

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

Property Reference	Gosbrook Unit 1			Issued on Date	16/09/2025
Assessment Reference	Gosbrook Unit 1	Prop Type Ref			
Property	Flat 1, 2 Send Road, Caversham, Reading, RG4 8GZ				
SAP Rating	88 B	DER	14.03	TER	22.81
Environmental	91 B	% DER<TER	38.50		
CO ₂ Emissions (t/year)	0.56	DFEE	48.65	TFEE	65.58
General Requirements Compliance	Pass	% DFEE<TFEE	25.82		
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 56 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) 22.81 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 14.03 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)65.6 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)48.6 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.17 (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	1.16 (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: 3.40 (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
Roof U-value 0.11 W/m²K
Floor U-value 0.12 W/m²K
Window U-value 1.10 W/m²K
Air permeability 3.4 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	55.7500 (1b)	x 2.4200 (2b)	= 134.9150 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	55.7500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 134.9150 (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)
					Air changes per hour
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					30.0000 / (5) = 0.2224 (8)
Pressure test					Yes
Measured/design AP50					3.4000
Infiltration rate					0.3924 (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) =		0.3629 (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	0.4627	0.4537	0.4446	0.3992	0.3902	0.3448	0.3448	0.3357	0.3629	0.3902	0.4083	0.4264 (22b)
Effective ac	0.6071	0.6029	0.5988	0.5797	0.5761	0.5594	0.5594	0.5564	0.5659	0.5761	0.5834	0.5909 (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)			9.1000	1.0536	9.5881		(27)
Front Door			2.1100	1.4000	2.9540		(26)
Heat Loss Floor 1			53.7500	0.1200	6.4500	75.0000	4031.2500 (28a)
External Wall 1	33.5800	4.7800	28.8000	0.1600	4.6080	60.0000	1728.0000 (29a)
External Wall 2	32.7400	4.3200	28.4200	0.1500	4.2630	60.0000	1705.2000 (29a)
Stairwell	23.3200	2.1100	21.2100	0.2277	4.8299	60.0000	1272.6000 (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)			145.0400				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	32.8745		(33)
Party Wall 1			4.9700	0.0000	0.0000	45.0000	223.6500 (32)
Party Ceilings 1			52.1000			70.0000	3647.0000 (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

(28)...(30) + (32) + (32a)...(32e) =	14372.3900 (34)
	257.8007 (35)
	6.3447 (36)
(33) + (36) =	39.2192 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	
(38)m	Jan 27.0277 Feb 26.8426 Mar 26.6612 Apr 25.8090 May 25.6496 Jun 24.9073 Jul 24.9073 Aug 24.7699 Sep 25.1932 Oct 25.6496 Nov 25.9721 Dec 26.3093 (38)
Heat transfer coeff	66.2469 66.0618 65.8804 65.0282 64.8688 64.1265 64.1265 63.9891 64.4124 64.8688 65.1913 65.5285 (39)
Average = Sum(39)m / 12 =	65.0274 (39)

HLP	Jan 1.1883 Feb 1.1850 Mar 1.1817 Apr 1.1664 May 1.1636 Jun 1.1503 Jul 1.1503 Aug 1.1478 Sep 1.1554 Oct 1.1636 Nov 1.1694 Dec 1.1754 (40)
HLP (average)	1.1664 (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												1.8593 (42)
Average daily hot water use (litres/day)												78.3583 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	86.1942	83.0598	79.9255	76.7912	73.6568	70.5225	70.5225	73.6568	76.7912	79.9255	83.0598	86.1942 (44)
Energy content	127.8235	111.7952	115.3627	100.5760	96.5050	83.2765	77.1679	88.5513	89.6089	104.4305	113.9941	123.7902 (45)
Energy content (annual)	Total = Sum(45)m =											1232.8819 (45)

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Distribution loss (46)m = 0.15 x (45)m	19.1735	16.7693	17.3044	15.0864	14.4758	12.4915	11.5752	13.2827	13.4413	15.6646	17.0991	18.5685 (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	1.2670	1.0679	1.0603	0.8882	0.8174	0.6754	0.6258	0.7501	0.7913	0.9599	1.0889	1.2270 (61)
Total heat required for water heating calculated for each month	129.0905	112.8631	116.4230	101.4641	97.3225	83.9519	77.7938	89.3014	90.4002	105.3904	115.0830	125.0173 (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	129.0905	112.8631	116.4230	101.4641	97.3225	83.9519	77.7938	89.3014	90.4002	105.3904	115.0830	125.0173 (64)
Heat gains from water heating, kWh/month	42.8181	37.4389	38.6232	33.6636	32.2923	27.8583	25.8148	29.6308	29.9928	34.9631	38.1753	41.4670 (65)
Solar input (sum of months) = Sum(63)m = 0.0000 (63)												
Total per year (kWh/year) = Sum(64)m = 1244.1011 (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	92.9649	92.9649	92.9649	92.9649	92.9649	92.9649	92.9649	92.9649	92.9649	92.9649	92.9649	92.9649 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	15.0197	13.3404	10.8491	8.2135	6.1397	5.1834	5.6008	7.2801	9.7714	12.4070	14.4808	15.4371 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	162.1162	163.7985	159.5593	150.5344	139.1422	128.4351	121.2821	119.5998	123.8391	132.8639	144.2561	154.9632 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.2965	32.2965	32.2965	32.2965	32.2965	32.2965	32.2965	32.2965	32.2965	32.2965	32.2965	32.2965 (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)	-74.3719	-74.3719	-74.3719	-74.3719	-74.3719	-74.3719	-74.3719	-74.3719	-74.3719	-74.3719	-74.3719	-74.3719 (71)
Water heating gains (Table 5)	57.5512	55.7126	51.9129	46.7549	43.4036	38.6921	34.6973	39.8264	41.6567	46.9934	53.0212	55.7352 (72)
Total internal gains	288.5766	286.7409	276.2107	259.3923	242.5749	226.2000	215.4697	220.5958	229.1566	246.1539	265.6476	280.0251 (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	0.4900	0.8000	0.7700	19.3827 (74)			
West				2.3900	19.6403	0.4900	0.8000	0.7700	12.7516 (80)			
Solar gains	32.1343	61.9861	104.0228	161.0149	209.6190	220.9632	207.6814	169.4640	123.4553	73.6919	39.8108	26.6446 (83)
Total gains	320.7108	348.7271	380.2335	420.4072	452.1940	447.1632	423.1511	390.0598	352.6119	319.8458	305.4584	306.6697 (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	60.2644	60.4333	60.5997	61.3938	61.5447	62.2571	62.2571	62.3908	61.9808	61.5447	61.2402	60.9251
alpha	5.0176	5.0289	5.0400	5.0929	5.1030	5.1505	5.1505	5.1594	5.1321	5.1030	5.0827	5.0617
util living area	0.9986	0.9975	0.9942	0.9804	0.9305	0.7995	0.6368	0.7020	0.9169	0.9882	0.9974	0.9989 (86)
MIT	19.9832	20.0690	20.2384	20.4861	20.7223	20.8821	20.9316	20.9221	20.7979	20.5058	20.2075	19.9711 (87)
Th 2	19.9294	19.9320	19.9347	19.9470	19.9493	19.9600	19.9600	19.9620	19.9559	19.9493	19.9446	19.9397 (88)
util rest of house	0.9981	0.9966	0.9919	0.9718	0.8978	0.7115	0.5013	0.5686	0.8638	0.9816	0.9962	0.9985 (89)
MIT 2	18.5671	18.6945	18.9436	19.3110	19.6387	19.8366	19.8768	19.8738	19.7474	19.3443	18.9070	18.5574 (90)
Living area fraction	19.1843	19.2936	19.5080	19.8232	20.1110	20.2923	20.3366	20.3307	20.2053	19.8506	19.4738	19.1736 (92)
MIT	19.1843	19.2936	19.5080	19.8232	20.1110	20.2923	20.3366	20.3307	20.2053	19.8506	19.4738	19.1736 (93)
Temperature adjustment												0.0000
adjusted MIT	19.1843	19.2936	19.5080	19.8232	20.1110	20.2923	20.3366	20.3307	20.2053	19.8506	19.4738	19.1736 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9976	0.9959	0.9907	0.9706	0.9037	0.7424	0.5527	0.6193	0.8789	0.9808	0.9955	0.9981 (94)
Ext temp.	319.9377	347.3003	376.6862	408.0318	408.6620	331.9642	233.8852	241.5689	309.9275	313.6909	304.0911	306.0840 (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	986.0417	950.8661	856.9703	710.3166	545.6118	365.0270	239.6132	251.5232	393.2546	600.0729	806.6669	981.1970 (97)
Space heating kWh	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000 (97a)
Space heating per m2	495.5814	405.5962	357.3314	217.6451	101.8907	0.0000	0.0000	0.0000	0.0000	213.0682	361.8546	502.2841 (98)
												2655.2516 (98)
												47.6278 (99)

8c. Space cooling requirement

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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													2943.7379 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	495.5814	405.5962	357.3314	217.6451	101.8907	0.0000	0.0000	0.0000	0.0000	213.0682	361.8546	502.2841	(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)	549.4250	449.6632	396.1545	241.2917	112.9608	0.0000	0.0000	0.0000	0.0000	236.2175	401.1692	556.8559	(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													
Water heating requirement	129.0905	112.8631	116.4230	101.4641	97.3225	83.9519	77.7938	89.3014	90.4002	105.3904	115.0830	125.0173	(64)
Efficiency of water heater (217)m	86.9006	86.7312	86.3034	85.2215	82.7707	76.2000	76.2000	76.2000	76.2000	85.0300	86.3710	87.0139	(216)
Fuel for water heating, kWh/month	148.5497	130.1298	134.8997	119.0593	117.5808	110.1731	102.0916	117.1934	118.6355	123.9450	133.2427	143.6750	(219)
Water heating fuel used												1499.1754	(219)
Annual totals kWh/year													
Space heating fuel - main system												2943.7379	(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)												265.2525	(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												4100.7419	(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	2943.7379	0.2160	635.8474	(261)
Space heating - secondary	0.0000	0.0000	0.0000	(263)
Water heating (other fuel)	1499.1754	0.2160	323.8219	(264)
Space and water heating			959.6693	(265)
Pumps and fans	75.0000	0.5190	38.9250	(267)
Energy for lighting	265.2525	0.5190	137.6661	(268)
Energy saving/generation technologies				
PV Unit	-682.4239	0.5190	-354.1780	(269)
Total CO2, kg/year			782.0823	(272)
Dwelling Carbon Dioxide Emission Rate (DER)			14.0300	(273)

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

DER			14.0300	ZC1
Total Floor Area		TFA	55.7500	
Assumed number of occupants		N	1.8593	
CO2 emission factor in Table 12 for electricity displaced from grid		EF	0.5190	
CO2 emissions from appliances, equation (L14)			17.2317	ZC2
CO2 emissions from cooking, equation (L16)			2.9349	ZC3
Total CO2 emissions			34.1966	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			34.1966	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	55.7500 (1b)	x 2.4200 (2b)	= 134.9150 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	55.7500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 134.9150 (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) = 0.1482 (8)
Measured/design AP50					Yes
Infiltration rate					5.0000
Number of sides sheltered					0.3982 (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) =				0.3684 (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	0.4697	0.4605	0.4513	0.4052	0.3960	0.3500	0.3500	0.3407	0.3684	0.3960	0.4144	0.4328 (22b)
	0.6103	0.6060	0.6018	0.5821	0.5784	0.5612	0.5612	0.5581	0.5678	0.5784	0.5859	0.5937 (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)			9.1000	1.3258	12.0644		(27)
Heat Loss Floor 1			53.7500	0.1300	6.9875		(28a)
External Wall 1	33.5800	4.7800	28.8000	0.1800	5.1840		(29a)
External Wall 2	32.7400	4.3200	28.4200	0.1800	5.1156		(29a)
Stairwell	23.3200	2.1100	21.2100	0.1800	3.8178		(29a)
External Roof 1	1.6500		1.6500	0.1300	0.2145		(30)
Total net area of external elements Aum(A, m ²)			145.0400				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 35.4938		(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)							10.5290 (36)
Total fabric heat loss						(33) + (36) =	46.0228 (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	27.1716	26.9810	26.7940	25.9161	25.7519	24.9872	24.9872	24.8456	25.2818	25.7519	26.0842	26.4316 (38)
Heat transfer coeff	73.1944	73.0038	72.8168	71.9389	71.7747	71.0100	71.0100	70.8684	71.3046	71.7747	72.1070	72.4543 (39)
Average = Sum(39)m / 12 =												71.9381 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.3129	1.3095	1.3061	1.2904	1.2874	1.2737	1.2737	1.2712	1.2790	1.2874	1.2934	1.2996 (40)
HLP (average)												1.2904 (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												1.8593 (42)
Average daily hot water use (litres/day)												78.3583 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	86.1942	83.0598	79.9255	76.7912	73.6568	70.5225	70.5225	73.6568	76.7912	79.9255	83.0598	86.1942 (44)
Energy content (annual)	127.8235	111.7952	115.3627	100.5760	96.5050	83.2765	77.1679	88.5513	89.6089	104.4305	113.9941	123.7902 (45)
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		1232.8819 (45)
Water storage loss:	19.1735	16.7693	17.3044	15.0864	14.4758	12.4915	11.5752	13.2827	13.4413	15.6646	17.0991	18.5685 (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)

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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	43.9236	38.2303	40.7292	37.8696	37.5347	34.7782	35.9375	37.5347	37.8696	40.7292	40.9610	43.9236 (61)
Total heat required for water heating calculated for each month	171.7471	150.0255	156.0918	138.4456	134.0398	118.0547	113.1054	126.0860	127.4785	145.1597	154.9551	167.7138 (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	171.7471	150.0255	156.0918	138.4456	134.0398	118.0547	113.1054	126.0860	127.4785	145.1597	154.9551	167.7138 (64)
Heat gains from water heating, kWh/month	53.4822	46.7295	48.5404	42.9089	41.4716	36.3840	34.6427	38.8270	39.2624	44.9054	48.1433	52.1411 (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	92.9649	92.9649	92.9649	92.9649	92.9649	92.9649	92.9649	92.9649	92.9649	92.9649	92.9649	92.9649 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	15.0197	13.3404	10.8491	8.2135	6.1397	5.1834	5.6008	7.2801	9.7714	12.4070	14.4808	15.4371 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	162.1162	163.7985	159.5593	150.5344	139.1422	128.4351	121.2821	119.5998	123.8391	132.8639	144.2561	154.9632 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.2965	32.2965	32.2965	32.2965	32.2965	32.2965	32.2965	32.2965	32.2965	32.2965	32.2965	32.2965 (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)	-74.3719	-74.3719	-74.3719	-74.3719	-74.3719	-74.3719	-74.3719	-74.3719	-74.3719	-74.3719	-74.3719	-74.3719 (71)
Water heating gains (Table 5)	71.8847	69.5379	65.2424	59.5957	55.7414	50.5333	46.5628	52.1868	54.5311	60.3568	66.8657	70.0822 (72)
Total internal gains	302.9101	300.5663	289.5403	272.2331	254.9127	238.0413	227.3352	232.9563	242.0310	259.5172	279.4921	294.3720 (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	339.0611	370.3006	406.5659	453.3748	490.7341	486.6249	460.9768	423.6032	380.9182	342.4206	324.2792	324.3473 (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	52.8937	53.0319	53.1680	53.8169	53.9400	54.5209	54.5209	54.6298	54.2957	53.9400	53.6915	53.4340	
alpha	4.5262	4.5355	4.5445	4.5878	4.5960	4.6347	4.6347	4.6420	4.6197	4.5960	4.5794	4.5623	
util living area	0.9978	0.9964	0.9919	0.9753	0.9216	0.7933	0.6372	0.7015	0.9092	0.9847	0.9961	0.9982 (86)	
MIT	19.5537	19.6799	19.9311	20.2965	20.6462	20.8873	20.9692	20.9524	20.7603	20.3274	19.8849	19.5348 (87)	
Th 2	19.8307	19.8334	19.8360	19.8484	19.8507	19.8615	19.8615	19.8635	19.8573	19.8507	19.8460	19.8411 (88)	
util rest of house	0.9971	0.9951	0.9888	0.9647	0.8852	0.7001	0.4919	0.5592	0.8514	0.9763	0.9945	0.9976 (89)	
MIT 2	17.9169	18.1029	18.4708	19.0058	19.4881	19.7820	19.8498	19.8427	19.6495	19.0572	18.4115	17.8964 (90)	
Living area fraction	18.6303	18.7903	19.1073	19.5684	19.9929	20.2638	20.3377	20.3264	20.1336	19.6108	19.0537	18.6105 (92)	
MIT	18.6303	18.7903	19.1073	19.5684	19.9929	20.2638	20.3377	20.3264	20.1336	19.6108	19.0537	18.6105 (93)	
Temperature adjustment												0.0000	
adjusted MIT	18.6303	18.7903	19.1073	19.5684	19.9929	20.2638	20.3377	20.3264	20.1336	19.6108	19.0537	18.6105 (93)	

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	337.6756	367.8539	400.9119	435.8673	437.0209	358.3589	256.2923	263.2884	330.7022	333.4998	321.9695	323.2666 (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	1048.8996	1014.0433	918.0222	767.4712	595.2223	402.1854	265.4154	278.2598	430.2253	646.7505	861.9452	1044.1048 (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	529.1507	434.2393	384.7301	238.7548	117.7018	0.0000	0.0000	0.0000	0.0000	233.0585	388.7825	536.3036 (98)
Space heating												2862.7213 (98)
Space heating per m2										(98) / (4) =		51.3493 (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												3065.0121 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	529.1507	434.2393	384.7301	238.7548	117.7018	0.0000	0.0000	0.0000	0.0000	233.0585	388.7825	536.3036 (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)	566.5425	464.9243	411.9166	255.6261	126.0191	0.0000	0.0000	0.0000	0.0000	249.5273	416.2554	574.2009 (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	171.7471	150.0255	156.0918	138.4456	134.0398	118.0547	113.1054	126.0860	127.4785	145.1597	154.9551	167.7138 (64)
Efficiency of water heater (217)m	87.6971	87.5717	87.2333	86.4108	84.7259	80.3000	80.3000	80.3000	80.3000	86.2370	87.2718	80.3000 (216)
Fuel for water heating, kWh/month	195.8412	171.3173	178.9362	160.2178	158.2041	147.0171	140.8536	157.0187	158.7528	168.3264	177.5547	191.0831 (219)
Water heating fuel used												2005.1230 (219)
Annual totals kWh/year												
Space heating fuel - main system												3065.0121 (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)												265.2525 (232)
Total delivered energy for all uses												5410.3876 (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	3065.0121	0.2160	662.0426 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2005.1230	0.2160	433.1066 (264)
Space and water heating			1095.1492 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	265.2525	0.5190	137.6661 (268)
Total CO2, kg/m2/year			1271.7402 (272)
Emissions per m2 for space and water heating			19.6439 (272a)
Fuel factor (mains gas)			1.0000
Emissions per m2 for lighting			2.4693 (272b)
Emissions per m2 for pumps and fans			0.6982 (272c)
Target Carbon Dioxide Emission Rate (TER) = (19.6439 * 1.00) + 2.4693 + 0.6982, rounded to 2 d.p.			22.8100 (273)