

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

Property Reference	Gosbrook Unit 6			Issued on Date	16/09/2025
Assessment Reference	Gosbrook Unit 6	Prop Type Ref			
Property	Flat 6, 2 Send Road, Caversham, Reading, RG4 8GZ				
SAP Rating	89 B	DER	12.05	TER	21.27
Environmental	93 A	% DER<TER	43.36		
CO ₂ Emissions (t/year)	0.35	DFEE	44.96	TFEE	49.37
General Requirements Compliance	Pass	% DFEE<TFEE	8.92		
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

Top-floor flat, total floor area 41 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) 21.27 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 12.05 kgCO₂/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 49.4 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE) 45.0 kWh/m²/yr OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.26 (max. 0.30)	0.40 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	(no floor)		
Roof	0.11 (max. 0.20)	0.12 (max. 0.35)	OK
Openings	1.33 (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: 4.10 (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): Medium OK
Based on:
Overshading: Average
Windows facing East: 1.83 m², No overhang
Windows facing South: 3.68 m², No overhang
Air change rate: 4.00 ach
Blinds/curtains: None

10 Key features

Party wall U-value 0.00 W/m²K
Roof U-value 0.11 W/m²K
Roof U-value 0.11 W/m²K
Roof U-value 0.12 W/m²K
Roof window U-value 0.82 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	40.6900 (1b)	x 2.2700 (2b)	= 92.3663 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	40.6900		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 92.3663 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					3 * 10 = 30.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					Air changes per hour
Pressure test					30.0000 / (5) = 0.3248 (8)
Measured/design AP50					Yes
Infiltration rate					4.1000
Number of sides sheltered					0.5298 (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) =	0.4901 (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												
	0.6248	0.6126	0.6003	0.5391	0.5268	0.4656	0.4656	0.4533	0.4901	0.5268	0.5513	0.5758 (22b)
Effective ac	0.6952	0.6876	0.6802	0.6453	0.6388	0.6084	0.6084	0.6027	0.6201	0.6388	0.6520	0.6658 (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)			5.5100	1.3258	7.3049		(27)
Front Door			2.1100	1.4000	2.9540		(26)
Rooflight (Uw = 0.82)			1.1100	0.7940	0.8813		(27a)
External Wall 1	11.4900	5.5100	5.9800	0.1600	0.9568	60.0000	358.8000 (29a)
Stairwell	16.2300	2.1100	14.1200	0.2236	3.1578	60.0000	847.2000 (29a)
WT02	8.9300		8.9300	0.4000	3.5720	9.0000	80.3700 (29a)
External Roof 1	29.1900	1.1100	28.0800	0.1100	3.0888	9.0000	252.7200 (30)
External Roof 2	13.7900		13.7900	0.1100	1.5169	9.0000	124.1100 (30)
External Roof 3	5.4900		5.4900	0.1200	0.6588	9.0000	49.4100 (30)
Total net area of external elements Aum(A, m ²)			85.1200				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	24.0913			(33)
Party Wall 1			5.8400	0.0000	0.0000	45.0000	262.8000 (32)
Party Floor 1			40.6900			70.0000	2848.3000 (32d)
Internal Wall 1			62.4000			9.0000	561.6000 (32c)
Internal Wall 2			3.9900			75.0000	299.2500 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	5684.5600 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							139.7041 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							7.8730 (36)
Total fabric heat loss						(33) + (36) =	31.9643 (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	21.1904	20.9594	20.7329	19.6692	19.4702	18.5437	18.5437	18.3721	18.9006	19.4702	19.8728	20.2937 (38)
Heat transfer coeff	53.1547	52.9237	52.6972	51.6335	51.4345	50.5080	50.5080	50.3364	50.8649	51.4345	51.8371	52.2580 (39)
Average = Sum(39)m / 12 =												51.6325 (39)
HLP	1.3063	1.3007	1.2951	1.2689	1.2641	1.2413	1.2413	1.2371	1.2501	1.2641	1.2740	1.2843 (40)
HLP (average)												1.2689 (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												1.4248 (42)
Average daily hot water use (litres/day)												68.0388 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	74.8427	72.1212	69.3996	66.6781	63.9565	61.2350	61.2350	63.9565	66.6781	69.3996	72.1212	74.8427 (44)

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Energy conte	110.9896	97.0722	100.1698	87.3305	83.7957	72.3093	67.0052	76.8895	77.8078	90.6774	98.9815	107.4875 (45)
Energy content (annual)										Total =	Sum (45)m =	1070.5160 (45)
Distribution loss (46)m = 0.15 x (45)m	16.6484	14.5608	15.0255	13.0996	12.5694	10.8464	10.0508	11.5334	11.6712	13.6016	14.8472	16.1231 (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	0.9553	0.8051	0.7995	0.6696	0.6163	0.5092	0.4719	0.5655	0.5966	0.7237	0.8209	0.9251 (61)
Total heat required for water heating calculated for each month	111.9449	97.8773	100.9693	88.0001	84.4120	72.8185	67.4771	77.4550	78.4044	91.4011	99.8025	108.4126 (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	111.9449	97.8773	100.9693	88.0001	84.4120	72.8185	67.4771	77.4550	78.4044	91.4011	99.8025	108.4126 (64)
Heat gains from water heating, kWh/month	37.1429	32.4778	33.5063	29.2048	28.0161	24.1701	22.3972	25.7071	26.0202	30.3312	33.1166	35.9709 (65)
Solar input (sum of months) = Sum (63)m = 0.0000 (63)												
Total per year (kWh/year) = Sum (64)m = 1078.9748 (64)												

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	71.2397	71.2397	71.2397	71.2397	71.2397	71.2397	71.2397	71.2397	71.2397	71.2397	71.2397	71.2397 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	11.1547	9.9075	8.0573	6.0999	4.5598	3.8495	4.1596	5.4068	7.2569	9.2144	10.7545	11.4647 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	123.2726	124.5518	121.3283	114.4659	105.8032	97.6616	92.2225	90.9433	94.1668	101.0293	109.6919	117.8335 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	30.1240	30.1240	30.1240	30.1240	30.1240	30.1240	30.1240	30.1240	30.1240	30.1240	30.1240	30.1240 (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)	-56.9917	-56.9917	-56.9917	-56.9917	-56.9917	-56.9917	-56.9917	-56.9917	-56.9917	-56.9917	-56.9917	-56.9917 (71)
Water heating gains (Table 5)	49.9232	48.3300	45.0354	40.5622	37.6561	33.5696	30.1038	34.5526	36.1392	40.7677	45.9953	48.3480 (72)
Total internal gains	231.7224	230.1613	221.7929	208.4999	195.3910	182.4527	173.8577	178.2745	184.9349	198.3832	213.8135	225.0181 (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			
East				1.8300	19.6403	0.5400	0.8000	0.7700	10.7601 (76)			
South				3.6800	46.7521	0.5400	0.8000	0.7700	51.5069 (78)			
West				1.1100	26.0000	0.4700	0.8000	1.0000	9.7662 (82)			
Solar gains	72.0332	125.6878	178.1780	228.3456	260.6325	260.3415	250.3740	195.7610	140.7524	86.8654	61.2434 (83)	
Total gains	303.7557	355.8490	399.9709	436.8455	456.0235	442.7942	424.2317	404.6791	380.6958	339.1357	300.6790	286.2615 (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	29.7066	29.8363	29.9645	30.5818	30.7001	31.2632	31.2632	31.3698	31.0439	30.7001	30.4617	30.2163
alpha	2.9804	2.9891	2.9976	3.0388	3.0467	3.0842	3.0842	3.0913	3.0696	3.0467	3.0308	3.0144
util living area	0.9727	0.9558	0.9260	0.8673	0.7706	0.6268	0.4873	0.5237	0.7228	0.8915	0.9575	0.9768 (86)
MIT	19.4015	19.6042	19.9044	20.2789	20.5847	20.7943	20.8725	20.8620	20.7163	20.3126	19.7998	19.3779 (87)
Th 2	19.8359	19.8403	19.8447	19.8652	19.8691	19.8871	19.8871	19.8905	19.8802	19.8691	19.8613	19.8532 (88)
util rest of house	0.9673	0.9472	0.9113	0.8400	0.7213	0.5455	0.3779	0.4149	0.6500	0.8633	0.9478	0.9721 (89)
MIT 2	17.7193	18.0139	18.4458	18.9848	19.3954	19.6624	19.7376	19.7333	19.5754	19.0456	18.3145	17.6972 (90)
Living area fraction									fLA = Living area / (4) =			0.4370 (91)
MIT	18.4544	18.7088	19.0832	19.5503	19.9151	20.1570	20.2335	20.2265	20.0740	19.5992	18.9635	18.4316 (92)
Temperature adjustment												0.0000
adjusted MIT	18.4544	18.7088	19.0832	19.5503	19.9151	20.1570	20.2335	20.2265	20.0740	19.5992	18.9635	18.4316 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9589	0.9367	0.8995	0.8312	0.7235	0.5665	0.4135	0.4496	0.6639	0.8553	0.9381	0.9646 (94)
Ext temp.	291.2860	333.3288	359.7701	363.1195	329.9197	250.8542	175.4001	181.9292	252.7349	290.0512	282.0689	276.1388 (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	752.3713	730.8114	663.0984	549.9121	422.5373	280.6724	183.5206	192.6113	303.8643	462.8698	614.9694	743.7159 (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	343.0475	267.1082	225.6763	134.4907	68.9075	0.0000	0.0000	0.0000	0.0000	128.5771	239.6884	347.8774 (98)
Space heating per m2												1755.3731 (98)
										(98) / (4) =		43.1402 (99)

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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 %)												90.2000 (206)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement												1946.0899 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	343.0475	267.1082	225.6763	134.4907	68.9075	0.0000	0.0000	0.0000	0.0000	128.5771	239.6884	347.8774 (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)	380.3187	296.1289	250.1954	149.1028	76.3942	0.0000	0.0000	0.0000	0.0000	142.5466	265.7299	385.6734 (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	111.9449	97.8773	100.9693	88.0001	84.4120	72.8185	67.4771	77.4550	78.4044	91.4011	99.8025	108.4126 (64)
Efficiency of water heater (217)m	86.2990	85.9646	85.3527	84.0894	81.9141	76.2000	76.2000	76.2000	76.2000	83.8026	85.5778	76.2000 (216)
Fuel for water heating, kWh/month	129.7175	113.8578	118.2966	104.6507	103.0494	95.5624	88.5526	101.6469	102.8929	109.0672	116.6219	125.4381 (219)
Water heating fuel used												1309.3539 (219)
Annual totals kWh/year												
Space heating fuel - main system												1946.0899 (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)												196.9956 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV Unit 0 (0.80 * 1.00 * 853 * 1.00) =												-682.4239
Total delivered energy for all uses												-682.4239 (233)
												2845.0154 (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	1946.0899	0.2160	420.3554 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1309.3539	0.2160	282.8204 (264)
Space and water heating			703.1759 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	196.9956	0.5190	102.2407 (268)
Energy saving/generation technologies			
PV Unit	-682.4239	0.5190	-354.1780 (269)
Total CO2, kg/year			490.1635 (272)
Dwelling Carbon Dioxide Emission Rate (DER)			12.0500 (273)

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

DER			12.0500 ZC1
Total Floor Area		TFA	40.6900
Assumed number of occupants		N	1.4248
CO2 emission factor in Table 12 for electricity displaced from grid		EF	0.5190
CO2 emissions from appliances, equation (L14)			17.9525 ZC2
CO2 emissions from cooking, equation (L16)			3.7649 ZC3
Total CO2 emissions			33.7674 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			33.7674 ZC8

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CALCULATION OF TARGET EMISSIONS 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Built) (Version 9.92, January 2014)
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1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	40.6900 (1b)	x 2.2700 (2b)	= 92.3663 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	40.6900		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 92.3663 (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)
Air changes per hour					
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					20.0000 / (5) = 0.2165 (8)
Pressure test					Yes
Measured/design AP50					5.0000
Infiltration rate					0.4665 (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) =		0.4315 (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	0.5502	0.5394	0.5286	0.4747	0.4639	0.4100	0.4100	0.3992	0.4315	0.4639	0.4855	0.5071 (22b)
	0.6514	0.6455	0.6397	0.6127	0.6076	0.5840	0.5840	0.5797	0.5931	0.6076	0.6178	0.6286 (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			2.1100	1.0000	2.1100		(26)
TER Opening Type (Uw = 1.40)			5.5100	1.3258	7.3049		(27)
TER Room Window (Uw = 1.70)			1.1100	1.5918	1.7669		(27a)
External Wall 1	11.4900	5.5100	5.9800	0.1800	1.0764		(29a)
Stairwell	16.2300	2.1100	14.1200	0.1800	2.5416		(29a)
WT02	8.9300		8.9300	0.1800	1.6074		(29a)
External Roof 1	29.1900	1.1100	28.0800	0.1300	3.6504		(30)
External Roof 2	13.7900		13.7900	0.1300	1.7927		(30)
External Roof 3	5.4900		5.4900	0.1300	0.7137		(30)
Total net area of external elements Aum(A, m ²)			85.1200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	22.5640		(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)							7.4326 (36)
Total fabric heat loss						(33) + (36) =	29.9966 (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	19.8542	19.6751	19.4995	18.6746	18.5203	17.8019	17.8019	17.6688	18.0786	18.5203	18.8325	19.1589 (38)
Heat transfer coeff	49.8508	49.6717	49.4960	48.6712	48.5169	47.7985	47.7985	47.6654	48.0752	48.5169	48.8291	49.1555 (39)
Average = Sum(39)m / 12 =												48.6705 (39)
HLP	1.2251	1.2207	1.2164	1.1961	1.1924	1.1747	1.1747	1.1714	1.1815	1.1924	1.2000	1.2080 (40)
HLP (average)												1.1961 (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												1.4248 (42)
Average daily hot water use (litres/day)												68.0388 (43)
Daily hot water use	74.8427	72.1212	69.3996	66.6781	63.9565	61.2350	61.2350	63.9565	66.6781	69.3996	72.1212	74.8427 (44)
Energy conte	110.9896	97.0722	100.1698	87.3305	83.7957	72.3093	67.0052	76.8895	77.8078	90.6774	98.9815	107.4875 (45)
Energy content (annual)										Total = Sum(45)m =		1070.5160 (45)
Distribution loss (46)m = 0.15 x (45)m	16.6484	14.5608	15.0255	13.0996	12.5694	10.8464	10.0508	11.5334	11.6712	13.6016	14.8472	16.1231 (46)
Water storage loss:												

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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	38.1390	33.1955	35.3653	32.8823	32.5915	30.1981	31.2047	32.5915	32.8823	35.3653	35.5666	38.1390 (61)
Total heat required for water heating calculated for each month	149.1286	130.2677	135.5351	120.2128	116.3872	102.5074	98.2099	109.4810	110.6901	126.0427	134.5481	145.6266 (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	149.1286	130.2677	135.5351	120.2128	116.3872	102.5074	98.2099	109.4810	110.6901	126.0427	134.5481	145.6266 (64)
Heat gains from water heating, kWh/month	46.4388	40.5754	42.1478	37.2580	36.0100	31.5924	30.0804	33.7136	34.0917	38.9916	41.8030	45.2744 (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	71.2397	71.2397	71.2397	71.2397	71.2397	71.2397	71.2397	71.2397	71.2397	71.2397	71.2397	71.2397	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	11.3556	10.0859	8.2024	6.2098	4.6419	3.9189	4.2345	5.5041	7.3876	9.3803	10.9482	11.6712	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	123.2726	124.5518	121.3283	114.4659	105.8032	97.6616	92.2225	90.9433	94.1668	101.0293	109.6919	117.8335	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	30.1240	30.1240	30.1240	30.1240	30.1240	30.1240	30.1240	30.1240	30.1240	30.1240	30.1240	30.1240	(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)	-56.9917	-56.9917	-56.9917	-56.9917	-56.9917	-56.9917	-56.9917	-56.9917	-56.9917	-56.9917	-56.9917	-56.9917	(71)
Water heating gains (Table 5)	62.4177	60.3800	56.6503	51.7472	48.4005	43.8783	40.4306	45.3140	47.3495	52.4080	58.0597	60.8526	(72)
Total internal gains	244.4179	242.3897	233.5529	219.7947	206.2175	192.8306	184.2595	189.1333	196.2759	210.1895	226.0717	237.7292	(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			
East				1.8300	19.6403	0.6300	0.7000	0.7700	10.9842 (76)			
South				3.6800	46.7521	0.6300	0.7000	0.7700	52.5800 (78)			
West				1.1100	26.0000	0.6300	0.7000	1.0000	11.4545 (82)			
Solar gains	75.0188	131.3902	187.3725	241.6693	277.0273	277.1872	266.3838	240.0875	206.4069	147.4540	90.5597	63.7186 (83)
Total gains	319.4366	373.7798	420.9254	461.4640	483.2448	470.0178	450.6433	429.2209	402.6828	357.6435	316.6314	301.4478 (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)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	56.6830	56.8875	57.0893	58.0568	58.2415	59.1168	59.1168	59.2818	58.7766	58.2415	57.8691	57.4848	
alpha	4.7789	4.7925	4.8060	4.8705	4.8828	4.9411	4.9411	4.9521	4.9184	4.8828	4.8579	4.8323	
util living area	0.9936	0.9859	0.9667	0.9133	0.8003	0.6213	0.4609	0.5017	0.7418	0.9375	0.9867	0.9951	(86)
MIT	19.8271	20.0174	20.2912	20.6167	20.8524	20.9681	20.9940	20.9910	20.9242	20.6123	20.1622	19.7990	(87)
Th 2	19.8999	19.9034	19.9069	19.9231	19.9261	19.9403	19.9403	19.9429	19.9348	19.9261	19.9200	19.9136	(88)
util rest of house	0.9916	0.9814	0.9558	0.8856	0.7422	0.5306	0.3529	0.3911	0.6561	0.9113	0.9816	0.9935	(89)
MIT 2	18.3628	18.6405	19.0343	19.4946	19.7905	19.9205	19.9382	19.9395	19.8801	19.5016	18.8642	18.3316	(90)
Living area fraction	19.0027	19.2421	19.5835	19.9849	20.2545	20.3783	20.3995	20.3990	20.3363	19.9869	19.4313	18.9728	(91)
MIT	19.0027	19.2421	19.5835	19.9849	20.2545	20.3783	20.3995	20.3990	20.3363	19.9869	19.4313	18.9728	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.0027	19.2421	19.5835	19.9849	20.2545	20.3783	20.3995	20.3990	20.3363	19.9869	19.4313	18.9728	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9893	0.9779	0.9519	0.8874	0.7614	0.5693	0.4003	0.4396	0.6905	0.9131	0.9786	0.9916	(94)
Ext temp.	316.0032	365.5066	400.6819	409.5224	367.9188	267.5947	180.3911	188.6942	278.0688	326.5491	309.8608	298.9140	(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	732.9398	712.3981	647.5824	539.5158	415.0381	276.1937	181.6126	190.6122	299.8127	455.4235	602.1281	726.1639	(97)
Space heating kWh	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	1.0000	(97a)
Space heating per m2	310.2008	233.1111	183.6940	93.5952	35.0567	0.0000	0.0000	0.0000	0.0000	95.8825	210.4324	317.8739	(98)
												1479.8466	(98)
												36.3688	(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													1584.4182 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	310.2008	233.1111	183.6940	93.5952	35.0567	0.0000	0.0000	0.0000	0.0000	95.8825	210.4324	317.8739	(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)	332.1208	249.5836	196.6745	100.2090	37.5340	0.0000	0.0000	0.0000	0.0000	102.6579	225.3024	340.3360	(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	149.1286	130.2677	135.5351	120.2128	116.3872	102.5074	98.2099	109.4810	110.6901	126.0427	134.5481	145.6266	(64)
Efficiency of water heater (217)m	86.8533	86.4997	85.8172	84.4293	82.4319	80.3000	80.3000	80.3000	80.3000	84.3728	86.1727	86.9634	(216)
Fuel for water heating, kWh/month	171.7018	150.5990	157.9347	142.3828	141.1920	127.6555	122.3037	136.3400	137.8457	149.3880	156.1377	167.4573	(219)
Water heating fuel used												1760.9382	(219)
Annual totals kWh/year													
Space heating fuel - main system												1584.4182	(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)												200.5430	(232)
Total delivered energy for all uses												3620.8994	(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	1584.4182	0.2160	342.2343 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1760.9382	0.2160	380.3627 (264)
Space and water heating			722.5970 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	200.5430	0.5190	104.0818 (268)
Total CO2, kg/m2/year			865.6038 (272)
Emissions per m2 for space and water heating			17.7586 (272a)
Fuel factor (mains gas)			1.0000
Emissions per m2 for lighting			2.5579 (272b)
Emissions per m2 for pumps and fans			0.9566 (272c)
Target Carbon Dioxide Emission Rate (TER) = (17.7586 * 1.00) + 2.5579 + 0.9566, rounded to 2 d.p.			21.2700 (273)