

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

Property Reference	Gosbrook Unit 2			Issued on Date	16/09/2025
Assessment Reference	Gosbrook Unit 2	Prop Type Ref			
Property	Flat 2, 2 Send Road, Caversham, Reading, RG4 8GZ				
SAP Rating	89 B	DER	12.16	TER	21.59
Environmental	92 A	% DER<TER	43.67		
CO ₂ Emissions (t/year)	0.48	DFEE	43.04	TFEE	60.23
General Requirements Compliance	Pass	% DFEE<TFEE	28.54		
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

Ground-floor flat, total floor area 55 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) 21.59 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 12.16 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 60.2 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE) 43.0 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.16 (max. 0.30)	0.23 (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	0.11 (max. 0.20)	0.11 (max. 0.35)	OK
Openings	1.14 (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: 2.90 (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 East: 4.64 m², No overhang
Windows facing South: 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
Roof U-value 0.11 W/m²K
Floor U-value 0.12 W/m²K
Window U-value 1.10 W/m²K
Air permeability 2.9 m³/m²h
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	55.4600 (1b)	x 2.4200 (2b)	= 134.2132 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	55.4600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 134.2132 (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)
					Air changes per hour
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					30.0000 / (5) = 0.2235 (8)
Pressure test					Yes
Measured/design AP50					2.9000
Infiltration rate					0.3685 (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) = 0.3409 (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	0.4346	0.4261	0.4176	0.3750	0.3665	0.3238	0.3238	0.3153	0.3409	0.3665	0.3835	0.4005 (22b)
Effective ac	0.5945	0.5908	0.5872	0.5703	0.5671	0.5524	0.5524	0.5497	0.5581	0.5671	0.5735	0.5802 (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 = 1.10)			13.7400	1.0536	14.4770		(27)
Front Door			2.1100	1.4000	2.9540		(26)
Heat Loss Floor 1			53.4600	0.1200	6.4152	75.0000	4009.5000 (28a)
External Wall 1	47.3600	9.4200	37.9400	0.1600	6.0704	60.0000	2276.4000 (29a)
External Wall 2	23.3100	4.3200	18.9900	0.1500	2.8485	60.0000	1139.4000 (29a)
Stairwell	9.6600	2.1100	7.5500	0.2277	1.7193	60.0000	453.0000 (29a)
External Roof 1	1.6500		1.6500	0.1100	0.1815	9.0000	14.8500 (30)
Total net area of external elements Aum(A, m ²)			135.4400				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	34.6659		(33)
Party Wall 1			4.9700	0.0000	0.0000	45.0000	223.6500 (32)
Party Ceilings 1			51.8100			70.0000	3626.7000 (32b)
Internal Wall 1			56.8600			9.0000	511.7400 (32c)
Internal Wall 2			14.9100			75.0000	1118.2500 (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

(28)...(30) + (32) + (32a)...(32e) = 13373.4900 (34)												
241.1376 (35)												
7.8938 (36)												
(33) + (36) = 42.5597 (37)												
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 26.3285	Feb 26.1660	Mar 26.0068	Apr 25.2589	May 25.1190	Jun 24.4676	Jul 24.4676	Aug 24.3470	Sep 24.7185	Oct 25.1190	Nov 25.4021	Dec 25.6980 (38)
Heat transfer coeff	68.8881	68.7257	68.5665	67.8186	67.6787	67.0273	67.0273	66.9067	67.2782	67.6787	67.9617	68.2577 (39)
Average = Sum(39)m / 12 =												67.8179 (39)
HLP	Jan 1.2421	Feb 1.2392	Mar 1.2363	Apr 1.2228	May 1.2203	Jun 1.2086	Jul 1.2086	Aug 1.2064	Sep 1.2131	Oct 1.2203	Nov 1.2254	Dec 1.2308 (40)
HLP (average)												1.2228 (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												1.8508 (42)
Average daily hot water use (litres/day)												78.1571 (43)
Daily hot water use	Jan 85.9728	Feb 82.8465	Mar 79.7202	Apr 76.5939	May 73.4677	Jun 70.3414	Jul 70.3414	Aug 73.4677	Sep 76.5939	Oct 79.7202	Nov 82.8465	Dec 85.9728 (44)
Energy conte	127.4952	111.5081	115.0664	100.3176	96.2572	83.0626	76.9697	88.3239	89.3787	104.1623	113.7013	123.4723 (45)
Energy content (annual)										Total = Sum(45)m =		1229.7153 (45)

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Distribution loss (46)m = 0.15 x (45)m	19.1243	16.7262	17.2600	15.0476	14.4386	12.4594	11.5455	13.2486	13.4068	15.6243	17.0552	18.5208 (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	1.2605	1.0624	1.0549	0.8836	0.8133	0.6719	0.6226	0.7462	0.7873	0.9549	1.0833	1.2208 (61)
Total heat required for water heating calculated for each month	128.7557	112.5705	116.1213	101.2013	97.0704	83.7345	77.5924	89.0701	90.1660	105.1173	114.7846	124.6930 (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	128.7557	112.5705	116.1213	101.2013	97.0704	83.7345	77.5924	89.0701	90.1660	105.1173	114.7846	124.6930 (64)
Heat gains from water heating, kWh/month	42.7073	37.3420	38.5233	33.5765	32.2088	27.7863	25.7481	29.5542	29.9153	34.8727	38.0765	41.3597 (65)
Solar input (sum of months) = Sum(63)m = 0.0000 (63)												
Total per year (kWh/year) = Sum(64)m = 1240.8770 (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	92.5412	92.5412	92.5412	92.5412	92.5412	92.5412	92.5412	92.5412	92.5412	92.5412	92.5412	92.5412 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	14.3863	12.7778	10.3916	7.8671	5.8807	4.9648	5.3646	6.9731	9.3593	11.8838	13.8701	14.7861 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	161.3703	163.0448	158.8251	149.8418	138.5019	127.8441	120.7240	119.0495	123.2692	132.2526	143.5924	154.2502 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.2541	32.2541	32.2541	32.2541	32.2541	32.2541	32.2541	32.2541	32.2541	32.2541	32.2541	32.2541 (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)	-74.0330	-74.0330	-74.0330	-74.0330	-74.0330	-74.0330	-74.0330	-74.0330	-74.0330	-74.0330	-74.0330	-74.0330 (71)
Water heating gains (Table 5)	57.4023	55.5685	51.7786	46.6341	43.2914	38.5921	34.6076	39.7235	41.5490	46.8719	52.8840	55.5910 (72)
Total internal gains	286.9212	285.1534	274.7576	258.1053	241.4365	225.1633	214.4587	219.5085	227.9399	244.7706	264.1089	278.3897 (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			4.6400		19.6403		0.4900		0.8000		0.7700		24.7562 (76)
South			6.7100		46.7521		0.4900		0.8000		0.7700		85.2202 (78)
West			2.3900		19.6403		0.4900		0.8000		0.7700		12.7516 (80)
Solar gains	122.7280	212.9420	298.6212	377.1677	425.3662	422.5996	407.3738	372.0094	326.2548	237.6016	147.7829	104.4827	(83)
Total gains	409.6492	498.0955	573.3788	635.2730	666.8027	647.7629	621.8324	591.5178	554.1947	482.3722	411.8918	382.8724	(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	53.9260	54.0534	54.1789	54.7764	54.8896	55.4231	55.4231	55.5230	55.2164	54.8896	54.6610	54.4240
alpha	4.5951	4.6036	4.6119	4.6518	4.6593	4.6949	4.6949	4.7015	4.6811	4.6593	4.6441	4.6283
util living area	0.9944	0.9859	0.9650	0.9102	0.7987	0.6265	0.4667	0.5085	0.7441	0.9387	0.9879	0.9958 (86)
MIT	19.9865	20.1502	20.3743	20.6293	20.8170	20.9123	20.9361	20.9333	20.8751	20.6180	20.2488	19.9561 (87)
Th 2	19.8864	19.8888	19.8911	19.9018	19.9038	19.9132	19.9132	19.9149	19.9095	19.9038	19.8997	19.8955 (88)
util rest of house	0.9926	0.9915	0.9539	0.8822	0.7407	0.5343	0.3553	0.3944	0.6583	0.9132	0.9834	0.9945 (89)
MIT 2	18.5450	18.7837	19.1058	19.4659	19.7027	19.8096	19.8264	19.8269	19.7754	19.4612	18.9370	18.5078 (90)
Living area fraction	19.2834	19.4837	19.7556	20.0619	20.2735	20.3745	20.3949	20.3936	20.3388	20.0538	19.6090	0.5123 (91)
MIT	19.2834	19.4837	19.7556	20.0619	20.2735	20.3745	20.3949	20.3936	20.3388	20.0538	19.6090	19.2497 (92)
Temperature adjustment												0.0000
adjusted MIT	19.2834	19.4837	19.7556	20.0619	20.2735	20.3745	20.3949	20.3936	20.3388	20.0538	19.6090	19.2497 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	406.0922	487.8709	546.0282	563.3844	507.9045	372.3847	252.0846	263.6701	384.7983	442.4724	404.4301	380.3697 (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	1032.1806	1002.2755	908.8888	756.9810	580.2420	387.0495	254.3598	267.2011	419.7330	639.8211	850.1314	1027.2583 (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	465.8098	345.6799	269.9682	139.3895	53.8191	0.0000	0.0000	0.0000	0.0000	146.8275	320.9049	481.2851 (98)
Space heating												2223.6841 (98)
Space heating per m2												(98) / (4) = 40.0953 (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													2465.2817 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	465.8098	345.6799	269.9682	139.3895	53.8191	0.0000	0.0000	0.0000	0.0000	146.8275	320.9049	481.2851	(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)	516.4189	383.2372	299.2996	154.5338	59.6664	0.0000	0.0000	0.0000	0.0000	162.7799	355.7704	533.5755	(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	128.7557	112.5705	116.1213	101.2013	97.0704	83.7345	77.5924	89.0701	90.1660	105.1173	114.7846	124.6930	(64)
Efficiency of water heater (217)m	86.7485	86.3048	85.4767	83.7292	80.6657	76.2000	76.2000	76.2000	76.2000	83.7780	86.0356	76.2000	(216)
Fuel for water heating, kWh/month	148.4240	130.4336	135.8514	120.8673	120.3367	109.8878	101.8272	116.8899	118.3281	125.4712	133.4153	143.4669	(219)
Water heating fuel used												1505.1995	(219)
Annual totals kWh/year													
Space heating fuel - main system												2465.2817	(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)												254.0662	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV Unit 0 (0.80 * 1.00 * 853 * 1.00) =										-682.4239		-682.4239	(233)
Total delivered energy for all uses												3617.1235	(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	2465.2817	0.2160	532.5009	(261)
Space heating - secondary	0.0000	0.0000	0.0000	(263)
Water heating (other fuel)	1505.1995	0.2160	325.1231	(264)
Space and water heating			857.6240	(265)
Pumps and fans	75.0000	0.5190	38.9250	(267)
Energy for lighting	254.0662	0.5190	131.8603	(268)
Energy saving/generation technologies				
PV Unit	-682.4239	0.5190	-354.1780	(269)
Total CO2, kg/year			674.2313	(272)
Dwelling Carbon Dioxide Emission Rate (DER)			12.1600	(273)

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

DER			12.1600	ZC1
Total Floor Area		TFA	55.4600	
Assumed number of occupants		N	1.8508	
CO2 emission factor in Table 12 for electricity displaced from grid		EF	0.5190	
CO2 emissions from appliances, equation (L14)			17.2421	ZC2
CO2 emissions from cooking, equation (L16)			2.9466	ZC3
Total CO2 emissions			32.3487	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			32.3487	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)
CALCULATION OF TARGET EMISSIONS 09 Jan 2014

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	55.4600 (1b)	x 2.4200 (2b)	= 134.2132 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	55.4600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 134.2132 (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) = 0.1490 (8)
Measured/design AP50					Yes
Infiltration rate					5.0000
Number of sides sheltered					0.3990 (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) =				0.3691 (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												
	0.4706	0.4614	0.4521	0.4060	0.3968	0.3506	0.3506	0.3414	0.3691	0.3968	0.4152	0.4337 (22b)
Effective ac	0.6107	0.6064	0.6022	0.5824	0.5787	0.5615	0.5615	0.5583	0.5681	0.5787	0.5862	0.5940 (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)			11.7500	1.3258	15.5777		(27)
Heat Loss Floor 1			53.4600	0.1300	6.9498		(28a)
External Wall 1	47.3600	8.0500	39.3100	0.1800	7.0758		(29a)
External Wall 2	23.3100	3.7000	19.6100	0.1800	3.5298		(29a)
Stairwell	9.6600	2.1100	7.5500	0.1800	1.3590		(29a)
External Roof 1	1.6500		1.6500	0.1300	0.2145		(30)
Total net area of external elements Aum(A, m ²)			135.4400				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	36.8166	(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)							12.5898 (36)
Total fabric heat loss						(33) + (36) =	49.4064 (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	27.0493	26.8589	26.6722	25.7955	25.6315	24.8678	24.8678	24.7264	25.1620	25.6315	25.9633	26.3102 (38)
Heat transfer coeff	76.4557	76.2653	76.0786	75.2018	75.0378	74.2742	74.2742	74.1328	74.5683	75.0378	75.3697	75.7166 (39)
Average = Sum(39)m / 12 =												75.2011 (39)
HLP	1.3786	1.3751	1.3718	1.3560	1.3530	1.3392	1.3392	1.3367	1.3445	1.3530	1.3590	1.3652 (40)
HLP (average)												1.3560 (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												1.8508 (42)
Average daily hot water use (litres/day)												78.1571 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	85.9728	82.8465	79.7202	76.5939	73.4677	70.3414	70.3414	73.4677	76.5939	79.7202	82.8465	85.9728 (44)
Energy conte	127.4952	111.5081	115.0664	100.3176	96.2572	83.0626	76.9697	88.3239	89.3787	104.1623	113.7013	123.4723 (45)
Energy content (annual)										Total = Sum(45)m =		1229.7153 (45)
Distribution loss (46)m = 0.15 x (45)m	19.1243	16.7262	17.2600	15.0476	14.4386	12.4594	11.5455	13.2486	13.4068	15.6243	17.0552	18.5208 (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)

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If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	43.8108	38.1321	40.6246	37.7724	37.4383	34.6889	35.8452	37.4383	37.7724	40.6246	40.8558	43.8108 (61)
Total heat required for water heating calculated for each month	171.3060	149.6402	155.6909	138.0900	133.6955	117.7515	112.8149	125.7622	127.1511	144.7869	154.5571	167.2831 (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	171.3060	149.6402	155.6909	138.0900	133.6955	117.7515	112.8149	125.7622	127.1511	144.7869	154.5571	167.2831 (64)
Heat gains from water heating, kWh/month	53.3448	46.6095	48.4157	42.7987	41.3651	36.2905	34.5537	38.7273	39.1615	44.7901	48.0196	52.0072 (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	92.5412	92.5412	92.5412	92.5412	92.5412	92.5412	92.5412	92.5412	92.5412	92.5412	92.5412	92.5412 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	14.4172	12.8053	10.4139	7.8840	5.8934	4.9755	5.3762	6.9881	9.3794	11.9094	13.9000	14.8179 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	161.3703	163.0448	158.8251	149.8418	138.5019	127.8441	120.7240	119.0495	123.2692	132.2526	143.5924	154.2502 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.2541	32.2541	32.2541	32.2541	32.2541	32.2541	32.2541	32.2541	32.2541	32.2541	32.2541	32.2541 (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)	-74.0330	-74.0330	-74.0330	-74.0330	-74.0330	-74.0330	-74.0330	-74.0330	-74.0330	-74.0330	-74.0330	-74.0330 (71)
Water heating gains (Table 5)	71.7001	69.3593	65.0749	59.4426	55.5982	50.4035	46.4432	52.0528	54.3910	60.2018	66.6939	69.9022 (72)
Total internal gains	301.2499	298.9717	288.0762	270.9308	253.7559	236.9855	226.3057	231.8528	240.8021	258.1260	277.9487	292.7327 (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				3.9700	19.6403	0.6300	0.7000	0.7700	23.8292 (76)			
South				5.7400	46.7521	0.6300	0.7000	0.7700	82.0133 (78)			
West				2.0400	19.6403	0.6300	0.7000	0.7700	12.2447 (80)			

Solar gains	118.0873	204.8850	287.3116	362.8692	409.2302	406.5646	391.9181	357.9023	313.8936	228.6084	142.1937	100.5325 (83)
Total gains	419.3372	503.8568	575.3878	633.8000	662.9862	643.5501	618.2239	589.7551	554.6956	486.7344	420.1424	393.2652 (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	50.3741	50.4999	50.6238	51.2140	51.3260	51.8537	51.8537	51.9526	51.6491	51.3260	51.1000	50.8659
alpha	4.3583	4.3667	4.3749	4.4143	4.4217	4.4569	4.4569	4.4635	4.4433	4.4217	4.4067	4.3911
util living area	0.9947	0.9878	0.9714	0.9284	0.8358	0.6768	0.5136	0.5560	0.7843	0.9494	0.9892	0.9960 (86)
MIT	19.6024	19.8123	20.1142	20.4752	20.7653	20.9348	20.9848	20.9785	20.8701	20.4803	19.9690	19.5655 (87)
Th 2	19.7798	19.7824	19.7850	19.7973	19.7995	19.8102	19.8102	19.8122	19.8061	19.7995	19.7949	19.7901 (88)
util rest of house	0.9930	0.9838	0.9615	0.9030	0.7784	0.5748	0.3823	0.4233	0.6951	0.9260	0.9849	0.9946 (89)
MIT 2	17.9532	18.2592	18.6945	19.2063	19.5803	19.7693	19.8052	19.8042	19.7104	19.2264	18.4975	17.9064 (90)
Living area fraction	18.7980	19.0548	19.4217	19.8563	20.1873	20.3664	20.4095	20.4057	20.3045	19.8687	19.2513	18.7563 (92)
Temperature adjustment	18.7980	19.0548	19.4217	19.8563	20.1873	20.3664	20.4095	20.4057	20.3045	19.8687	19.2513	18.7563 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	415.5471	494.0494	551.1158	573.2305	529.5961	402.1239	278.1664	289.8954	408.0270	451.4981	412.6959	390.5144 (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	1108.4554	1079.5180	983.0684	823.9371	636.8707	428.2919	282.9442	296.9572	462.6570	695.5040	915.8383	1102.1497 (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	515.5238	393.4349	321.3727	180.5087	79.8123	0.0000	0.0000	0.0000	0.0000	181.5404	362.2626	529.4567 (98)
Space heating												2563.9122 (98)
Space heating per m2												46.2299 (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													2745.0880 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	515.5238	393.4349	321.3727	180.5087	79.8123	0.0000	0.0000	0.0000	0.0000	181.5404	362.2626	529.4567	(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)	551.9527	421.2365	344.0822	193.2642	85.4522	0.0000	0.0000	0.0000	0.0000	194.3687	387.8614	566.8701	(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	171.3060	149.6402	155.6909	138.0900	133.6955	117.7515	112.8149	125.7622	127.1511	144.7869	154.5571	167.2831	(64)
Efficiency of water heater (217)m	87.6503	87.3719	86.8356	85.7265	83.7999	80.3000	80.3000	80.3000	80.3000	85.6218	87.1229	87.7501	(216)
Fuel for water heating, kWh/month	195.4425	171.2680	179.2939	161.0820	159.5414	146.6395	140.4918	156.6154	158.3451	169.1005	177.4012	190.6358	(219)
Water heating fuel used												2005.8572	(219)
Annual totals kWh/year													
Space heating fuel - main system												2745.0880	(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)												254.6127	(232)
Total delivered energy for all uses												5080.5579	(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	2745.0880	0.2160	592.9390 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2005.8572	0.2160	433.2652 (264)
Space and water heating			1026.2042 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	254.6127	0.5190	132.1440 (268)
Total CO2, kg/m2/year			1197.2732 (272)
Emissions per m2 for space and water heating			18.5035 (272a)
Fuel factor (mains gas)			1.0000
Emissions per m2 for lighting			2.3827 (272b)
Emissions per m2 for pumps and fans			0.7019 (272c)
Target Carbon Dioxide Emission Rate (TER) = (18.5035 * 1.00) + 2.3827 + 0.7019, rounded to 2 d.p.			21.5900 (273)