.9392	63.8249	46.1245	(83)
Total gains	423.9138	457.5420	476.7849	490.4741	497.6179	481.1095	458.7152	441.8654	428.9249	415.3148	405.1203	405.8495	(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	84.4539	84.4539	84.4539	84.4539	84.4539	84.4539	84.4539	84.4539	84.4539	84.4539	84.4539	84.4539
Feb	6.6303	6.6303	6.6303	6.6303	6.6303	6.6303	6.6303	6.6303	6.6303	6.6303	6.6303	6.6303
Mar	0.9984	0.9968	0.9928	0.9780	0.9222	0.7699	0.5843	0.6298	0.8658	0.9796	0.9963	0.9988 (86)
Apr	20.3527	20.4225	20.5382	20.6924	20.8441	20.9344	20.9555	20.9534	20.9046	20.7244	20.5056	20.3287 (87)
May	20.2341	20.2341	20.2341	20.2341	20.2341	20.2341	20.2341	20.2341	20.2341	20.2341	20.2341	20.2341 (88)
Jun	0.9978	0.9958	0.9902	0.9696	0.8922	0.6973	0.4867	0.5315	0.8089	0.9701	0.9949	0.9984 (89)
Jul	19.3548	19.4566	19.6251	19.8466	20.0531	20.1561	20.1725	20.1713	20.1277	19.8938	19.5783	19.3198 (90)
Aug	19.7138	19.8041	19.9536	20.1509	20.3377	20.4361	20.4542	20.4527	20.4072	20.1926	19.9119	19.6827 (92)
Sep	19.5638	19.6541	19.8036	20.0009	20.1877	20.2861	20.3042	20.3027	20.2572	20.0426	19.7619	19.5327 (93)
Oct												
Nov												
Dec												
Living area fraction												
Temperature adjustment												
adjusted MIT												

8. Space heating requirement

Utilisation	0.9972	0.9948	0.9884	0.9664	0.8901	0.7026	0.4958	0.5406	0.8108	0.9671	0.9938	0.9979 (94)
Useful gains	422.7401	455.1539	471.2529	473.9848	442.9361	338.0227	227.4521	238.8625	347.7883	401.6513	402.5991	405.0017 (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	941.9577	910.5025	820.9898	685.0561	523.7892	350.8986	228.5899	240.8417	379.9726	582.7207	781.3888	946.2115 (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	386.2978	305.9942	260.2043	151.9713	60.1547	0.0000	0.0000	0.0000	0.0000	134.7156	272.7286	402.6601 (98)
Space heating												1974.7267 (98)
Space heating per m2												(98) / (4) = 26.3121 (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													2177.2070 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	386.2978	305.9942	260.2043	151.9713	60.1547	0.0000	0.0000	0.0000	0.0000	134.7156	272.7286	402.6601	(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)	425.9072	337.3696	286.8845	167.5539	66.3228	0.0000	0.0000	0.0000	0.0000	148.5288	300.6931	443.9472	(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	119.5882	105.8024	112.7545	104.5703	106.2615	97.4379	94.7550	103.5164	103.1616	110.2468	111.5408	116.0811	(64)
Efficiency of water heater (217)m	89.7972	89.7196	89.5486	89.1545	88.3021	87.0000	87.0000	87.0000	87.0000	88.9966	89.5940	87.0000	(216)
Fuel for water heating, kWh/month	133.1759	117.9256	125.9143	117.2911	120.3386	111.9976	108.9137	118.9844	118.5766	123.8776	124.4959	129.2016	(219)
Water heating fuel used													1450.6928 (219)
Annual totals kWh/year													
Space heating fuel - main system													2177.2070 (211)
Space heating fuel - secondary													0.0000 (215)
Electricity for pumps and fans:													
(MEVDecentralised, Database: total watage = 5.3360, total flow = 29.0000, SFP = 0.1840)													
mechanical ventilation fans (SFP = 0.1840)													43.6304 (230a)
central heating pump													30.0000 (230c)
main heating flue fan													45.0000 (230e)
Total electricity for the above, kWh/year													118.6304 (231)
Electricity for lighting (calculated in Appendix L)													430.4489 (232)
Total delivered energy for all uses													4176.9791 (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	2177.2070	0.2160	470.2767 (261)	
Space heating - secondary	0.0000	0.0000	0.0000 (263)	
Water heating (other fuel)	1450.6928	0.2160	313.3497 (264)	
Space and water heating			783.6264 (265)	
Pumps and fans	118.6304	0.5190	61.5692 (267)	
Energy for lighting	430.4489	0.5190	223.4030 (268)	
Total CO2, kg/year			1068.5985 (272)	
Dwelling Carbon Dioxide Emission Rate (DER)			14.2400 (273)	

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

DER			14.2400 ZC1
Total Floor Area		TFA	75.0500
Assumed number of occupants		N	2.3622
CO2 emission factor in Table 12 for electricity displaced from grid		EF	0.5190
CO2 emissions from appliances, equation (L14)			16.4853 ZC2
CO2 emissions from cooking, equation (L16)			2.3410 ZC3
Total CO2 emissions			33.0663 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			33.0663 ZC8

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CALCULATION OF TARGET EMISSIONS 09 Jan 2014

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CALCULATION OF TARGET EMISSIONS 09 Jan 2014

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	7.6800 (1b)	x 2.5000 (2b)	= 19.2000 (1b) - (3b)
First floor	67.3700 (1c)	x 2.6000 (2c)	= 175.1620 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	75.0500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 194.3620 (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) = 0.1544 (8)
Pressure test					Yes
Measured/design AP50					5.0000
Infiltration rate					0.4044 (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) =		0.3740 (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	0.4769	0.4675	0.4582	0.4114	0.4021	0.3553	0.3553	0.3460	0.3740	0.4021	0.4208	0.4395 (22b)
Effective ac	0.6137	0.6093	0.6050	0.5846	0.5808	0.5631	0.5631	0.5598	0.5699	0.5808	0.5885	0.5966 (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)			2.0000	1.3258	2.6515		(27)
TER Room Window (Uw = 1.70)			1.2800	1.5918	2.0375		(27a)
Heat Loss Floor 1			7.6800	0.1300	0.9984		(28b)
External Wall 1	50.9500	2.1000	48.8500	0.1800	8.7930		(29a)
Dormer Cheeks	2.0000	2.0000	0.0000	0.1800	0.0000		(29a)
External Roof 1	34.3100	1.2800	33.0300	0.1300	4.2939		(30)
Dormer Roof	0.6000		0.6000	0.1300	0.0780		(30)
Flat Roof	43.4500		43.4500	0.1300	5.6485		(30)
Total net area of external elements Aum(A, m ²)			138.9900				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		26.6008		(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)							3.0550 (36)
Total fabric heat loss						(33) + (36) =	29.6558 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	39.3629	39.0797	38.8021	37.4983	37.2543	36.1187	36.1187	35.9084	36.5561	37.2543	37.7478	38.2637 (38)
Heat transfer coeff	69.0187	68.7355	68.4579	67.1540	66.9101	65.7745	65.7745	65.5642	66.2119	66.9101	67.4036	67.9195 (39)
Average = Sum(39)m / 12 =												67.1529 (39)
HLP	0.9196	0.9159	0.9122	0.8948	0.8915	0.8764	0.8764	0.8736	0.8822	0.8915	0.8981	0.9050 (40)
HLP (average)												0.8948 (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												2.3622 (42)
Average daily hot water use (litres/day)												90.3033 (43)
Daily hot water use	99.3336	95.7215	92.1093	88.4972	84.8851	81.2729	81.2729	84.8851	88.4972	92.1093	95.7215	99.3336 (44)
Energy conte	147.3088	128.8373	132.9485	115.9077	111.2162	95.9711	88.9314	102.0501	103.2689	120.3499	131.3713	142.6607 (45)
Energy content (annual)										Total = Sum(45)m =		1420.8219 (45)
Distribution loss (46)m = 0.15 x (45)m	22.0963	19.3256	19.9423	17.3862	16.6824	14.3957	13.3397	15.3075	15.4903	18.0525	19.7057	21.3991 (46)

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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	50.6193	44.0581	46.9379	43.6425	43.2565	40.0798	41.4158	43.2565	43.6425	46.9379	47.2051	50.6193	(61)
Total heat required for water heating calculated for each month	197.9281	172.8953	179.8864	159.5502	154.4727	136.0509	130.3472	145.3066	146.9113	167.2878	178.5764	193.2801	(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	197.9281	172.8953	179.8864	159.5502	154.4727	136.0509	130.3472	145.3066	146.9113	167.2878	178.5764	193.2801	(64)
Heat gains from water heating, kWh/month	61.6350	53.8529	55.9399	49.4499	47.7935	41.9304	39.9236	44.7458	45.2475	51.7508	55.4822	60.0895	(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	118.1121	118.1121	118.1121	118.1121	118.1121	118.1121	118.1121	118.1121	118.1121	118.1121	118.1121	118.1121	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	24.3738	21.6486	17.6058	13.3287	9.9634	8.4115	9.0889	11.8141	15.8569	20.1340	23.4993	25.0512	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	208.7858	210.9523	205.4927	193.8698	179.1980	165.4086	156.1964	154.0299	159.4895	171.1124	185.7842	199.5736	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.8112	34.8112	34.8112	34.8112	34.8112	34.8112	34.8112	34.8112	34.8112	34.8112	34.8112	34.8112	(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)	-94.4897	-94.4897	-94.4897	-94.4897	-94.4897	-94.4897	-94.4897	-94.4897	-94.4897	-94.4897	-94.4897	-94.4897	(71)
Water heating gains (Table 5)	82.8428	80.1383	75.1880	68.6805	64.2386	58.2366	53.6608	60.1422	62.8438	69.5575	77.0587	80.7655	(72)
Total internal gains	377.4360	374.1728	359.7202	337.3127	314.8337	293.4904	280.3798	287.4198	299.6238	322.2376	347.7758	366.8240	(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	
South					2.0000	46.7521	0.6300	0.7000	0.7700		28.5761	
North					1.2800	16.1759	0.6300	0.7000	1.0000		8.2179 (78)	

Solar gains	36.7939	62.3637	87.9146	118.8335	146.1734	151.9418	143.5683	121.4161	97.9702	69.2931	43.9316	31.6227 (83)
Total gains	414.2299	436.5366	447.6347	456.1462	461.0071	445.4322	423.9481	408.8359	397.5940	391.5307	391.7074	398.4466 (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	75.5130	75.8241	76.1316	77.6097	77.8927	79.2375	79.2375	79.4917	78.7141	77.8927	77.3224	76.7350		
alpha	6.0342	6.0549	6.0754	6.1740	6.1928	6.2825	6.2825	6.2994	6.2476	6.1928	6.1548	6.1157		
util living area	0.9987	0.9978	0.9956	0.9874	0.9543	0.8371	0.6617	0.7058	0.9142	0.9874	0.9973	0.9990	(86)	
MIT	20.0348	20.1229	20.2846	20.5247	20.7606	20.9367	20.9883	20.9828	20.8772	20.5939	20.2835	20.0268	(87)	
Th 2	20.1508	20.1540	20.1572	20.1719	20.1747	20.1876	20.1876	20.1900	20.1826	20.1747	20.1691	20.1633	(88)	
util rest of house	0.9982	0.9971	0.9940	0.9821	0.9330	0.7679	0.5503	0.5972	0.8675	0.9810	0.9962	0.9986	(89)	
MIT 2	18.8490	18.9800	19.2185	19.5780	19.9113	20.1384	20.1824	20.1816	20.0712	19.6813	19.2265	18.8466	(90)	
Living area fraction	19.2756	19.3912	19.6020	19.9186	20.2169	20.4256	20.4724	20.4698	20.3612	20.0096	19.6068	19.2712	(92)	
Temperature adjustment	19.2756	19.3912	19.6020	19.9186	20.2169	20.4256	20.4724	20.4698	20.3612	20.0096	19.6068	19.2712	(93)	
adjusted MIT	19.2756	19.3912	19.6020	19.9186	20.2169	20.4256	20.4724	20.4698	20.3612	20.0096	19.6068	19.2712	(93)	

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	413.2315	434.8709	444.3227	447.0362	430.7192	351.9438	250.4576	260.2380	349.6295	383.4521	389.8252	397.6868	(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	1033.5949	996.0578	896.9350	739.9433	569.8634	383.1761	254.7018	266.8356	414.5627	629.5959	843.0025	1023.6266	(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	461.5504	377.1176	336.7436	210.8931	103.5233	0.0000	0.0000	0.0000	0.0000	183.1310	326.2876	465.6992	(98)
Space heating												2464.9457	(98)
Space heating per m2												32.8440	(99)

8c. Space cooling requirement

Not applicable

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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													2639.1282 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	461.5504	377.1176	336.7436	210.8931	103.5233	0.0000	0.0000	0.0000	0.0000	183.1310	326.2876	465.6992	(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)	494.1653	403.7661	360.5392	225.7956	110.8387	0.0000	0.0000	0.0000	0.0000	196.0717	349.3444	498.6073	(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	197.9281	172.8953	179.8864	159.5502	154.4727	136.0509	130.3472	145.3066	146.9113	167.2878	178.5764	193.2801	(64)
Efficiency of water heater (217)m	87.1116	86.9617	86.6070	85.7544	84.0689	80.3000	80.3000	80.3000	80.3000	85.2793	86.5495	87.1837	(217)
Fuel for water heating, kWh/month	227.2122	198.8178	207.7041	186.0547	183.7454	169.4283	162.3252	180.9546	182.9531	196.1645	206.3287	221.6929	(219)
Water heating fuel used												2323.3817	(219)
Annual totals kWh/year													
Space heating fuel - main system												2639.1282	(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)												430.4489	(232)
Total delivered energy for all uses												5467.9587	(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	2639.1282	0.2160	570.0517 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2323.3817	0.2160	501.8504 (264)
Space and water heating			1071.9021 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	430.4489	0.5190	223.4030 (268)
Total CO2, kg/m2/year			1334.2301 (272)
Emissions per m2 for space and water heating			14.2825 (272a)
Fuel factor (mains gas)			1.0000
Emissions per m2 for lighting			2.9767 (272b)
Emissions per m2 for pumps and fans			0.5187 (272c)
Target Carbon Dioxide Emission Rate (TER) = (14.2825 * 1.00) + 2.9767 + 0.5187, rounded to 2 d.p.			17.7800 (273)