

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

Property Reference	010580			Issued on Date	10/02/2022
Assessment Reference	B09-TY-04_2	Prop Type Ref	B09-TY-04		
Property					
SAP Rating	84 B	DER	9.87	TER	21.63
Environmental	92 A	% DER<TER	54.36		
CO ₂ Emissions (t/year)	0.66	DFEE	39.37	TFEE	36.27
General Requirements Compliance	Fail	% DFEE<TFEE	-8.54		
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 78 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) 21.63 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 9.87 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)36.3 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)39.4 kWh/m²/yrFail
Excess energy =3.1 kWh/m²/yr (8.5%)

2 Fabric U-values

Element	Average	Highest	
External wall	0.15 (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 East: 12.86 m², Overhang width less than twice window, ratio 0.62
Windows facing South: 13.15 m², No overhang
Air change rate: 2.40 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
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	78.4000 (1b)	x 2.6000 (2b)	= 203.8400 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	78.4000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 203.8400 (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) =												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)			26.0100	1.2357	32.1416		(27)
Opening Type 5			1.8000	1.4000	2.5200		(26)
External 1	20.2800	13.1500	7.1300	0.1200	0.8556		(29a)
External 2	26.2600	12.8600	13.4000	0.1200	1.6080		(29a)
Sheltered 1	9.6200		9.6200	0.2000	1.9240		(29a)
Sheltered 2	4.4200	1.8000	2.6200	0.2000	0.5240		(29a)
Total net area of external elements Aum(A, m2)			60.5800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	39.5732		(33)
Part 2			14.3000	0.0000	0.0000		(32)
Party 1			24.7000	0.0000	0.0000		(32)
Party Floor 1			78.4000				(32d)
Party Ceiling 1			78.4000				(32b)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							100.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							8.2548 (36)
Total fabric heat loss						(33) + (36) =	47.8280 (37)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	18.2672	18.0528	17.8384	16.7663	16.5519	15.4799	15.4799	15.2655	15.9087	16.5519	16.9808	17.4096 (38)
Heat transfer coeff	66.0953	65.8809	65.6665	64.5944	64.3800	63.3079	63.3079	63.0935	63.7367	64.3800	64.8088	65.2376 (39)
Average = Sum(39)m / 12 =												64.5408 (39)
HLP	0.8431	0.8403	0.8376	0.8239	0.8212	0.8075	0.8075	0.8048	0.8130	0.8212	0.8266	0.8321 (40)
HLP (average)												0.8232 (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												2.4318 (42)
Average daily hot water use (litres/day)												91.9553 (43)
Daily hot water use	101.1508	97.4726	93.7944	90.1162	86.4380	82.7598	82.7598	86.4380	90.1162	93.7944	97.4726	101.1508 (44)

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Energy content (annual)	150.0037	131.1942	135.3807	118.0282	113.2508	97.7269	90.5583	103.9170	105.1581	122.5516	133.7746	145.2706 (45)
Distribution loss (46)m = 0.15 x (45)m												1446.8146 (45)
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												
If cylinder contains dedicated solar storage												
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												
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	205.2805	181.1216	190.6575	171.5218	168.5276	151.2205	145.8351	159.1938	158.6517	177.8284	187.2683	200.5474 (62)
Heat gains from water heating, kWh/month												
	94.0977	83.5640	89.2355	82.0393	81.8773	75.2891	74.3321	78.7738	77.7600	84.9698	87.2750	92.5239 (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	121.5901	121.5901	121.5901	121.5901	121.5901	121.5901	121.5901	121.5901	121.5901	121.5901	121.5901	121.5901 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
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)												
Water heating gains (Table 5)												
Total internal gains	421.2787	419.2430	405.9871	384.5822	362.8460	341.8675	328.2100	334.0917	345.0578	366.6728	391.5241	410.1655 (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						
East		12.8600	19.6403	0.2900	0.8000	0.7700	40.6078 (76)					
South		13.1500	46.7521	0.2900	0.8000	0.7700	98.8434 (78)					
Solar gains	139.4512	241.3175	337.0287	423.8545	476.6891	473.0853	456.2442	417.5183	367.5587	268.8621	167.7963	118.8037 (83)
Total gains	560.7300	660.5605	743.0157	808.4366	839.5351	814.9528	784.4542	751.6100	712.6165	635.5349	559.3205	528.9692 (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)												
tau	32.9491	33.0563	33.1642	33.7147	33.8269	34.3998	34.3998	34.5167	34.1683	33.8269	33.6031	33.3822
alpha	3.1966	3.2038	3.2109	3.2476	3.2551	3.2933	3.2933	3.3011	3.2779	3.2551	3.2402	3.2255
util living area	0.9400	0.9042	0.8472	0.7515	0.6239	0.4708	0.3474	0.3757	0.5615	0.7845	0.9067	0.9483 (86)
MIT	19.5295	19.8170	20.1753	20.5529	20.8073	20.9445	20.9845	20.9797	20.8977	20.5603	19.9896	19.4779 (87)
Th 2	20.2162	20.2185	20.2209	20.2327	20.2350	20.2468	20.2468	20.2492	20.2421	20.2350	20.2303	20.2256 (88)
util rest of house	0.9327	0.8932	0.8302	0.7253	0.5864	0.4219	0.2906	0.3178	0.5117	0.7556	0.8942	0.9419 (89)
MIT 2	18.2405	18.6512	19.1573	19.6846	20.0196	20.1950	20.2358	20.2341	20.1407	19.7074	18.9116	18.1730 (90)
Living area fraction												0.5102 (91)
MIT	18.8981	19.2460	19.6767	20.1276	20.4215	20.5774	20.6178	20.6145	20.5269	20.1426	19.4616	18.8387 (92)
Temperature adjustment												0.0000
adjusted MIT	18.8981	19.2460	19.6767	20.1276	20.4215	20.5774	20.6178	20.6145	20.5269	20.1426	19.4616	18.8387 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	514.5658	579.4473	607.0554	583.2957	500.2197	361.5856	250.1118	260.2803	378.3403	477.8339	491.9341	490.7183 (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	964.8681	945.1264	865.2675	725.2392	561.4889	378.4151	254.3566	265.9097	409.6327	614.3499	801.1409	954.9953 (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	335.0249	245.7364	192.1098	102.1993	45.5843	0.0000	0.0000	0.0000	0.0000	101.5679	222.6290	345.4221 (98)

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Space heating 1590.2738 (98)
 Space heating per m2 (98) / (4) = 20.2841 (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	1590.2738 (98)
Space heat from Heat pump = (98) x 1.00 x 1.00 x 1.05	1669.7875 (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	2097.6544 (64)
Water heat from Heat pump = (64) x 1.00 x 1.00 x 1.05	2202.5371 (310a)
Electricity used for heat distribution	38.7232 (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)	170.9708 (330a)
Total electricity for the above, kWh/year	170.9708 (331)
Electricity for lighting (calculated in Appendix L)	340.1777 (332)
Energy saving/generation technologies (Appendices M ,N and Q)	
Total delivered energy for all uses	4383.4731 (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	1290.7749	0.5190	669.9122	(367)
Electrical energy for heat distribution	38.7232	0.5190	20.0974	(372)
Total CO2 associated with community systems (negative value allowed since DFEE <= TFEE)			690.0095	(373)
Space and water heating			690.0095	(376)
Pumps and fans	170.9708	0.5190	88.7338	(378)
Energy for lighting	340.1777	0.5190	176.5522	(379)
Energy saving/generation technologies				
PV Unit	-350.0000	0.5190	-181.6500	(380)
Total CO2, kg/year			773.6456	(383)
Dwelling Carbon Dioxide Emission Rate (DER)			9.8700	(384)

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

DER		9.8700	ZC1
Total Floor Area		TFA 78.4000	
Assumed number of occupants		N 2.4318	
CO2 emission factor in Table 12 for electricity displaced from grid		EF 0.5190	
CO2 emissions from appliances, equation (L14)		16.3310	ZC2
CO2 emissions from cooking, equation (L16)		2.2623	ZC3
Total CO2 emissions		28.4633	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		28.4633	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	78.4000 (1b)	x 2.6000 (2b)	= 203.8400 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	78.4000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 203.8400 (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) =	0.1472 (8)
Pressure test				Yes	
Measured/design AP50					5.0000
Infiltration rate					0.3972 (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) =		0.3376 (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	0.4304	0.4220	0.4136	0.3714	0.3629	0.3207	0.3207	0.3123	0.3376	0.3629	0.3798	0.3967 (22b)
Effective ac	0.5926	0.5890	0.5855	0.5690	0.5659	0.5514	0.5514	0.5488	0.5570	0.5659	0.5721	0.5787 (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)			17.8000	1.3258	23.5985		(27)					
External 1	20.2800	9.0000	11.2800	0.1800	2.0304		(29a)					
External 2	26.2600	8.8000	17.4600	0.1800	3.1428		(29a)					
Sheltered 1	9.6200		9.6200	0.1800	1.7316		(29a)					
Sheltered 2	4.4200	1.8000	2.6200	0.1800	0.4716		(29a)					
Total net area of external elements Aum(A, m ²)			60.5800				(31)					
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	32.7749	(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)							5.3970 (36)					
Total fabric heat loss						(33) + (36) =	38.1719 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	39.8651	39.6231	39.3860	38.2719	38.0635	37.0932	37.0932	36.9135	37.4669	38.0635	38.4851	38.9260 (38)
Heat transfer coeff	78.0370	77.7950	77.5578	76.4438	76.2353	75.2650	75.2650	75.0854	75.6388	76.2353	76.6570	77.0978 (39)
Average = Sum(39)m / 12 =												76.4428 (39)
HLP	0.9954	0.9923	0.9893	0.9750	0.9724	0.9600	0.9600	0.9577	0.9648	0.9724	0.9778	0.9834 (40)
HLP (average)												0.9750 (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												2.4318 (42)
Average daily hot water use (litres/day)												91.9553 (43)
Daily hot water use	101.1508	97.4726	93.7944	90.1162	86.4380	82.7598	82.7598	86.4380	90.1162	93.7944	97.4726	101.1508 (44)
Energy conte	150.0037	131.1942	135.3807	118.0282	113.2508	97.7269	90.5583	103.9170	105.1581	122.5516	133.7746	145.2706 (45)
Energy content (annual)												Total = Sum(45)m = 1446.8146 (45)
Distribution loss (46)m = 0.15 x (45)m												
Water storage loss:	22.5006	19.6791	20.3071	17.7042	16.9876	14.6590	13.5837	15.5875	15.7737	18.3827	20.0662	21.7906 (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)

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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												
	196.5986	173.2799	181.9756	163.1200	159.8457	142.8187	137.1532	150.5119	150.2499	169.1465	178.8665	191.8655 (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												
	196.5986	173.2799	181.9756	163.1200	159.8457	142.8187	137.1532	150.5119	150.2499	169.1465	178.8665	191.8655 (64)
												Total per year (kWh/year) = Sum(64)m = 1995.4320 (64)
Heat gains from water heating, kWh/month												
	87.1522	77.2907	82.2900	75.3178	74.9318	68.5677	67.3866	71.8283	71.0385	78.0243	80.5535	85.5784 (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
	121.5901	121.5901	121.5901	121.5901	121.5901	121.5901	121.5901	121.5901	121.5901	121.5901	121.5901	121.5901 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	19.2584	17.1051	13.9108	10.5314	7.8723	6.6462	7.1814	9.3347	12.5290	15.9084	18.5674	19.7936 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	216.0641	218.3061	212.6562	200.6281	185.4449	171.1748	161.6414	159.3994	165.0493	177.0774	192.2606	206.5308 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	35.1590	35.1590	35.1590	35.1590	35.1590	35.1590	35.1590	35.1590	35.1590	35.1590	35.1590	35.1590 (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)												
	-97.2720	-97.2720	-97.2720	-97.2720	-97.2720	-97.2720	-97.2720	-97.2720	-97.2720	-97.2720	-97.2720	-97.2720 (71)
Water heating gains (Table 5)												
	117.1400	115.0158	110.6048	104.6081	100.7148	95.2328	90.5733	96.5434	98.6646	104.8714	111.8799	115.0247 (72)
Total internal gains	414.9395	412.9041	399.6489	378.2446	356.5090	335.5308	321.8732	327.7545	338.7199	360.3342	385.1850	403.8261 (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							
East	8.8000	19.6403	0.6300	0.7000		52.8204 (76)						
South	9.0000	46.7521	0.6300	0.7000		128.5923 (78)						
Solar gains	181.4128	313.9291	438.4349	551.3792	620.1057	615.4161	593.5089	543.1349	478.1487	349.7604	218.2866	154.5526 (83)
Total gains	596.3522	726.8332	838.0837	929.6238	976.6148	950.9469	915.3821	870.8893	816.8686	710.0946	603.4716	558.3787 (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	69.7675	69.9845	70.1985	71.2215	71.4163	72.3370	72.3370	72.5101	71.9795	71.4163	71.0234	70.6173
alpha	5.6512	5.6656	5.6799	5.7481	5.7611	5.8225	5.8225	5.8340	5.7986	5.7611	5.7349	5.7078
util living area	0.9934	0.9802	0.9442	0.8497	0.6905	0.5017	0.3612	0.3955	0.6209	0.8947	0.9830	0.9953 (86)
MIT	20.1239	20.3340	20.5888	20.8328	20.9571	20.9943	20.9993	20.9988	20.9817	20.8050	20.4159	20.0864 (87)
Th 2	20.0872	20.0898	20.0923	20.1042	20.1064	20.1168	20.1168	20.1187	20.1128	20.1064	20.1019	20.0972 (88)
util rest of house	0.9914	0.9745	0.9290	0.8148	0.6351	0.4347	0.2890	0.3203	0.5483	0.8606	0.9770	0.9938 (89)
MIT 2	18.9304	19.2346	19.5941	19.9247	20.0690	20.1134	20.1165	20.1183	20.1003	19.9005	19.3645	18.8836 (90)
Living area fraction	19.5393	19.7955	20.1016	20.3880	20.5221	20.5628	20.5669	20.5675	20.5500	20.3620	19.9009	19.4973 (92)
Temperature adjustment	19.5393	19.7955	20.1016	20.3880	20.5221	20.5628	20.5669	20.5675	20.5500	20.3620	19.9009	0.0000
adjusted MIT	19.5393	19.7955	20.1016	20.3880	20.5221	20.5628	20.5669	20.5675	20.5500	20.3620	19.9009	19.4973 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9898	0.9722	0.9291	0.8265	0.6615	0.4688	0.3258	0.3587	0.5848	0.8713	0.9754	0.9926 (94)
Useful gains	590.2762	706.6492	778.6887	768.3499	646.0052	445.7829	298.2751	312.4086	477.6708	618.7207	588.6107	554.2313 (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	1189.2289	1158.7963	1054.9084	878.1875	672.5540	448.7929	298.5708	312.9203	487.8707	744.2068	981.2810	1179.3894 (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	445.6209	303.8429	205.5074	79.0831	19.7524	0.0000	0.0000	0.0000	0.0000	93.3617	282.7226	465.1176 (98)
Space heating												1895.0085 (98)
Space heating per m ²												(98) / (4) = 24.1710 (99)

8c. Space cooling requirement

Not applicable

FULL SAP CALCULATION PRINTOUT

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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													2026.7471 (211)
Space heating requirement	445.6209	303.8429	205.5074	79.0831	19.7524	0.0000	0.0000	0.0000	0.0000	93.3617	282.7226	465.1176	(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)	476.5999	324.9656	219.7941	84.5809	21.1255	0.0000	0.0000	0.0000	0.0000	99.8520	302.3771	497.4520	(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	196.5986	173.2799	181.9756	163.1200	159.8457	142.8187	137.1532	150.5119	150.2499	169.1465	178.8665	191.8655	(64)
Efficiency of water heater (217)m	86.9317	86.2976	85.1387	83.0044	80.8513	79.8000	79.8000	79.8000	79.8000	83.3028	86.0300	87.0897	(216)
Fuel for water heating, kWh/month	226.1529	200.7935	213.7401	196.5198	197.7033	178.9708	171.8712	188.6114	188.2831	203.0501	207.9117	220.3079	(219)
Water heating fuel used													2393.9155 (219)
Annual totals kWh/year													
Space heating fuel - main system													2026.7471 (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)													340.1088 (232)
Total delivered energy for all uses													4835.7714 (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	2026.7471	0.2160	437.7774 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2393.9155	0.2160	517.0858 (264)
Space and water heating			954.8631 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	340.1088	0.5190	176.5165 (268)
Total CO2, kg/m2/year			1170.3046 (272)
Emissions per m2 for space and water heating			12.1794 (272a)
Fuel factor (electricity)			1.5500
Emissions per m2 for lighting			2.2515 (272b)
Emissions per m2 for pumps and fans			0.4965 (272c)
Target Carbon Dioxide Emission Rate (TER) = (12.1794 * 1.55) + 2.2515 + 0.4965, rounded to 2 d.p.			21.6300 (273)