

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

Property Reference	Gosbrook Unit 5			Issued on Date	16/09/2025
Assessment Reference	Gosbrook Unit 5	Prop Type Ref			
Property	Flat 5, 2 Send Road, Caversham, Reading, RG4 8GZ				
SAP Rating	88 B	DER	13.34	TER	21.41
Environmental	93 A	% DER<TER	37.68		
CO ₂ Emissions (t/year)	0.41	DFEE	47.06	TFEE	51.01
General Requirements Compliance	Pass	% DFEE<TFEE	7.73		
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 44 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) 21.41 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 13.34 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)51.0 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)47.1 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.27 (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	1.31 (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: 4.38 (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: 1.85 m², No overhang
Windows facing West: 1.83 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	44.3800 (1b)	x 2.2700 (2b)	= 100.7426 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	44.3800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 100.7426 (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) = 0.2978 (8)
Measured/design AP50					Yes
Infiltration rate					4.3800
Number of sides sheltered					0.5168 (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) =				0.4780 (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	0.6095	0.5975	0.5856	0.5258	0.5139	0.4541	0.4541	0.4422	0.4780	0.5139	0.5378	0.5617 (22b)
Effective ac	0.6857	0.6785	0.6715	0.6382	0.6320	0.6031	0.6031	0.5978	0.6143	0.6320	0.6446	0.6577 (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)			3.6800	1.3258	4.8788		(27)
Front Door			2.1100	1.4000	2.9540		(26)
Rooflight (Uw = 0.82)			1.1100	0.7940	0.8813		(27a)
External Wall 1	11.2700	3.6800	7.5900	0.1600	1.2144	60.0000	455.4000 (29a)
Stairwell	16.8000	2.1100	14.6900	0.2236	3.2853	60.0000	881.4000 (29a)
WT02	11.0400		11.0400	0.4000	4.4160	9.0000	99.3600 (29a)
External Roof 1	33.8000	1.1100	32.6900	0.1100	3.5959	9.0000	294.2100 (30)
External Roof 2	14.2200		14.2200	0.1100	1.5642	9.0000	127.9800 (30)
External Roof 3	5.4700		5.4700	0.1200	0.6564	9.0000	49.2300 (30)
Total net area of external elements Aum(A, m ²)			92.6000				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	23.4463			(33)
Party Wall 1			5.8400	0.0000	0.0000	45.0000	262.8000 (32)
Party Floor 1			44.3800			70.0000	3106.6000 (32d)
Party Ceilings 1			44.4200			70.0000	3109.4000 (32b)
Internal Wall 1			58.5800			9.0000	527.2200 (32c)
Internal Wall 2			30.5200			75.0000	2289.0000 (32c)
Heat capacity Cm = Sum(A x k)			(28)...(30) + (32) + (32a)...(32e) =	11202.6000			(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K				252.4245			(35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				7.5857			(36)
Total fabric heat loss			(33) + (36) =	31.0320			(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	22.7974	22.5576	22.3226	21.2187	21.0121	20.0506	20.0506	19.8726	20.4210	21.0121	21.4299	21.8668 (38)
Heat transfer coeff	53.8294	53.5896	53.3546	52.2506	52.0441	51.0826	51.0826	50.9046	51.4530	52.0441	52.4619	52.8987 (39)
Average = Sum(39)m / 12 =												52.2496 (39)
HLP	1.2129	1.2075	1.2022	1.1773	1.1727	1.1510	1.1510	1.1470	1.1594	1.1727	1.1821	1.1920 (40)
HLP (average)												1.1773 (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)												
											1.5270 (42)	
											70.4662 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												

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Energy conte	77.5128	74.6942	71.8755	69.0569	66.2382	63.4196	63.4196	66.2382	69.0569	71.8755	74.6942	77.5128 (44)
Energy content (annual)	114.9493	100.5354	103.7435	90.4461	86.7852	74.8890	69.3957	79.6326	80.5836	93.9125	102.5128	111.3223 (45)
Distribution loss (46)m = 0.15 x (45)m										Total = Sum (45)m =		1108.7079 (45)
	17.2424	15.0803	15.5615	13.5669	13.0178	11.2334	10.4094	11.9449	12.0875	14.0869	15.3769	16.6983 (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	1.0247	0.8636	0.8575	0.7183	0.6611	0.5462	0.5061	0.6066	0.6400	0.7763	0.8806	0.9923 (61)
Total heat required for water heating calculated for each month	115.9739	101.3990	104.6010	91.1644	87.4463	75.4352	69.9018	80.2392	81.2236	94.6887	103.3934	112.3146 (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	115.9739	101.3990	104.6010	91.1644	87.4463	75.4352	69.9018	80.2392	81.2236	94.6887	103.3934	112.3146 (64)
Heat gains from water heating, kWh/month	38.4768	33.6439	34.7091	30.2529	29.0213	25.0371	23.2006	26.6295	26.9540	31.4200	34.3056	37.2627 (65)
										Total per year (kWh/year) = Sum (64)m =		1117.7810 (64)

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

Metabolic gains (Table 5), Watts												
(66)m	76.3499	76.3499	76.3499	76.3499	76.3499	76.3499	76.3499	76.3499	76.3499	76.3499	76.3499	76.3499 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	13.0137	11.5587	9.4001	7.1165	5.3197	4.4911	4.8528	6.3078	8.4664	10.7500	12.5468	13.3754 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	132.6848	134.0616	130.5920	123.2056	113.8815	105.1183	99.2639	97.8870	101.3566	108.7431	118.0671	126.8304 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	30.6350	30.6350	30.6350	30.6350	30.6350	30.6350	30.6350	30.6350	30.6350	30.6350	30.6350	30.6350 (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)	-61.0799	-61.0799	-61.0799	-61.0799	-61.0799	-61.0799	-61.0799	-61.0799	-61.0799	-61.0799	-61.0799	-61.0799 (71)
Water heating gains (Table 5)	51.7161	50.0653	46.6520	42.0179	39.0072	34.7738	31.1836	35.7923	37.4362	42.2311	47.6467	50.0843 (72)
Total internal gains	246.3196	244.5906	235.5491	221.2450	207.1134	193.2882	184.2052	188.8921	196.1642	210.6292	227.1656	239.1951 (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					1.8500	10.6334	0.5400	0.8000			0.7700	5.8893 (74)
West					1.8300	19.6403	0.5400	0.8000			0.7700	10.7601 (80)
East					1.1100	26.0000	0.4700	0.8000			1.0000	9.7662 (82)
Solar gains	26.4156	52.5874	89.8490	137.6187	175.4595	182.8502	172.7362	143.6552	106.5070	63.1648	33.0773	21.6462 (83)
Total gains	272.7351	297.1780	325.3982	358.8637	382.5729	376.1383	356.9414	332.5474	302.6712	273.7940	260.2429	260.8413 (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	57.8092	58.0679	58.3237	59.5559	59.7922	60.9177	60.9177	61.1307	60.4792	59.7922	59.3160	58.8262		
alpha	4.8539	4.8712	4.8882	4.9704	4.9861	5.0612	5.0612	5.0754	5.0319	4.9861	4.9544	4.9217		
util living area	0.9979	0.9963	0.9915	0.9732	0.9141	0.7715	0.6058	0.6643	0.8931	0.9832	0.9961	0.9983	(86)	
MIT	19.9680	20.0609	20.2408	20.5019	20.7349	20.8885	20.9329	20.9256	20.8129	20.5188	20.2092	19.9627	(87)	
Th 2	19.9097	19.9140	19.9182	19.9382	19.9419	19.9594	19.9594	19.9626	19.9526	19.9419	19.9343	19.9264	(88)	
util rest of house	0.9971	0.9951	0.9883	0.9620	0.8768	0.6814	0.4746	0.5336	0.8321	0.9742	0.9945	0.9977	(89)	
MIT 2	18.5315	18.6706	18.9358	19.3268	19.6473	19.8405	19.8757	19.8753	19.7601	19.3580	18.9034	18.5369	(90)	
Living area fraction									fLA = Living area / (4) =			0.4543	(91)	
MIT	19.1840	19.3021	19.5286	19.8606	20.1414	20.3166	20.3560	20.3524	20.2383	19.8853	19.4966	19.1846	(92)	
Temperature adjustment												0.0000		
adjusted MIT	19.1840	19.3021	19.5286	19.8606	20.1414	20.3166	20.3560	20.3524	20.2383	19.8853	19.4966	19.1846	(93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9965	0.9941	0.9868	0.9610	0.8849	0.7149	0.5265	0.5854	0.8515	0.9736	0.9936	0.9972 (94)
Useful gains	271.7710	295.4225	321.1145	344.8799	338.5360	268.8968	187.9405	194.6861	257.7106	266.5702	258.5657	260.1036 (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	801.1990	771.8045	695.1350	572.6962	439.3239	292.0180	191.8650	201.1963	315.8360	483.2456	650.3486	792.6646 (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	393.8945	320.1287	278.2713	164.0277	74.9862	0.0000	0.0000	0.0000	0.0000	161.2065	282.0837	396.2254 (98)
Space heating												2070.8239 (98)
Space heating per m2											(98) / (4) =	46.6612 (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													2295.8136	(211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Space heating requirement	393.8945	320.1287	278.2713	164.0277	74.9862	0.0000	0.0000	0.0000	0.0000	161.2065	282.0837	396.2254	(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)	436.6901	354.9099	308.5047	181.8489	83.1333	0.0000	0.0000	0.0000	0.0000	178.7212	312.7314	439.2743	(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	115.9739	101.3990	104.6010	91.1644	87.4463	75.4352	69.9018	80.2392	81.2236	94.6887	103.3934	112.3146	(64)	
Efficiency of water heater (217)m	86.5817	86.3823	85.8889	84.6444	82.0813	76.2000	76.2000	76.2000	76.2000	84.4582	85.9637	86.6826	(216)	
Fuel for water heating, kWh/month	133.9474	117.3840	121.7865	107.7028	106.5361	98.9963	91.7347	105.3007	106.5926	112.1131	120.2755	129.5699	(219)	
Water heating fuel used												1351.9397	(219)	
Annual totals kWh/year														
Space heating fuel - main system													2295.8136	(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)													229.8263	(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													3270.1557	(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	2295.8136	0.2160	495.8957	(261)
Space heating - secondary	0.0000	0.0000	0.0000	(263)
Water heating (other fuel)	1351.9397	0.2160	292.0190	(264)
Space and water heating			787.9147	(265)
Pumps and fans	75.0000	0.5190	38.9250	(267)
Energy for lighting	229.8263	0.5190	119.2798	(268)
Energy saving/generation technologies				
PV Unit	-682.4239	0.5190	-354.1780	(269)
Total CO2, kg/year			591.9415	(272)
Dwelling Carbon Dioxide Emission Rate (DER)			13.3400	(273)

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

DER			13.3400	ZC1
Total Floor Area		TFA	44.3800	
Assumed number of occupants		N	1.5270	
CO2 emission factor in Table 12 for electricity displaced from grid		EF	0.5190	
CO2 emissions from appliances, equation (L14)			17.7166	ZC2
CO2 emissions from cooking, equation (L16)			3.5072	ZC3
Total CO2 emissions			34.5637	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			34.5637	ZC8

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CALCULATION OF TARGET EMISSIONS 09 Jan 2014

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1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	44.3800 (1b)	x 2.2700 (2b)	= 100.7426 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	44.3800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 100.7426 (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) = 0.1985 (8)
Measured/design AP50					Yes
Infiltration rate					5.0000
Number of sides sheltered					0.4485 (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) =	0.4149 (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	0.5290	0.5186	0.5082	0.4564	0.4460	0.3941	0.3941	0.3838	0.4149	0.4460	0.4667	0.4875 (22b)
Effective ac	0.6399	0.6345	0.6292	0.6041	0.5995	0.5777	0.5777	0.5736	0.5861	0.5995	0.6089	0.6188 (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)			3.6800	1.3258	4.8788		(27)
TER Room Window (Uw = 1.70)			1.1100	1.5918	1.7669		(27a)
External Wall 1	11.2700	3.6800	7.5900	0.1800	1.3662		(29a)
Stairwell	16.8000	2.1100	14.6900	0.1800	2.6442		(29a)
WT02	11.0400		11.0400	0.1800	1.9872		(29a)
External Roof 1	33.8000	1.1100	32.6900	0.1300	4.2497		(30)
External Roof 2	14.2200		14.2200	0.1300	1.8486		(30)
External Roof 3	5.4700		5.4700	0.1300	0.7111		(30)
Total net area of external elements Aum(A, m ²)			92.6000				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		21.5626		(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)							6.9822 (36)
Total fabric heat loss						(33) + (36) =	28.5448 (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	21.2738	21.0932	20.9162	20.0846	19.9291	19.2048	19.2048	19.0707	19.4838	19.9291	20.2438	20.5728 (38)
Heat transfer coeff	49.8187	49.6381	49.4610	48.6295	48.4739	47.7496	47.7496	47.6155	48.0286	48.4739	48.7886	49.1177 (39)
Average = Sum(39)m / 12 =												48.6287 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.1225	1.1185	1.1145	1.0958	1.0922	1.0759	1.0759	1.0729	1.0822	1.0922	1.0993	1.1068 (40)
HLP (average)												1.0957 (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												1.5270 (42)
Average daily hot water use (litres/day)												70.4662 (43)
Daily hot water use	77.5128	74.6942	71.8755	69.0569	66.2382	63.4196	63.4196	66.2382	69.0569	71.8755	74.6942	77.5128 (44)
Energy conte	114.9493	100.5354	103.7435	90.4461	86.7852	74.8890	69.3957	79.6326	80.5836	93.9125	102.5128	111.3223 (45)
Energy content (annual)												Total = Sum(45)m = 1108.7079 (45)
Distribution loss (46)m = 0.15 x (45)m	17.2424	15.0803	15.5615	13.5669	13.0178	11.2334	10.4094	11.9449	12.0875	14.0869	15.3769	16.6983 (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	39.4997	34.3798	36.6270	34.0555	33.7543	31.2754	32.3179	33.7543	34.0555	36.6270	36.8355	39.4997 (61)
Total heat required for water heating calculated for each month	154.4490	134.9152	140.3705	124.5016	120.5395	106.1644	101.7136	113.3868	114.6391	130.5394	139.3483	150.8219 (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	154.4490	134.9152	140.3705	124.5016	120.5395	106.1644	101.7136	113.3868	114.6391	130.5394	139.3483	150.8219 (64)
Heat gains from water heating, kWh/month	48.0956	42.0230	43.6515	38.5872	37.2946	32.7195	31.1535	34.9164	35.3079	40.3826	43.2944	46.8896 (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	76.3499	76.3499	76.3499	76.3499	76.3499	76.3499	76.3499	76.3499	76.3499	76.3499	76.3499	76.3499 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	13.3034	11.8159	9.6094	7.2749	5.4381	4.5911	4.9608	6.4482	8.6548	10.9893	12.8261	13.6731 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	132.6848	134.0616	130.5920	123.2056	113.8815	105.1183	99.2639	97.8870	101.3566	108.7431	118.0671	126.8304 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	30.6350	30.6350	30.6350	30.6350	30.6350	30.6350	30.6350	30.6350	30.6350	30.6350	30.6350	30.6350 (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)	-61.0799	-61.0799	-61.0799	-61.0799	-61.0799	-61.0799	-61.0799	-61.0799	-61.0799	-61.0799	-61.0799	-61.0799 (71)
Water heating gains (Table 5)	64.6446	62.5342	58.6713	53.5933	50.1272	45.4437	41.8730	46.9306	49.0388	54.2777	60.1311	63.0236 (72)
Total internal gains	259.5377	257.3167	247.7777	232.9788	218.3518	204.0580	195.0027	200.1709	207.9552	222.9150	239.9292	252.4321 (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				1.8500	10.6334	0.6300	0.7000	0.7700	6.0120 (74)			
West				1.8300	19.6403	0.6300	0.7000	0.7700	10.9842 (80)			
East				1.1100	26.0000	0.6300	0.7000	1.0000	11.4545 (82)			
Solar gains	28.4507	56.7668	97.2034	149.0522	190.0800	198.0814	187.1286	155.6142	115.2935	68.2500	35.6510	23.2965 (83)
Total gains	287.9884	314.0835	344.9811	382.0310	408.4318	402.1394	382.1313	355.7851	323.2487	291.1650	275.5803	275.7286 (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	61.8632	62.0883	62.3106	63.3761	63.5795	64.5438	64.5438	64.7256	64.1689	63.5795	63.1693	62.7461
alpha	5.1242	5.1392	5.1540	5.2251	5.2386	5.3029	5.3029	5.3150	5.2779	5.2386	5.2113	5.1831
util living area	0.9971	0.9950	0.9879	0.9606	0.8781	0.7082	0.5392	0.5968	0.8510	0.9754	0.9945	0.9977 (86)
MIT	19.8413	19.9642	20.1984	20.5267	20.8029	20.9554	20.9913	20.9856	20.8793	20.5292	20.1369	19.8267 (87)
Th 2	19.9825	19.9858	19.9890	20.0043	20.0072	20.0205	20.0205	20.0230	20.0154	20.0072	20.0014	19.9953 (88)
util rest of house	0.9962	0.9933	0.9836	0.9457	0.8337	0.6200	0.4247	0.4795	0.7819	0.9633	0.9924	0.9970 (89)
MIT 2	18.4424	18.6239	18.9662	19.4449	19.8124	19.9907	20.0173	20.0170	19.9170	19.4574	18.8878	18.4304 (90)
Living area fraction	19.0779	19.2328	19.5259	19.9363	20.2624	20.4289	20.4597	20.4570	20.3542	19.9443	19.4552	19.0647 (92)
Temperature adjustment	19.0779	19.2328	19.5259	19.9363	20.2624	20.4289	20.4597	20.4570	20.3542	19.9443	19.4552	19.0647 (93)
adjusted MIT	19.0779	19.2328	19.5259	19.9363	20.2624	20.4289	20.4597	20.4570	20.3542	19.9443	19.4552	19.0647 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9950	0.9916	0.9810	0.9445	0.8464	0.6585	0.4770	0.5331	0.8083	0.9623	0.9907	0.9960 (94)
Ext temp.	286.5547	311.4409	338.4339	360.8394	345.6887	264.8267	182.2843	189.6650	261.2926	280.1963	273.0284	274.6230 (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	736.2146	711.4506	644.2756	536.6918	415.0508	278.3282	184.3011	193.1762	300.3783	452.9525	602.7944	730.1178 (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	334.5470	268.8065	227.5462	126.6137	51.6054	0.0000	0.0000	0.0000	0.0000	128.5306	237.4315	338.8881 (98)
												1713.9690 (98)
												38.6203 (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													1835.0846 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	334.5470	268.8065	227.5462	126.6137	51.6054	0.0000	0.0000	0.0000	0.0000	128.5306	237.4315	338.8881	(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)	358.1873	287.8014	243.6255	135.5607	55.2520	0.0000	0.0000	0.0000	0.0000	137.6131	254.2094	362.8352	(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	154.4490	134.9152	140.3705	124.5016	120.5395	106.1644	101.7136	113.3868	114.6391	130.5394	139.3483	150.8219	(64)
Efficiency of water heater (217)m	86.9459	86.7535	86.2605	85.0935	83.0827	80.3000	80.3000	80.3000	80.3000	85.0122	86.3817	87.0287	(216)
Fuel for water heating, kWh/month	177.6380	155.5155	162.7285	146.3114	145.0837	132.2098	126.6670	141.2040	142.7635	153.5538	161.3169	173.3013	(219)
Water heating fuel used												1818.2935	(219)
Annual totals kWh/year													
Space heating fuel - main system												1835.0846	(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)												234.9418	(232)
Total delivered energy for all uses												3963.3198	(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	1835.0846	0.2160	396.3783 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1818.2935	0.2160	392.7514 (264)
Space and water heating			789.1297 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	234.9418	0.5190	121.9348 (268)
Total CO2, kg/m2/year			949.9894 (272)
Emissions per m2 for space and water heating			17.7812 (272a)
Fuel factor (mains gas)			1.0000
Emissions per m2 for lighting			2.7475 (272b)
Emissions per m2 for pumps and fans			0.8771 (272c)
Target Carbon Dioxide Emission Rate (TER) = (17.7812 * 1.00) + 2.7475 + 0.8771, rounded to 2 d.p.			21.4100 (273)