

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

Property Reference	010579			Issued on Date	10/02/2022
Assessment Reference	B09-TY-03_3	Prop Type Ref	B09-TY-03		
Property	London				
SAP Rating	85 B	DER	9.82	TER	22.13
Environmental	92 A	% DER<TER	55.63		
CO ₂ Emissions (t/year)	0.83	DFEE	43.05	TFEE	46.24
General Requirements Compliance	Fail	% DFEE<TFEE	6.89		
Assessor Details	Miss Emma Jolly, Emma Jolly, Tel: 01454806691, emmajolly@hoarelea.com			Assessor ID	T689-0001
Client					

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

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DWELLING AS DESIGNED

Mid-floor flat, total floor area 102 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:Electricity (c)
Fuel factor:1.55 (electricity)
Target Carbon Dioxide Emission Rate (TER) 22.13 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 9.82 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)46.2 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)43.1 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.16 (max. 0.30)	0.20 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	(no floor)		
Roof	(no roof)		
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: 3.00 (design value)
Maximum 10.0 OK

4 Heating efficiency

Main heating system: Community heating scheme -
Secondary heating system: None

5 Cylinder insulation

Hot water storage Nominal cylinder loss: 0.10 kWh/day
Permitted by DBSCG 0.29 OK
Primary pipework insulated: Yes (assumed) OK

6 Controls

Space heating controls: Charging system linked to use of community heating, TRVsOK
Hot water controls: No cylinderstat Fail

7 Low energy lights

Percentage of fixed lights with low-energy fittings:100%
Minimum 75% OK

8 Mechanical ventilation

Continuous supply and extract system
Specific fan power: 0.63
Maximum 1.5 OK
MVHR efficiency: 90%
Minimum: 70% OK

9 Summertime temperature

Overheating risk (Thames Valley): Medium OK
Based on:
Overshading: Average
Windows facing North: 13.83 m², No overhang
Windows facing East: 15.89 m², Overhang width less than twice window, ratio 0.62
Air change rate: 2.50 ach
Blinds/curtains: Dark-coloured curtain or roller blind, closed 100% of daylight hours

10 Key features

External wall U-value 0.12 W/m²K
External wall U-value 0.12 W/m²K
Party wall U-value 0.00 W/m²K
Party wall U-value 0.00 W/m²K
Air permeability 3.0 m³/m²h
Photovoltaic array 350.00 kWh/Year

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CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

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

1. Overall dwelling dimensions

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	102.3000 (1b)	x 2.6000 (2b)	= 265.9800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	102.3000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 265.9800 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour
Number of chimneys	0	0	0	0 * 40 =	0.0000 (6a)
Number of open flues	0	0	0	0 * 20 =	0.0000 (6b)
Number of intermittent fans				0 * 10 =	0.0000 (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) =				0.0000 / (5) =	0.0000 (8)
Pressure test				Yes	
Measured/design AP50				3.0000	
Infiltration rate				0.1500	(18)
Number of sides sheltered				2	(19)
Shelter factor			(20) = 1 - [0.075 x (19)] =		0.8500 (20)
Infiltration rate adjusted to include shelter factor			(21) = (18) x (20) =		0.1275 (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	0.1626	0.1594	0.1562	0.1403	0.1371	0.1211	0.1211	0.1179	0.1275	0.1371	0.1434	0.1498 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation:												0.5000 (23a)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												76.5000 (23c)
Effective ac	0.2801	0.2769	0.2737	0.2578	0.2546	0.2386	0.2386	0.2354	0.2450	0.2546	0.2609	0.2673 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Opening Type 1 (Uw = 1.30)			29.7200	1.2357	36.7262		(27)
Opening Type 6			1.8000	1.4000	2.5200		(26)
External 1	36.1400	13.8300	22.3100	0.1200	2.6772		(29a)
External 2	23.1400	15.8900	7.2500	0.1200	0.8700		(29a)
Sheltered 1	23.1400		23.1400	0.2000	4.6280		(29a)
Sheltered 2	10.1400	1.8000	8.3400	0.2000	1.6680		(29a)
Total net area of external elements Aum(A, m2)			92.5600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	49.0894		(33)
Part 2			14.3000	0.0000	0.0000		(32)
Party 1			18.4600	0.0000	0.0000		(32)
Party Floor 1			102.3000				(32d)
Party Ceiling 1			102.3000				(32b)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							100.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							10.3826 (36)
Total fabric heat loss						(33) + (36) =	59.4720 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Jan	24.5820	24.3023	24.0225	22.6236	22.3438	20.9449	20.9449	20.6651	21.5045	22.3438	22.9034	23.4629 (38)
Heat transfer coeff	84.0541	83.7743	83.4945	82.0956	81.8159	80.4170	80.4170	80.1372	80.9765	81.8159	82.3754	82.9350 (39)
Average = Sum(39)m / 12 =												82.0257 (39)
HLP	0.8216	0.8189	0.8162	0.8025	0.7998	0.7861	0.7861	0.7834	0.7916	0.7998	0.8052	0.8107 (40)
HLP (average)												0.8018 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												2.7598 (42)
Average daily hot water use (litres/day)												99.7458 (43)
Daily hot water use	109.7203	105.7305	101.7407	97.7508	93.7610	89.7712	89.7712	93.7610	97.7508	101.7407	105.7305	109.7203 (44)

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Energy content (annual)	162.7121	142.3090	146.8502	128.0275	122.8455	106.0063	98.2304	112.7208	114.0671	132.9342	145.1081	157.5780 (45)
Distribution loss (46)m = 0.15 x (45)m	24.4068	21.3464	22.0275	19.2041	18.4268	15.9009	14.7346	16.9081	17.1101	19.9401	21.7662	23.6367 (46)
Water storage loss:												
Store volume												1.0000 (47)
b) If manufacturer declared loss factor is not known :												
Hot water storage loss factor from Table 2 (kWh/litre/day)												0.0212 (51)
Volume factor from Table 2a												4.9324 (52)
Temperature factor from Table 2b												0.7800 (53)
Enter (49) or (54) in (55)												0.0815 (55)
Total storage loss	2.5256	2.2812	2.5256	2.4442	2.5256	2.4442	2.5256	2.5256	2.4442	2.5256	2.4442	2.5256 (56)
If cylinder contains dedicated solar storage	2.5256	2.2812	2.5256	2.4442	2.5256	2.4442	2.5256	2.5256	2.4442	2.5256	2.4442	2.5256 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Total heat required for water heating calculated for each month	188.5001	165.6015	172.6382	152.9837	148.6335	130.9625	124.0185	138.5089	139.0233	158.7222	170.0642	183.3660 (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	188.5001	165.6015	172.6382	152.9837	148.6335	130.9625	124.0185	138.5089	139.0233	158.7222	170.0642	183.3660 (64)
Heat gains from water heating, kWh/month	74.7322	65.9517	69.4581	62.5341	61.4765	55.2120	53.2920	58.1101	57.8922	64.8310	68.2134	73.0251 (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	137.9911	137.9911	137.9911	137.9911	137.9911	137.9911	137.9911	137.9911	137.9911	137.9911	137.9911	137.9911 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	23.1786	20.5870	16.7425	12.6751	9.4748	7.9990	8.6432	11.2348	15.0793	19.1467	22.3470	23.8228 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	259.9933	262.6912	255.8925	241.4190	223.1487	205.9773	194.5057	191.8078	198.6064	213.0800	231.3502	248.5217 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.7991	36.7991	36.7991	36.7991	36.7991	36.7991	36.7991	36.7991	36.7991	36.7991	36.7991	36.7991 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-110.3929	-110.3929	-110.3929	-110.3929	-110.3929	-110.3929	-110.3929	-110.3929	-110.3929	-110.3929	-110.3929	-110.3929 (71)
Water heating gains (Table 5)	100.4465	98.1424	93.3577	86.8529	82.6298	76.6834	71.6291	78.1050	80.4059	87.1385	94.7408	98.1520 (72)
Total internal gains	448.0157	445.8179	430.3900	405.3444	379.6507	355.0570	339.1753	345.5449	358.4890	383.7625	412.8354	434.8938 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	Specific data or Table 6c	FF	Access factor Table 6d	Gains W					
North	13.8300	10.6334	0.2900	0.8000	0.8000	0.7700	23.6437 (74)					
East	15.8900	19.6403	0.2900	0.8000	0.8000	0.7700	50.1756 (76)					
Solar gains	73.8193	143.3384	238.4250	359.0778	455.0542	473.6126	447.6237	373.6074	280.3142	170.2541	91.7306	60.9725 (83)
Total gains	521.8350	589.1563	668.8150	764.4222	834.7049	828.6696	786.7991	719.1523	638.8032	554.0166	504.5660	495.8663 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation factor for gains for living area, nil,m (see Table 9a)	33.8076	33.9205	34.0342	34.6141	34.7325	35.3367	35.3367	35.4600	35.0925	34.7325	34.4965	34.2638
tau	3.2538	3.2614	3.2689	3.3076	3.3155	3.3558	3.3558	3.3640	3.3395	3.3155	3.2998	3.2843
util living area	0.9745	0.9611	0.9301	0.8568	0.7315	0.5666	0.4322	0.4847	0.7156	0.9002	0.9614	0.9781 (86)
MIT	19.2360	19.4562	19.8376	20.3281	20.7013	20.9099	20.9725	20.9599	20.7974	20.3001	19.6912	19.2024 (87)
Th 2	20.2346	20.2370	20.2393	20.2512	20.2535	20.2654	20.2654	20.2678	20.2607	20.2535	20.2488	20.2441 (88)
util rest of house	0.9711	0.9558	0.9206	0.8374	0.6966	0.5139	0.3658	0.4162	0.6671	0.8824	0.9554	0.9751 (89)
MIT 2	17.8314	18.1517	18.7021	19.4028	19.9090	20.1783	20.2451	20.2365	20.0482	19.3775	18.5027	17.7887 (90)
Living area fraction	18.4465	18.7230	19.1994	19.8080	20.2560	20.4987	20.5637	20.5533	20.3763	19.7815	19.0232	18.4078 (92)
MIT	18.4465	18.7230	19.1994	19.8080	20.2560	20.4987	20.5637	20.5533	20.3763	19.7815	19.0232	18.4078 (93)
Temperature adjustment												0.0000
adjusted MIT	18.4465	18.7230	19.1994	19.8080	20.2560	20.4987	20.5637	20.5533	20.3763	19.7815	19.0232	18.4078 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	501.1308	555.3138	605.1643	630.2985	581.5586	440.1486	309.4229	318.9632	431.3060	481.5456	475.6738	478.7106 (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	1189.0723	1158.0123	1060.3311	895.4972	700.0134	474.3548	318.7462	332.8339	508.2345	751.1918	982.1766	1178.3217 (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	511.8285	405.0134	338.6441	190.9431	88.1304	0.0000	0.0000	0.0000	0.0000	200.6168	364.6821	520.5107 (98)

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Space heating 2620.3691 (98)
 Space heating per m2 (98) / (4) = 25.6146 (99)

 8c. Space cooling requirement

Not applicable

 9b. Energy requirements

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (301)
Fraction of space heat from community system	1.0000 (302)
Fraction of heat from community Heat pump	1.0000 (303a)
Fraction of total space heat from community Heat pump	1.0000 (304a)
Factor for control and charging method (Table 4c(3)) for community space heating	1.0000 (305)
Factor for control and charging method (Table 4c(3)) for community water heating	1.0000 (305a)
Distribution loss factor (Table 12c) for community heating system	1.0500 (306)
Space heating:	
Annual space heating requirement	2620.3691 (98)
Space heat from Heat pump = (98) x 1.00 x 1.00 x 1.05	2751.3876 (307a)
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)	0.0000 (308)
Space heating fuel for secondary/supplementary system	0.0000 (309)
Water heating	
Annual water heating requirement	1873.0225 (64)
Water heat from Heat pump = (64) x 1.00 x 1.00 x 1.05	1966.6737 (310a)
Electricity used for heat distribution	47.1806 (313)
Annual totals kWh/year	
Electricity for pumps and fans:	
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7875)	
mechanical ventilation fans (SFP = 0.7875)	255.5403 (330a)
Total electricity for the above, kWh/year	255.5403 (331)
Electricity for lighting (calculated in Appendix L)	409.3412 (332)
Energy saving/generation technologies (Appendices M ,N and Q)	
Total delivered energy for all uses	5382.9427 (338)

 12b. Carbon dioxide emissions - Community heating scheme

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Efficiency of heat source Heat pump			300.0000	(367a)
Space heating from Heat pump	1572.6871	0.5190	816.2246	(367)
Electrical energy for heat distribution	47.1806	0.5190	24.4867	(372)
Total CO2 associated with community systems (negative value allowed since DFEE <= TFEE)			840.7113	(373)
Space and water heating			840.7113	(376)
Pumps and fans	255.5403	0.5190	132.6254	(378)
Energy for lighting	409.3412	0.5190	212.4481	(379)
Energy saving/generation technologies				
PV Unit	-350.0000	0.5190	-181.6500	(380)
Total CO2, kg/year			1004.1348	(383)
Dwelling Carbon Dioxide Emission Rate (DER)			9.8200	(384)

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

DER	9.8200	ZC1
Total Floor Area	TFA 102.3000	
Assumed number of occupants	N 2.7598	
CO2 emission factor in Table 12 for electricity displaced from grid	EF 0.5190	
CO2 emissions from appliances, equation (L14)	15.0603	ZC2
CO2 emissions from cooking, equation (L16)	1.8107	ZC3
Total CO2 emissions	26.6910	ZC4
Residual CO2 emissions offset from biofuel CHP	0.0000	ZC5
Additional allowable electricity generation, kWh/m ² /year	0.0000	ZC6
Resulting CO2 emissions offset from additional allowable electricity generation	0.0000	ZC7
Net CO2 emissions	26.6910	ZC8

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CALCULATION OF TARGET EMISSIONS 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (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	102.3000 (1b)	x 2.6000 (2b)	= 265.9800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	102.3000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 265.9800 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	0	0	0 * 40 =	0.0000 (6a)
Number of open flues	0	0	0	0 * 20 =	0.0000 (6b)
Number of intermittent fans				4 * 10 =	40.0000 (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) =				40.0000 / (5) =	0.1504 (8)
Pressure test					Yes
Measured/design AP50					5.0000
Infiltration rate					0.4004 (18)
Number of sides sheltered					2 (19)
Shelter factor				(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor				(21) = (18) x (20) =	0.3403 (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	0.4339	0.4254	0.4169	0.3744	0.3659	0.3233	0.3233	0.3148	0.3403	0.3659	0.3829	0.3999 (22b)
	0.5941	0.5905	0.5869	0.5701	0.5669	0.5523	0.5523	0.5496	0.5579	0.5669	0.5733	0.5800 (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			1.8000	1.0000	1.8000		(26)					
TER Opening Type (Uw = 1.40)			23.7600	1.3258	31.5000		(27)					
External 1	36.1400	11.0600	25.0800	0.1800	4.5144		(29a)					
External 2	23.1400	12.7000	10.4400	0.1800	1.8792		(29a)					
Sheltered 1	23.1400		23.1400	0.1800	4.1652		(29a)					
Sheltered 2	10.1400	1.8000	8.3400	0.1800	1.5012		(29a)					
Total net area of external elements Aum(A, m ²)			92.5600				(31)					
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 45.3600		(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)							7.3160 (36)					
Total fabric heat loss							(33) + (36) = 52.6760 (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	52.1500	51.8291	51.5146	50.0373	49.7609	48.4742	48.4742	48.2360	48.9698	49.7609	50.3200	50.9046 (38)
Heat transfer coeff	104.8260	104.5051	104.1906	102.7133	102.4369	101.1502	101.1502	100.9120	101.6458	102.4369	102.9960	103.5806 (39)
Average = Sum(39)m / 12 =												102.7120 (39)
HLP	1.0247	1.0216	1.0185	1.0040	1.0013	0.9888	0.9888	0.9864	0.9936	1.0013	1.0068	1.0125 (40)
HLP (average)												1.0040 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												2.7598 (42)
Average daily hot water use (litres/day)												99.7458 (43)
Daily hot water use	109.7203	105.7305	101.7407	97.7508	93.7610	89.7712	89.7712	93.7610	97.7508	101.7407	105.7305	109.7203 (44)
Energy conte	162.7121	142.3090	146.8502	128.0275	122.8455	106.0063	98.2304	112.7208	114.0671	132.9342	145.1081	157.5780 (45)
Energy content (annual)												Total = Sum(45)m = 1569.3892 (45)
Distribution loss (46)m = 0.15 x (45)m												24.4068 (46)
Water storage loss:	24.4068	21.3464	22.0275	19.2041	18.4268	15.9009	14.7346	16.9081	17.1101	19.9401	21.7662	23.6367 (46)
Store volume												1.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												0.2134 (48)
Temperature factor from Table 2b												0.5400 (49)

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Enter (49) or (54) in (55)												0.1152 (55)
Total storage loss												
	3.5715	3.2259	3.5715	3.4563	3.5715	3.4563	3.5715	3.5715	3.4563	3.5715	3.4563	3.5715 (56)
If cylinder contains dedicated solar storage												
	3.5715	3.2259	3.5715	3.4563	3.5715	3.4563	3.5715	3.5715	3.4563	3.5715	3.4563	3.5715 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624 (59)
Total heat required for water heating calculated for each month												
	189.5460	166.5461	173.6841	153.9958	149.6794	131.9746	125.0643	139.5547	140.0354	159.7681	171.0763	184.4119 (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)
												Solar input (sum of months) = Sum(63)m = 0.0000 (63)
Output from w/h												
	189.5460	166.5461	173.6841	153.9958	149.6794	131.9746	125.0643	139.5547	140.0354	159.7681	171.0763	184.4119 (64)
												Total per year (kWh/year) = Sum(64)m = 1885.3365 (64)
Heat gains from water heating, kWh/month												
	75.5689	66.7074	70.2948	63.3438	62.3132	56.0217	54.1287	58.9468	58.7019	65.6677	69.0231	73.8618 (65)

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

Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	137.9911	137.9911	137.9911	137.9911	137.9911	137.9911	137.9911	137.9911	137.9911	137.9911	137.9911	137.9911 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	23.1786	20.5870	16.7425	12.6751	9.4748	7.9990	8.6432	11.2348	15.0793	19.1467	22.3470	23.8228 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	259.9933	262.6912	255.8925	241.4190	223.1487	205.9773	194.5057	191.8078	198.6064	213.0800	231.3502	248.5217 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	36.7991	36.7991	36.7991	36.7991	36.7991	36.7991	36.7991	36.7991	36.7991	36.7991	36.7991	36.7991 (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)												
	-110.3929	-110.3929	-110.3929	-110.3929	-110.3929	-110.3929	-110.3929	-110.3929	-110.3929	-110.3929	-110.3929	-110.3929 (71)
Water heating gains (Table 5)												
	101.5711	99.2670	94.4822	87.9775	83.7543	77.8079	72.7537	79.2296	81.5305	88.2631	95.8653	99.2766 (72)
Total internal gains	452.1403	449.9425	434.5146	409.4689	383.7752	359.1816	343.2999	349.6695	362.6136	387.8871	416.9599	439.0184 (73)

6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access	Gains						
	m ²	Table 6a	Specific data	Specific data	factor	W						
		W/m ²	or Table 6b	or Table 6c	Table 6d							
North	11.0600	10.6334	0.6300	0.7000		35.9417 (74)						
East	12.7000	19.6403	0.6300	0.7000		76.2295 (76)						
Solar gains	112.1712	217.8075	362.2961	545.6397	691.4901	719.6954	680.2013	567.7213	425.9503	258.7069	139.3879	92.6502 (83)
Total gains	564.3115	667.7500	796.8107	955.1086	1075.2654	1078.8769	1023.5012	917.3908	788.5638	646.5940	556.3478	531.6686 (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	67.7711	67.9791	68.1844	69.1650	69.3516	70.2338	70.2338	70.3997	69.8914	69.3516	68.9751	68.5859
alpha	5.5181	5.5319	5.5456	5.6110	5.6234	5.6823	5.6823	5.6933	5.6594	5.6234	5.5983	5.5724
util living area	0.9987	0.9964	0.9862	0.9359	0.7933	0.5864	0.4327	0.5008	0.7959	0.9754	0.9969	0.9991 (86)
MIT	19.8848	20.0438	20.3181	20.6709	20.9059	20.9861	20.9979	20.9955	20.9303	20.5899	20.1733	19.8616 (87)
Th 2	20.0628	20.0654	20.0680	20.0800	20.0822	20.0927	20.0927	20.0947	20.0887	20.0822	20.0777	20.0729 (88)
util rest of house	0.9982	0.9951	0.9814	0.9150	0.7399	0.5091	0.3446	0.4050	0.7224	0.9636	0.9957	0.9987 (89)
MIT 2	18.5643	18.7982	19.1978	19.7009	19.9951	20.0840	20.0919	20.0928	20.0346	19.6009	18.9970	18.5378 (90)
Living area fraction												fLA = Living area / (4) = 0.4379 (91)
MIT	19.1426	19.3437	19.6884	20.1257	20.3940	20.4791	20.4887	20.4881	20.4269	20.0340	19.5122	19.1175 (92)
Temperature adjustment												0.0000
adjusted MIT	19.1426	19.3437	19.6884	20.1257	20.3940	20.4791	20.4887	20.4881	20.4269	20.0340	19.5122	19.1175 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9976	0.9938	0.9789	0.9162	0.7591	0.5426	0.3833	0.4471	0.7517	0.9629	0.9946	0.9983 (94)
Ext temp.	562.9750	663.6419	780.0336	875.0746	816.2336	585.4522	392.2827	410.1298	592.7349	622.5844	553.3539	530.7545 (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	1555.8874	1509.4395	1374.1079	1153.0313	890.5848	594.6682	393.3417	412.5400	643.0999	966.3903	1278.4032	1545.1634 (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	738.7269	568.3760	441.9912	200.1288	55.3173	0.0000	0.0000	0.0000	0.0000	255.7916	522.0355	754.7202 (98)
												3537.0874 (98)
												(98) / (4) = 34.5756 (99)

8c. Space cooling requirement

Not applicable

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
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 %)													93.5000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													3782.9812 (211)
Space heating requirement	738.7269	568.3760	441.9912	200.1288	55.3173	0.0000	0.0000	0.0000	0.0000	255.7916	522.0355	754.7202	(98)
Space heating efficiency (main heating system 1)	93.5000	93.5000	93.5000	93.5000	93.5000	0.0000	0.0000	0.0000	0.0000	93.5000	93.5000	93.5000	(210)
Space heating fuel (main heating system)	790.0822	607.8887	472.7179	214.0415	59.1629	0.0000	0.0000	0.0000	0.0000	273.5739	558.3267	807.1874	(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	189.5460	166.5461	173.6841	153.9958	149.6794	131.9746	125.0643	139.5547	140.0354	159.7681	171.0763	184.4119	(64)
Efficiency of water heater (217)m	88.0882	87.8312	87.2015	85.5138	82.4299	79.8000	79.8000	79.8000	79.8000	86.0633	87.6008	88.1783	(216)
Fuel for water heating, kWh/month	215.1774	189.6207	199.1755	180.0830	181.5839	165.3817	156.7222	174.8806	175.4829	185.6401	195.2908	209.1352	(219)
Water heating fuel used													2228.1740 (219)
Annual totals kWh/year													
Space heating fuel - main system													3782.9812 (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)													409.3412 (232)
Total delivered energy for all uses													6495.4963 (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	3782.9812	0.2160	817.1239	(261)
Space heating - secondary	0.0000	0.0000	0.0000	(263)
Water heating (other fuel)	2228.1740	0.2160	481.2856	(264)
Space and water heating			1298.4095	(265)
Pumps and fans	75.0000	0.5190	38.9250	(267)
Energy for lighting	409.3412	0.5190	212.4481	(268)
Total CO2, kg/m2/year			1549.7826	(272)
Emissions per m2 for space and water heating			12.6922	(272a)
Fuel factor (electricity)			1.5500	
Emissions per m2 for lighting			2.0767	(272b)
Emissions per m2 for pumps and fans			0.3805	(272c)
Target Carbon Dioxide Emission Rate (TER) = (12.6922 * 1.55) + 2.0767 + 0.3805, rounded to 2 d.p.			22.1300	(273)