

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

Property Reference	Gosbrook Unit 3			Issued on Date	16/09/2025
Assessment Reference	Gosbrook Unit 3	Prop Type Ref			
Property	Flat 3, 2 Send Road, Caversham, Reading, RG4 8GZ				
SAP Rating	89 B	DER	12.31	TER	19.90
Environmental	93 A	% DER<TER	38.16		
CO ₂ Emissions (t/year)	0.44	DFEE	42.67	TFEE	49.24
General Requirements Compliance	Pass	% DFEE<TFEE	13.34		
Assessor Details	Miss Charlotte Rasinsky, Charlotte Rasinsky , Tel: 07591101243, charlotte.rasinsky@brookbanks.com			Assessor ID	ED74-0001
Client					

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

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DWELLING AS BUILT

Mid-floor flat, total floor area 52 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) 19.90 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 12.31 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)49.2 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)42.7 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.18 (max. 0.30)	0.22 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	(no floor)		
Roof	0.11 (max. 0.20)	0.11 (max. 0.35)	OK
Openings	1.40 (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: 4.50 (measured in this dwelling)
Maximum 10.0 OK

4 Heating efficiency

Main heating system: Boiler system with radiators or underfloor - Mains gas
Data from database
Vaillant ecoFIT sustain 830 VUW 306/6-3 (H-GB)
Combi boiler
Efficiency: 89.3% 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: 6.71 m², No overhang
Windows facing West: 2.39 m², No overhang
Air change rate: 4.00 ach
Blinds/curtains: None

10 Key features

Party wall U-value 0.00 W/m²K
Party wall U-value 0.00 W/m²K
Roof U-value 0.11 W/m²K
Roof U-value 0.11 W/m²K
Photovoltaic array 1.00 kW

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CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

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

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	52.1600 (1b)	x 2.3900 (2b)	= 124.6624 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	52.1600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 124.6624 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					3 * 10 = 30.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					30.0000 / (5) = 0.2406 (8)
Pressure test					Yes
Measured/design AP50					4.5000
Infiltration rate					0.4656 (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) = 0.4307 (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	0.5492	0.5384	0.5276	0.4738	0.4630	0.4092	0.4092	0.3984	0.4307	0.4630	0.4846	0.5061 (22b)
Effective ac	0.6508	0.6449	0.6392	0.6122	0.6072	0.5837	0.5837	0.5794	0.5928	0.6072	0.6174	0.6281 (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
Window/Door (Uw = 1.40)			9.1000	1.3258	12.0644		(27)
Front Door			2.1100	1.4000	2.9540		(26)
External Wall 1	49.2900	9.1000	40.1900	0.1600	6.4304	60.0000	2411.4000 (29a)
Stairwell	17.4900	2.1100	15.3800	0.2236	3.4396	60.0000	922.8000 (29a)
External Roof 1	8.1800		8.1800	0.1100	0.8998	9.0000	73.6200 (30)
External Roof 2	1.1200		1.1200	0.1100	0.1232	9.0000	10.0800 (30)
Total net area of external elements Aum(A, m ²)			76.0800				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	25.9114			(33)
Party Wall 1			8.7800	0.0000	0.0000	45.0000	395.1000 (32)
Party Wall 2			4.7500	0.0000	0.0000	45.0000	213.7500 (32)
Party Floor 1			52.1600			70.0000	3651.2000 (32d)
Party Ceilings 1			45.2500			70.0000	3167.5000 (32b)
Internal Wall 1			55.7600			9.0000	501.8400 (32c)
Internal Wall 2			16.6400			75.0000	1248.0000 (32c)

Heat capacity Cm = Sum(A x k)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K
Thermal bridges (Sum(L x Psi) calculated using Appendix K)
Total fabric heat loss

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	26.7729	26.5320	26.2959	25.1868	24.9793	24.0133	24.0133	23.8345	24.3854	24.9793	25.3991	25.8379 (38)
Heat transfer coeff	58.3534	58.1125	57.8764	56.7673	56.5598	55.5939	55.5939	55.4150	55.9660	56.5598	56.9796	57.4185 (39)
Average = Sum(39)m / 12 =												56.7663 (39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1187	1.1141	1.1096	1.0883	1.0844	1.0658	1.0658	1.0624	1.0730	1.0844	1.0924	1.1008 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy
Average daily hot water use (litres/day)

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	83.4378	80.4037	77.3696	74.3355	71.3014	68.2673	68.2673	71.3014	74.3355	77.3696	80.4037	83.4378 (44)
	123.7358	108.2201	111.6735	97.3597	93.4189	80.6134	74.7002	85.7196	86.7433	101.0910	110.3487	119.8315 (45)

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CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Energy content (annual)	Total = Sum (45)m = 1193.4558 (45)											
Distribution loss (46)m = 0.15 x (45)m												
18.5604	16.2330	16.7510	14.6039	14.0128	12.0920	11.2050	12.8579	13.0115	15.1636	16.5523	17.9747	(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	1.1873	1.0006	0.9936	0.8323	0.7660	0.6329	0.5865	0.7029	0.7415	0.8995	1.0203	1.1498 (61)
Total heat required for water heating calculated for each month												
124.9231	109.2208	112.6671	98.1920	94.1849	81.2463	75.2866	86.4224	87.4848	101.9904	111.3690	120.9814	(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	(63)
Solar input (sum of months) = Sum (63)m =	0.0000 (63)											
Output from w/h												
124.9231	109.2208	112.6671	98.1920	94.1849	81.2463	75.2866	86.4224	87.4848	101.9904	111.3690	120.9814	(64)
Heat gains from water heating, kWh/month												
41.4390	36.2334	37.3798	32.5802	31.2533	26.9622	24.9844	28.6775	29.0275	33.8376	36.9460	40.1314	(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	87.6896	87.6896	87.6896	87.6896	87.6896	87.6896	87.6896	87.6896	87.6896	87.6896	87.6896	87.6896	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	13.7263	12.1916	9.9149	7.5062	5.6110	4.7370	5.1185	6.6532	8.9299	11.3386	13.2338	14.1078	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	152.8409	154.4269	150.4302	141.9217	131.1813	121.0868	114.3430	112.7570	116.7537	125.2622	136.0026	146.0971	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.7690	31.7690	31.7690	31.7690	31.7690	31.7690	31.7690	31.7690	31.7690	31.7690	31.7690	31.7690	(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)	-70.1516	-70.1516	-70.1516	-70.1516	-70.1516	-70.1516	-70.1516	-70.1516	-70.1516	-70.1516	-70.1516	-70.1516	(71)
Water heating gains (Table 5)	55.6976	53.9187	50.2417	45.2502	42.0071	37.4475	33.5812	38.5450	40.3160	45.4807	51.3139	53.9401	(72)
Total internal gains	274.5716	272.8440	262.8937	246.9850	231.1062	215.5781	205.3496	210.2621	218.3066	234.3884	252.8573	266.4519	(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				6.7100	10.6334	0.5400		0.8000		0.7700		21.3605 (74)	
West				2.3900	19.6403	0.5400		0.8000		0.7700		14.0528 (80)	
Solar gains	35.4133	68.3112	114.6373	177.4449	231.0087	243.5105	228.8734	186.7562	136.0528	81.2115	43.8731	29.3635	(83)
Total gains	309.9849	341.1553	377.5310	424.4299	462.1149	459.0886	434.2230	397.0183	354.3593	315.5999	296.7304	295.8154	(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	59.9569	60.2055	60.4511	61.6321	61.8582	62.9330	62.9330	63.1362	62.5146	61.8582	61.4025	60.9332	
alpha	4.9971	5.0137	5.0301	5.1088	5.1239	5.1955	5.1955	5.2091	5.1676	5.1239	5.0935	5.0622	
util living area	0.9978	0.9960	0.9900	0.9655	0.8857	0.7166	0.5505	0.6176	0.8716	0.9805	0.9958	0.9983	(86)
MIT	20.0171	20.1134	20.2952	20.5578	20.7831	20.9099	20.9399	20.9342	20.8386	20.5553	20.2501	20.0088	(87)
Th 2	19.9856	19.9893	19.9930	20.0104	20.0136	20.0288	20.0288	20.0317	20.0230	20.0136	20.0070	20.0002	(88)
util rest of house	0.9970	0.9946	0.9865	0.9525	0.8439	0.6299	0.4356	0.4995	0.8087	0.9709	0.9941	0.9977	(89)
MIT 2	18.6665	18.8100	19.0773	19.4669	19.7709	19.9262	19.9492	19.9493	19.8534	19.4709	19.0239	18.6659	(90)
Living area fraction	fLA = Living area / (4) = 0.4335 (91)												
MIT	19.2519	19.3750	19.6052	19.9398	20.2096	20.3526	20.3786	20.3762	20.2804	19.9410	19.5554	19.2480	(92)
Temperature adjustment	0.0000												
adjusted MIT	19.2519	19.3750	19.6052	19.9398	20.2096	20.3526	20.3786	20.3762	20.2804	19.9410	19.5554	19.2480	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9963	0.9935	0.9847	0.9514	0.8532	0.6605	0.4780	0.5432	0.8276	0.9700	0.9931	0.9971	(94)
Useful gains	308.8479	338.9476	371.7724	403.8172	394.2942	303.2121	207.5477	215.6556	293.2563	306.1280	294.6869	294.9581	(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	872.4961	841.1761	758.4831	626.7008	481.3040	319.8101	210.0691	220.3416	345.8947	528.3231	709.7063	864.0347	(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	419.3543	337.4975	287.7128	160.4762	64.7353	0.0000	0.0000	0.0000	0.0000	165.3132	298.8139	423.3930	(98)
Space heating	2157.2962												(98)
Space heating per m2	(98) / (4) =												41.3592 (99)

8c. Space cooling requirement

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CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 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 %)													90.2000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													2391.6810 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	419.3543	337.4975	287.7128	160.4762	64.7353	0.0000	0.0000	0.0000	0.0000	165.3132	298.8139	423.3930	(98)
Space heating efficiency (main heating system 1)	90.2000	90.2000	90.2000	90.2000	90.2000	0.0000	0.0000	0.0000	0.0000	90.2000	90.2000	90.2000	(210)
Space heating fuel (main heating system)	464.9161	374.1658	318.9720	177.9116	71.7686	0.0000	0.0000	0.0000	0.0000	183.2741	331.2793	469.3936	(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	124.9231	109.2208	112.6671	98.1920	94.1849	81.2463	75.2866	86.4224	87.4848	101.9904	111.3690	120.9814	(64)
Efficiency of water heater (217)m	86.5502	86.3224	85.7658	84.3193	81.3428	76.2000	76.2000	76.2000	76.2000	84.2911	85.9143	76.2000	(216)
Fuel for water heating, kWh/month	144.3360	126.5267	131.3660	116.4526	115.7876	106.6224	98.8014	113.4153	114.8095	120.9979	129.6281	139.6022	(219)
Water heating fuel used												1458.3456	(219)
Annual totals kWh/year													
Space heating fuel - main system												2391.6810	(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)													242.4107 (232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV Unit 0 (0.80 * 0.50 * 853 * 1.00) =										-341.2120			-682.4239
PV Unit 1 (0.80 * 0.50 * 853 * 1.00) =										-341.2120			-682.4239 (233)
Total delivered energy for all uses													3485.0133 (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	2391.6810	0.2160	516.6031	(261)
Space heating - secondary	0.0000	0.0000	0.0000	(263)
Water heating (other fuel)	1458.3456	0.2160	315.0026	(264)
Space and water heating			831.6057	(265)
Pumps and fans	75.0000	0.5190	38.9250	(267)
Energy for lighting	242.4107	0.5190	125.8112	(268)
Energy saving/generation technologies				
PV Unit	-682.4239	0.5190	-354.1780	(269)
Total CO2, kg/year			642.1639	(272)
Dwelling Carbon Dioxide Emission Rate (DER)			12.3100	(273)

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

DER			12.3100	ZC1
Total Floor Area		TFA	52.1600	
Assumed number of occupants		N	1.7538	
CO2 emission factor in Table 12 for electricity displaced from grid		EF	0.5190	
CO2 emissions from appliances, equation (L14)			17.3639	ZC2
CO2 emissions from cooking, equation (L16)			3.0884	ZC3
Total CO2 emissions			32.7623	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			32.7623	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	52.1600 (1b)	x 2.3900 (2b)	= 124.6624 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	52.1600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 124.6624 (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) =				Air changes per hour
Pressure test					20.0000 / (5) = 0.1604 (8)
Measured/design AP50					Yes
Infiltration rate					5.0000
Number of sides sheltered					0.4104 (18)
					1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =				0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =				0.3797 (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												
Effective ac	0.4841	0.4746	0.4651	0.4176	0.4081	0.3607	0.3607	0.3512	0.3797	0.4081	0.4271	0.4461 (22b)
Effective ac	0.6172	0.6126	0.6081	0.5872	0.5833	0.5650	0.5650	0.5617	0.5721	0.5833	0.5912	0.5995 (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			2.1100	1.0000	2.1100			(26)					
TER Opening Type (Uw = 1.40)			9.1000	1.3258	12.0644			(27)					
External Wall 1	49.2900	9.1000	40.1900	0.1800	7.2342			(29a)					
Stairwell	17.4900	2.1100	15.3800	0.1800	2.7684			(29a)					
External Roof 1	8.1800		8.1800	0.1300	1.0634			(30)					
External Roof 2	1.1200		1.1200	0.1300	0.1456			(30)					
Total net area of external elements Aum(A, m2)			76.0800					(31)					
Fabric heat loss, W/K = Sum (A x U)								(32)					
			(26)...(30) + (32) =		25.3860			(33)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K								250.0000 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)								5.6826 (36)					
Total fabric heat loss						(33) + (36) =		31.0686 (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	25.3889	25.2017	25.0183	24.1566	23.9954	23.2450	23.2450	23.1060	23.5340	23.9954	24.3216	24.6625	(38)
Heat transfer coeff	56.4575	56.2703	56.0869	55.2252	55.0640	54.3136	54.3136	54.1746	54.6026	55.0640	55.3902	55.7311	(39)
Average = Sum(39)m / 12 =												55.2245	(39)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0824	1.0788	1.0753	1.0588	1.0557	1.0413	1.0413	1.0386	1.0468	1.0557	1.0619	1.0685	(40)
HLP (average)												1.0588	(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												1.7538 (42)
Average daily hot water use (litres/day)												75.8525 (43)
Daily hot water use	83.4378	80.4037	77.3696	74.3355	71.3014	68.2673	68.2673	71.3014	74.3355	77.3696	80.4037	83.4378 (44)
Energy conte	123.7358	108.2201	111.6735	97.3597	93.4189	80.6134	74.7002	85.7196	86.7433	101.0910	110.3487	119.8315 (45)
Energy content (annual)										Total = Sum(45)m =		1193.4558 (45)
Distribution loss (46)m = 0.15 x (45)m												
Water storage loss:	18.5604	16.2330	16.7510	14.6039	14.0128	12.0920	11.2050	12.8579	13.0115	15.1636	16.5523	17.9747 (46)
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												

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Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Total heat required for water heating calculated for each month	42.5190	37.0077	39.4267	36.6586	36.3344	33.6661	34.7883	36.3344	36.6586	39.4267	39.6511	42.5190 (61)
Solar input	166.2548	145.2279	151.1002	134.0183	129.7533	114.2795	109.4884	122.0540	123.4019	140.5177	149.9998	162.3505 (62)
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63)
Heat gains from water heating, kWh/month	166.2548	145.2279	151.1002	134.0183	129.7533	114.2795	109.4884	122.0540	123.4019	140.5177	149.9998	162.3505 (64)
	51.7719	45.2351	46.9881	41.5367	40.1454	35.2205	33.5349	37.5854	38.0068	43.4694	46.6037	50.4737 (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	87.6896	87.6896	87.6896	87.6896	87.6896	87.6896	87.6896	87.6896	87.6896	87.6896	87.6896	87.6896	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	13.9892	12.4251	10.1047	7.6499	5.7184	4.8277	5.2165	6.7807	9.1010	11.5558	13.4873	14.3780	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	152.8409	154.4269	150.4302	141.9217	131.1813	121.0868	114.3430	112.7570	116.7537	125.2622	136.0026	146.0971	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.7690	31.7690	31.7690	31.7690	31.7690	31.7690	31.7690	31.7690	31.7690	31.7690	31.7690	31.7690	(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)	-70.1516	-70.1516	-70.1516	-70.1516	-70.1516	-70.1516	-70.1516	-70.1516	-70.1516	-70.1516	-70.1516	-70.1516	(71)
Water heating gains (Table 5)	69.5859	67.3142	63.1561	57.6899	53.9589	48.9173	45.0738	50.5179	52.7872	58.4266	64.7274	67.8410	(72)
Total internal gains	288.7228	286.4730	275.9979	259.5684	243.1654	227.1387	216.9402	222.3625	230.9488	247.5515	266.5242	280.6230	(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					6.7100	10.6334	0.6300	0.7000	0.7700		21.8055 (74)	
West					2.3900	19.6403	0.6300	0.7000	0.7700		14.3455 (80)	
Solar gains	36.1510	69.7344	117.0256	181.1417	235.8214	248.5836	233.6416	190.6470	138.8872	82.9034	44.7871	29.9752 (83)
Total gains	324.8739	356.2074	393.0235	440.7102	478.9868	475.7223	450.5818	413.0095	369.8360	330.4549	311.3113	310.5983 (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	64.1584	64.3718	64.5824	65.5900	65.7820	66.6909	66.6909	66.8620	66.3379	65.7820	65.3947	64.9946	
alpha	5.2772	5.2915	5.3055	5.3727	5.3855	5.4461	5.4461	5.4575	5.4225	5.3855	5.3596	5.3330	
util living area	0.9976	0.9956	0.9890	0.9609	0.8702	0.6896	0.5224	0.5876	0.8520	0.9774	0.9953	0.9981	(86)
MIT	19.8721	19.9943	20.2250	20.5518	20.8254	20.9641	20.9934	20.9880	20.8869	20.5426	20.1581	19.8554	(87)
Th 2	20.0152	20.0182	20.0211	20.0346	20.0372	20.0491	20.0491	20.0513	20.0445	20.0372	20.0320	20.0267	(88)
util rest of house	0.9968	0.9942	0.9850	0.9462	0.8250	0.6035	0.4137	0.4744	0.7844	0.9663	0.9935	0.9975	(89)
MIT 2	18.5110	18.6914	19.0286	19.5040	19.8656	20.0253	20.0466	20.0462	19.9518	19.4997	18.9411	18.4949	(90)
Living area fraction	19.1010	19.2562	19.5472	19.9582	20.2817	20.4322	20.4570	20.4545	20.3571	19.9518	19.4687	19.0846	(92)
Temperature adjustment	19.1010	19.2562	19.5472	19.9582	20.2817	20.4322	20.4570	20.4545	20.3571	19.9518	19.4687	19.0846	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	323.5130	353.5774	386.1629	416.4090	401.2114	304.3066	207.7442	216.3154	299.1944	318.9160	308.8170	309.5653	(94)
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	835.6244	807.8282	731.7775	610.6912	472.5413	316.7692	209.4870	219.6493	341.6560	514.9457	685.1031	829.5378	(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	381.0109	305.2566	257.1372	139.8831	53.0694	0.0000	0.0000	0.0000	0.0000	145.8461	270.9260	386.8596	(98)
Space heating												1939.9889	(98)
Space heating per m2												37.1930	(99)

8c. Space cooling requirement

Not applicable

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

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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													2077.0759 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	381.0109	305.2566	257.1372	139.8831	53.0694	0.0000	0.0000	0.0000	0.0000	145.8461	270.9260	386.8596	(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)	407.9346	326.8271	275.3075	149.7678	56.8195	0.0000	0.0000	0.0000	0.0000	156.1522	290.0706	414.1965	(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	166.2548	145.2279	151.1002	134.0183	129.7533	114.2795	109.4884	122.0540	123.4019	140.5177	149.9998	162.3505	(64)
Efficiency of water heater	87.0729	86.8772	86.3787	85.1591	82.9915	80.3000	80.3000	80.3000	80.3000	85.1449	86.5219	87.1593	(217)
Fuel for water heating, kWh/month	190.9375	167.1645	174.9276	157.3740	156.3452	142.3157	136.3492	151.9975	153.6761	165.0335	173.3663	186.2687	(219)
Water heating fuel used												1955.7557	(219)
Annual totals kWh/year													
Space heating fuel - main system												2077.0759	(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)												247.0534	(232)
Total delivered energy for all uses												4354.8850	(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	2077.0759	0.2160	448.6484 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1955.7557	0.2160	422.4432 (264)
Space and water heating			871.0916 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	247.0534	0.5190	128.2207 (268)
Total CO2, kg/m2/year			1038.2374 (272)
Emissions per m2 for space and water heating			16.7004 (272a)
Fuel factor (mains gas)			1.0000
Emissions per m2 for lighting			2.4582 (272b)
Emissions per m2 for pumps and fans			0.7463 (272c)
Target Carbon Dioxide Emission Rate (TER) = (16.7004 * 1.00) + 2.4582 + 0.7463, rounded to 2 d.p.			19.9000 (273)