

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

Property Reference	010561			Issued on Date	10/02/2022
Assessment Reference	B09-TY-01_3	Prop Type Ref	B09-TY-01		
Property	London				
SAP Rating	84 B	DER	14.59	TER	14.62
Environmental	88 B	% DER<TER	0.17		
CO ₂ Emissions (t/year)	1.07	DFEE	39.55	TFEE	36.62
General Requirements Compliance	Fail	% DFEE<TFEE	-7.99		
Assessor Details	Miss Emma Jolly, Emma Jolly, Tel: 01454806691, emmajolly@hoarelea.com			Assessor ID	T689-0001
Client					

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

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

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

DWELLING AS DESIGNED

Mid-floor flat, total floor area 84 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 (c)
Fuel factor:1.00 (mains gas)
Target Carbon Dioxide Emission Rate (TER) 14.62 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 14.59 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)36.6 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)39.5 kWh/m²/yrFail
Excess energy =2.9 kWh/m²/yr (7.9%)

2 Fabric U-values

Element	Average	Highest	
External wall	0.14 (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	No cylinder
-------------------	-------------

6 Controls

Space heating controls:	Charging system linked to use of community heating, TRVsOK
-------------------------	--

Hot water controls:

No cylinder

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:	0.55
Maximum	1.5 OK
MVHR efficiency:	92%
Minimum:	70% OK

9 Summertime temperature

Overheating risk (Thames Valley):	Medium	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average
Windows facing South:	13.15 m ² , No overhang
Windows facing West:	15.38 m ² , No overhang
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/m ² K
External wall U-value	0.12 W/m ² K
Party wall U-value	0.00 W/m ² K
Party wall U-value	0.00 W/m ² K
Air permeability	3.0 m ³ /m ² h

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

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	84.4000 (1b)	x 2.6000 (2b)	= 219.4400 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	84.4000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 219.4400 (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					0.1371	0.1211	0.1211	0.1179	0.1275	0.1371	0.1434	0.1498 (22b)
Balanced mechanical ventilation with heat recovery	0.1626	0.1594	0.1562	0.1403								
If mechanical ventilation:												0.5000 (23a)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												78.2000 (23c)
Effective ac	0.2716	0.2684	0.2652	0.2493	0.2461	0.2301	0.2301	0.2269	0.2365	0.2461	0.2524	0.2588 (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)			28.5300	1.2357	35.2557		(27)
Opening Type 6			1.8000	1.4000	2.5200		(26)
External 1	31.2000	15.3800	15.8200	0.1200	1.8984		(29a)
External 2	20.2800	13.1500	7.1300	0.1200	0.8556		(29a)
Sheltered 1	6.7600		6.7600	0.2000	1.3520		(29a)
Sheltered 2	4.4200	1.8000	2.6200	0.2000	0.5240		(29a)
Total net area of external elements Aum(A, m2)			62.6600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	42.4057		(33)
Part 2			25.2200	0.0000	0.0000		(32)
Party 1			11.4400	0.0000	0.0000		(32)
Party Floor 1			84.4000				(32d)
Party Ceiling 1			84.4000				(32b)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							100.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							8.9842 (36)
Total fabric heat loss						(33) + (36) =	51.3899 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	19.6653	19.4344	19.2036	18.0495	17.8187	16.6645	16.6645	16.4337	17.1262	17.8187	18.2803	18.7420 (38)
Heat transfer coeff	71.0552	70.8243	70.5935	69.4394	69.2086	68.0545	68.0545	67.8236	68.5161	69.2086	69.6702	70.1319 (39)
Average = Sum(39)m / 12 =												69.3817 (39)
HLP	0.8419	0.8392	0.8364	0.8227	0.8200	0.8063	0.8063	0.8036	0.8118	0.8200	0.8255	0.8309 (40)
HLP (average)												0.8221 (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												2.5411 (42)
Average daily hot water use (litres/day)												94.5503 (43)
Daily hot water use	104.0054	100.2234	96.4413	92.6593	88.8773	85.0953	85.0953	88.8773	92.6593	96.4413	100.2234	104.0054 (44)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Energy content (annual)	154.2370	134.8966	139.2012	121.3590	116.4469	100.4848	93.1139	106.8496	108.1257	126.0101	137.5499	149.3703 (45)
Distribution loss (46)m = 0.15 x (45)m	23.1355	20.2345	20.8802	18.2039	17.4670	15.0727	13.9671	16.0274	16.2189	18.9015	20.6325	22.4055 (46)
Water storage loss:												
Store volume												110.0000 (47)
b) If manufacturer declared loss factor is not known :												
Hot water storage loss factor from Table 2 (kWh/litre/day)												0.0152 (51)
Volume factor from Table 2a												1.0294 (52)
Temperature factor from Table 2b												0.6000 (53)
Enter (49) or (54) in (55)												1.0327 (55)
Total storage loss	32.0144	28.9162	32.0144	30.9817	32.0144	30.9817	32.0144	32.0144	30.9817	32.0144	30.9817	32.0144 (56)
If cylinder contains dedicated solar storage	32.0144	28.9162	32.0144	30.9817	32.0144	30.9817	32.0144	32.0144	30.9817	32.0144	30.9817	32.0144 (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	209.5138	184.8241	194.4780	174.8527	171.7237	153.9785	148.3907	162.1264	161.6194	181.2869	191.0436	204.6471 (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	209.5138	184.8241	194.4780	174.8527	171.7237	153.9785	148.3907	162.1264	161.6194	181.2869	191.0436	204.6471 (64)
Heat gains from water heating, kWh/month	95.5052	84.7951	90.5059	83.1468	82.9400	76.2061	75.1818	79.7489	78.7467	86.1198	88.5303	93.8871 (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	127.0533	127.0533	127.0533	127.0533	127.0533	127.0533	127.0533	127.0533	127.0533	127.0533	127.0533	127.0533 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	20.3612	18.0846	14.7074	11.1344	8.3231	7.0267	7.5926	9.8692	13.2464	16.8194	19.6307	20.9271 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	228.3904	230.7604	224.7881	212.0739	196.0244	180.9402	170.8630	168.4930	174.4653	187.1795	203.2290	218.3132 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.7053	35.7053	35.7053	35.7053	35.7053	35.7053	35.7053	35.7053	35.7053	35.7053	35.7053	35.7053 (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)	-101.6427	-101.6427	-101.6427	-101.6427	-101.6427	-101.6427	-101.6427	-101.6427	-101.6427	-101.6427	-101.6427	-101.6427 (71)
Water heating gains (Table 5)	128.3672	126.1832	121.6477	115.4817	111.4785	105.8419	101.0508	107.1894	109.3705	115.7524	122.9587	126.1923 (72)
Total internal gains	438.2348	436.1442	422.2592	399.8060	376.9421	354.9248	340.6225	346.6676	358.1982	380.8673	406.9344	426.5486 (73)

6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access factor	Gains						
	m2	Table 6a	Specific data	Specific data	Table 6d	W						
		W/m2	or Table 6b	or Table 6c								
South	13.1500	46.7521	0.2900	0.8000	0.7700	98.8434 (78)						
West	15.3800	19.6403	0.2900	0.8000	0.7700	48.5652 (80)						
Solar gains	147.4086	256.8838	362.6641	461.2423	522.5092	519.9904	500.8998	455.8767	397.3738	287.3328	177.7182	125.3474 (83)
Total gains	585.6434	693.0280	784.9233	861.0483	899.4513	874.9152	841.5222	802.5444	755.5719	668.2001	584.6526	551.8960 (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	32.9947	33.1022	33.2105	33.7625	33.8751	34.4495	34.4495	34.5668	34.2174	33.8751	33.6506	33.4291
alpha	3.1996	3.2068	3.2140	3.2508	3.2583	3.2966	3.2966	3.3045	3.2812	3.2583	3.2434	3.2286
util living area	0.9442	0.9094	0.8525	0.7553	0.6255	0.4714	0.3481	0.3781	0.5676	0.7928	0.9126	0.9521 (86)
MIT	19.4984	19.7901	20.1582	20.5467	20.8064	20.9445	20.9844	20.9794	20.8948	20.5458	19.9629	19.4465 (87)
Th 2	20.2172	20.2195	20.2219	20.2337	20.2360	20.2478	20.2478	20.2502	20.2431	20.2360	20.2313	20.2266 (88)
util rest of house	0.9373	0.8988	0.8359	0.7293	0.5880	0.4225	0.2913	0.3200	0.5177	0.7644	0.9007	0.9461 (89)
MIT 2	18.1970	18.6140	19.1347	19.6775	20.0195	20.1960	20.2368	20.2349	20.1386	19.6895	18.8750	18.1289 (90)
Living area fraction	18.8662	19.2188	19.6610	20.1245	20.4241	20.5809	20.6212	20.6178	20.5274	20.1298	19.4344	0.5142 (91)
MIT	18.8662	19.2188	19.6610	20.1245	20.4241	20.5809	20.6212	20.6178	20.5274	20.1298	19.4344	18.8064 (92)
Temperature adjustment												0.0000
adjusted MIT	18.8662	19.2188	19.6610	20.1245	20.4241	20.5809	20.6212	20.6178	20.5274	20.1298	19.4344	18.8064 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9227	0.8830	0.8226	0.7254	0.5976	0.4445	0.3197	0.3488	0.5369	0.7602	0.8861	0.9324 (94)
Ext temp.	540.3893	611.9594	645.6486	624.5631	537.4737	388.8823	269.0755	279.9005	405.6904	507.9360	518.0776	514.6089 (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	1035.0036	1014.1171	929.0789	779.4191	603.7838	407.0250	273.6636	286.0634	440.3813	659.5468	859.3403	1024.3769 (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)
	367.9930	270.2500	210.8721	111.4963	49.3347	0.0000	0.0000	0.0000	0.0000	112.7985	245.7092	379.2673 (98)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Space heating 1747.7211 (98)
 Space heating per m2 (98) / (4) = 20.7076 (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 Boilers	1.0000 (303a)
Fraction of total space heat from community Boilers	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	1747.7211 (98)
Space heat from Boilers = (98) x 1.00 x 1.00 x 1.05	1835.1071 (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	2138.4847 (64)
Water heat from Boilers = (64) x 1.00 x 1.00 x 1.05	2245.4090 (310a)
Electricity used for heat distribution	40.8052 (313)
Annual totals kWh/year	
Electricity for pumps and fans:	
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.6875)	
mechanical ventilation fans (SFP = 0.6875)	184.0553 (330a)
Total electricity for the above, kWh/year	184.0553 (331)
Electricity for lighting (calculated in Appendix L)	359.5847 (332)
Total delivered energy for all uses	4624.1560 (338)

 12b. Carbon dioxide emissions - Community heating scheme

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Efficiency of heat source Boilers			95.0000 (367a)
Space heating from Boilers	4295.2801	0.2160	927.7805 (367)
Electrical energy for heat distribution	40.8052	0.5190	21.1779 (372)
Total CO2 associated with community systems (negative value allowed since DFEE <= TFEE)			948.9584 (373)
Space and water heating			948.9584 (376)
Pumps and fans	184.0553	0.5190	95.5247 (378)
Energy for lighting	359.5847	0.5190	186.6244 (379)
Total CO2, kg/year			1231.1075 (383)
Dwelling Carbon Dioxide Emission Rate (DER)			14.5900 (384)

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

DER		14.5900 ZC1
Total Floor Area		TFA 84.4000
Assumed number of occupants		N 2.5411
CO2 emission factor in Table 12 for electricity displaced from grid		EF 0.5190
CO2 emissions from appliances, equation (L14)		16.0355 ZC2
CO2 emissions from cooking, equation (L16)		2.1325 ZC3
Total CO2 emissions		32.7580 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		32.7580 ZC8

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

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	84.4000 (1b)	x 2.6000 (2b)	= 219.4400 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	84.4000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 219.4400 (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				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) =	0.1367 (8)
Pressure test					Yes
Measured/design AP50					5.0000
Infiltration rate					0.3867 (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) =		0.3287 (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 infiltr rate												
Effective ac	0.4191	0.4109	0.4027	0.3616	0.3534	0.3123	0.3123	0.3041	0.3287	0.3534	0.3698	0.3862 (22b)
Effective ac	0.5878	0.5844	0.5811	0.5654	0.5624	0.5488	0.5488	0.5462	0.5540	0.5624	0.5684	0.5746 (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)			19.2900	1.3258	25.5739		(27)					
External 1	31.2000	10.4000	20.8000	0.1800	3.7440		(29a)					
External 2	20.2800	8.8900	11.3900	0.1800	2.0502		(29a)					
Sheltered 1	6.7600		6.7600	0.1800	1.2168		(29a)					
Sheltered 2	4.4200	1.8000	2.6200	0.1800	0.4716		(29a)					
Total net area of external elements Aum(A, m ²)			62.6600				(31)					
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	34.8565	(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)							6.0280 (36)					
Total fabric heat loss						(33) + (36) =	40.8845 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	42.5672	42.3203	42.0782	40.9413	40.7285	39.7383	39.7383	39.5549	40.1197	40.7285	41.1589	41.6088 (38)
Heat transfer coeff	83.4517	83.2047	82.9627	81.8257	81.6130	80.6228	80.6228	80.4394	81.0042	81.6130	82.0433	82.4932 (39)
Average = Sum(39)m / 12 =												81.8247 (39)
HLP	0.9888	0.9858	0.9830	0.9695	0.9670	0.9552	0.9552	0.9531	0.9598	0.9670	0.9721	0.9774 (40)
HLP (average)												0.9695 (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												2.5411 (42)
Average daily hot water use (litres/day)												94.5503 (43)
Daily hot water use	104.0054	100.2234	96.4413	92.6593	88.8773	85.0953	85.0953	88.8773	92.6593	96.4413	100.2234	104.0054 (44)
Energy conte	154.2370	134.8966	139.2012	121.3590	116.4469	100.4848	93.1139	106.8496	108.1257	126.0101	137.5499	149.3703 (45)
Energy content (annual)												Total = Sum(45)m = 1487.6450 (45)
Distribution loss (46)m = 0.15 x (45)m												
Water storage loss:	23.1355	20.2345	20.8802	18.2039	17.4670	15.0727	13.9671	16.0274	16.2189	18.9015	20.6325	22.4055 (46)
Store volume												150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938 (48)
Temperature factor from Table 2b												0.5400 (49)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF TARGET EMISSIONS 09 Jan 2014

Enter (49) or (54) in (55)												0.7527 (55)	
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(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	200.8319	176.9823	185.7961	166.4509	163.0418	145.5766	139.7088	153.4445	153.2176	172.6050	182.6417	195.9652	(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	200.8319	176.9823	185.7961	166.4509	163.0418	145.5766	139.7088	153.4445	153.2176	172.6050	182.6417	195.9652	(64)
Heat gains from water heating, kWh/month	88.5597	78.5217	83.5603	76.4253	75.9945	69.4847	68.2363	72.8034	72.0253	79.1743	81.8088	86.9415	(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)
(66)m	127.0533	127.0533	127.0533	127.0533	127.0533	127.0533	127.0533	127.0533	127.0533	127.0533	127.0533	127.0533	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	20.3612	18.0846	14.7074	11.1344	8.3231	7.0267	7.5926	9.8692	13.2464	16.8194	19.6307	20.9271	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	228.3904	230.7604	224.7881	212.0739	196.0244	180.9402	170.8630	168.4930	174.4653	187.1795	203.2290	218.3132	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.7053	35.7053	35.7053	35.7053	35.7053	35.7053	35.7053	35.7053	35.7053	35.7053	35.7053	35.7053	(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)	-101.6427	-101.6427	-101.6427	-101.6427	-101.6427	-101.6427	-101.6427	-101.6427	-101.6427	-101.6427	-101.6427	-101.6427	(71)
Water heating gains (Table 5)	119.0319	116.8478	112.3123	106.1463	102.1432	96.5065	91.7155	97.8540	100.0351	106.4170	113.6233	116.8569	(72)
Total internal gains	431.8995	429.8088	415.9238	393.4706	370.6067	348.5894	334.2871	340.3323	351.8628	374.5319	400.5990	420.2132	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b g	Specific data or Table 6c FF	Access factor Table 6d	Gains W	(83)						
South	8.8900	46.7521	0.6300	0.7000	0.7700	127.0207	(78)						
West	10.4000	19.6403	0.6300	0.7000	0.7700	62.4241	(80)						
Solar gains	189.4448	330.1420	466.0954	592.7966	671.5442	668.3093	643.7725	585.9033	510.7073	369.2763	228.3984	161.0921	(83)
Total gains	621.3443	759.9507	882.0192	986.2672	1042.1509	1016.8987	978.0596	926.2355	862.5701	743.8083	628.9974	581.3053	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Thl (C)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	0.9943	0.9825	0.9482	0.8540	0.6926	0.5026	0.3621	0.3984	0.6288	0.9027	0.9852	0.9960	(86)
tau	70.2336	70.4420	70.6476	71.6292	71.8159	72.6980	72.6980	72.8637	72.3557	71.8159	71.4392	71.0496	(87)
alpha	5.6822	5.6961	5.7098	5.7753	5.7877	5.8465	5.8465	5.8576	5.8237	5.7877	5.7626	5.7366	(88)
util living area	0.9943	0.9825	0.9482	0.8540	0.6926	0.5026	0.3621	0.3984	0.6288	0.9027	0.9852	0.9960	(86)
MIT	20.1106	20.3198	20.5792	20.8300	20.9571	20.9944	20.9993	20.9988	20.9809	20.7958	20.4012	20.0730	(87)
Th 2	20.0927	20.0952	20.0975	20.1088	20.1109	20.1208	20.1208	20.1226	20.1170	20.1109	20.1067	20.1022	(88)
util rest of house	0.9926	0.9773	0.9338	0.8197	0.6374	0.4357	0.2901	0.3230	0.5560	0.8702	0.9799	0.9948	(89)
MIT 2	18.9153	19.2188	19.5857	19.9257	20.0735	20.1174	20.1205	20.1222	20.1038	19.8936	19.3474	18.8678	(90)
Living area fraction	19.5300	19.7850	20.0966	20.3907	20.5279	20.5684	20.5724	20.5730	20.5548	20.3575	19.8893	19.4875	(92)
Temperature adjustment	19.5300	19.7850	20.0966	20.3907	20.5279	20.5684	20.5724	20.5730	20.5548	20.3575	19.8893	19.4875	(93)
adjusted MIT	19.5300	19.7850	20.0966	20.3907	20.5279	20.5684	20.5724	20.5730	20.5548	20.3575	19.8893	19.4875	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(94)
Utilisation	0.9912	0.9751	0.9338	0.8313	0.6639	0.4700	0.3271	0.3618	0.5928	0.8801	0.9783	0.9936	(94)
Useful gains	615.8556	741.0524	823.5904	819.8661	691.8780	477.9753	319.9522	335.1087	511.3312	654.6469	615.3682	577.5996	(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	1270.9662	1238.5015	1128.0106	940.2338	720.4691	481.1863	320.2676	335.6695	522.8688	796.3409	1049.2758	1261.1192	(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	487.4023	334.2858	226.4887	86.6648	21.2718	0.0000	0.0000	0.0000	0.0000	105.4203	312.4134	508.5386	(98)
Space heating												2082.4856	(98)
Space heating per m2												24.6740	(99)

8c. Space cooling requirement

Not applicable

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF TARGET EMISSIONS 09 Jan 2014

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													2227.2573 (211)
Space heating requirement	487.4023	334.2858	226.4887	86.6648	21.2718	0.0000	0.0000	0.0000	0.0000	105.4203	312.4134	508.5386	(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)	521.2858	357.5250	242.2339	92.6896	22.7505	0.0000	0.0000	0.0000	0.0000	112.7490	334.1320	543.8915	(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	200.8319	176.9823	185.7961	166.4509	163.0418	145.5766	139.7088	153.4445	153.2176	172.6050	182.6417	195.9652	(64)
Efficiency of water heater (217)m	87.0923	86.4857	85.3431	83.1667	80.9040	79.8000	79.8000	79.8000	79.8000	83.5454	86.2341	87.2460	(216)
Fuel for water heating, kWh/month	230.5965	204.6376	217.7049	200.1412	201.5251	182.4269	175.0737	192.2863	192.0020	206.6003	211.7975	224.6123	(219)
Water heating fuel used													2439.4042 (219)
Annual totals kWh/year													
Space heating fuel - main system													2227.2573 (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)													359.5847 (232)
Total delivered energy for all uses													5101.2461 (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	2227.2573	0.2160	481.0876	(261)
Space heating - secondary	0.0000	0.0000	0.0000	(263)
Water heating (other fuel)	2439.4042	0.2160	526.9113	(264)
Space and water heating			1007.9989	(265)
Pumps and fans	75.0000	0.5190	38.9250	(267)
Energy for lighting	359.5847	0.5190	186.6244	(268)
Total CO2, kg/m2/year			1233.5483	(272)
Emissions per m2 for space and water heating			11.9431	(272a)
Fuel factor (mains gas)			1.0000	
Emissions per m2 for lighting			2.2112	(272b)
Emissions per m2 for pumps and fans			0.4612	(272c)
Target Carbon Dioxide Emission Rate (TER) = (11.9431 * 1.00) + 2.2112 + 0.4612, rounded to 2 d.p.			14.6200	(273)