

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

Property Reference	010567			Issued on Date	10/02/2022
Assessment Reference	B08-TY-04	Prop Type Ref	8.TY.04		
Property					
SAP Rating	88 B	DER	9.84	TER	11.62
Environmental	92 A	% DER<TER	15.28		
CO ₂ Emissions (t/year)	0.97	DFEE	26.99	TFEE	27.14
General Requirements Compliance	Pass	% DFEE<TFEE	0.54		
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 117 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) 11.62 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 9.84 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)27.1 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)27.0 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.15 (max. 0.30)	0.18 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	(no floor)		
Roof	(no roof)		
Openings	1.20 (max. 2.00)	1.20 (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): Not significant OK
Based on:
Overshading: Average
Windows facing North East: 5.52 m², No overhang
Windows facing South East: 7.52 m², No overhang
Air change rate: 4.00 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
Party wall U-value 0.00 W/m²K
Air permeability 3.0 m³/m²h

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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 (m ²)	Storey height (m)	Volume (m ³)
Ground floor	117.0000 (1b)	x 2.5000 (2b)	= 292.5000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	117.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 292.5000 (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				3	(19)
Shelter factor			(20) = 1 - [0.075 x (19)] =		0.7750 (20)
Infiltration rate adjusted to include shelter factor			(21) = (18) x (20) =		0.1163 (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	0.1482	0.1453	0.1424	0.1279	0.1250	0.1104	0.1104	0.1075	0.1163	0.1250	0.1308	0.1366 (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	0.2572	0.2543	0.2514	0.2369	0.2340	0.2194	0.2194	0.2165	0.2253	0.2340	0.2398	0.2456 (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
Opening Type 1 (Uw = 1.20)			13.0400	1.1450	14.9313		(27)
External Wall 1	27.6300	13.0400	14.5900	0.1200	1.7508		(29a)
Sheltered Corridor	8.1000		8.1000	0.1842	1.4917		(29a)
Sheltered UNHEATED	5.0500		5.0500	0.1695	0.8559		(29a)
Total net area of external elements Aum(A, m ²)			40.7800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	19.0297		(33)
Party Wall 1			78.5400	0.0000	0.0000		(32)
Party Floor 1			117.0000				(32d)
Party Ceilings 1			117.0000				(32b)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							9.2020 (36)
Total fabric heat loss						(33) + (36) =	28.2317 (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	24.8280	24.5475	24.2670	22.8644	22.5838	21.1812	21.1812	20.9007	21.7423	22.5838	23.1449	23.7059 (38)
Heat transfer coeff	53.0598	52.7793	52.4987	51.0961	50.8156	49.4129	49.4129	49.1324	49.9740	50.8156	51.3766	51.9377 (39)
Average = Sum(39)m / 12 =												51.0260 (39)
HLP	0.4535	0.4511	0.4487	0.4367	0.4343	0.4223	0.4223	0.4199	0.4271	0.4343	0.4391	0.4439 (40)
HLP (average)												0.4361 (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												2.8509 (42)
Average daily hot water use (litres/day)												101.9098 (43)
Daily hot water use	112.1008	108.0244	103.9480	99.8716	95.7952	91.7188	91.7188	95.7952	99.8716	103.9480	108.0244	112.1008 (44)
Energy conte	166.2422	145.3965	150.0361	130.8051	125.5106	108.3061	100.3616	115.1664	116.5418	135.8183	148.2562	160.9967 (45)
Energy content (annual)												Total = Sum(45)m = 1603.4377 (45)
Distribution loss (46)m = 0.15 x (45)m												

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CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Water storage loss:	24.9363	21.8095	22.5054	19.6208	18.8266	16.2459	15.0542	17.2750	17.4813	20.3727	22.2384	24.1495 (46)
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	221.5190	195.3239	205.3129	184.2988	180.7875	161.7998	155.6384	170.4432	170.0355	191.0951	201.7499	216.2735 (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	221.5190	195.3239	205.3129	184.2988	180.7875	161.7998	155.6384	170.4432	170.0355	191.0951	201.7499	216.2735 (64)
Heat gains from water heating, kWh/month	99.4970	86.2863	94.1085	86.2877	85.9537	78.8067	77.5917	82.5143	81.5451	89.3810	92.0901	97.7528 (65)

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

Metabolic gains (Table 5), Watts												
(66)m	142.5469	142.5469	142.5469	142.5469	142.5469	142.5469	142.5469	142.5469	142.5469	142.5469	142.5469	142.5469 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	28.2876	25.1248	20.4328	15.4690	11.5632	9.7622	10.5484	13.7112	18.4031	23.3670	27.2727	29.0738 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	281.2545	284.1731	276.8184	261.1613	241.3970	222.8213	210.4116	207.4931	214.8477	230.5048	250.2692	268.8448 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.2547	37.2547	37.2547	37.2547	37.2547	37.2547	37.2547	37.2547	37.2547	37.2547	37.2547	37.2547 (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)	-114.0375	-114.0375	-114.0375	-114.0375	-114.0375	-114.0375	-114.0375	-114.0375	-114.0375	-114.0375	-114.0375	-114.0375 (71)
Water heating gains (Table 5)	133.7325	131.3784	126.4899	119.8440	115.5292	109.4538	104.2899	110.9063	113.2571	120.1358	127.9030	131.3882 (72)
Total internal gains	509.0387	506.4403	489.5052	462.2383	434.2535	407.8013	391.0139	397.8746	412.2719	439.7716	471.2089	495.0709 (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							
Northeast	5.5200	11.2829	0.2900	0.7000	0.7700	8.7617 (75)						
Southeast	7.5200	36.7938	0.2900	0.7000	0.7700	38.9244 (77)						
Solar gains	47.6862	84.1375	122.8508	165.1753	196.8367	200.6155	191.2498	166.8336	137.3827	95.0741	57.6470	40.4665 (83)
Total gains	556.7248	590.5778	612.3561	627.4136	631.0902	608.4168	582.2637	564.7082	549.6547	534.8458	528.8559	535.5374 (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	153.1292	153.9431	154.7656	159.0141	159.8919	164.4306	164.4306	165.3694	162.5845	159.8919	158.1458	156.4375
alpha	11.2086	11.2629	11.3177	11.6009	11.6595	11.9620	11.9620	12.0246	11.8390	11.6595	11.5431	11.4292
util living area	0.9980	0.9949	0.9821	0.9137	0.7422	0.5197	0.3734	0.4002	0.6264	0.9154	0.9917	0.9985 (86)
MIT	20.6962	20.7588	20.8529	20.9585	20.9961	20.9999	21.0000	21.0000	20.9995	20.9641	20.8251	20.6888 (87)
Th 2	20.5636	20.5659	20.5681	20.5792	20.5814	20.5925	20.5925	20.5948	20.5881	20.5814	20.5770	20.5725 (88)
util rest of house	0.9974	0.9934	0.9772	0.8956	0.7110	0.4866	0.3388	0.3650	0.5894	0.8944	0.9891	0.9981 (89)
MIT 2	20.1493	20.2424	20.3792	20.5321	20.5779	20.5925	20.5925	20.5948	20.5877	20.5424	20.3483	20.1464 (90)
Living area fraction												FLA = Living area / (4) = 0.3479 (91)
MIT	20.3396	20.4220	20.5440	20.6804	20.7234	20.7342	20.7343	20.7357	20.7310	20.6891	20.5142	20.3351 (92)
Temperature adjustment												0.0000
adjusted MIT	20.3396	20.4220	20.5440	20.6804	20.7234	20.7342	20.7343	20.7357	20.7310	20.6891	20.5142	20.3351 (93)

8. Space heating requirement

Utilisation	0.9970	0.9929	0.9769	0.9002	0.7217	0.4981	0.3508	0.3772	0.6023	0.9001	0.9886	0.9978 (94)
Useful gains	555.0613	586.3691	598.2320	564.7964	455.4484	303.0739	204.2862	213.0237	331.0467	481.4120	522.8496	534.3750 (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	851.0557	819.2408	737.2913	601.9338	458.5276	303.1104	204.2867	213.0248	331.3764	512.6823	689.1743	838.0195 (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	220.2198	156.4898	103.4602	26.7389	2.2909	0.0000	0.0000	0.0000	0.0000	23.2651	119.7538	225.9115 (98)
Space heating												878.1299 (98)
Space heating per m ²												(98) / (4) = 7.5054 (99)

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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	878.1299	(98)
Space heat from Boilers = (98) x 1.00 x 1.00 x 1.05	922.0364	(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	2254.2774	(64)
Water heat from Boilers = (64) x 1.00 x 1.00 x 1.05	2366.9913	(310a)
Electricity used for heat distribution	32.8903	(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)	245.3344	(330a)
Total electricity for the above, kWh/year	245.3344	(331)
Electricity for lighting (calculated in Appendix L)	499.5672	(332)
Total delivered energy for all uses	4033.9292	(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	3462.1344	0.2160	747.8210 (367)
Electrical energy for heat distribution	32.8903	0.5190	17.0701 (372)
Total CO2 associated with community systems (negative value allowed since DFEE <= TFEE)			764.8911 (373)
Space and water heating			764.8911 (376)
Pumps and fans	245.3344	0.5190	127.3285 (378)
Energy for lighting	499.5672	0.5190	259.2754 (379)
Total CO2, kg/year			1151.4950 (383)
Dwelling Carbon Dioxide Emission Rate (DER)			9.8400 (384)

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

DER		9.8400	ZC1
Total Floor Area		TFA 117.0000	
Assumed number of occupants		N 2.8509	
CO2 emission factor in Table 12 for electricity displaced from grid		EF 0.5190	
CO2 emissions from appliances, equation (L14)		14.2449	ZC2
CO2 emissions from cooking, equation (L16)		1.6019	ZC3
Total CO2 emissions		25.6868	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		25.6868	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 (m2)	Storey height (m)	Volume (m3)
Ground floor	117.0000 (1b)	x 2.5000 (2b)	= 292.5000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	117.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 292.5000 (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				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) =	0.1368 (8)
Pressure test				Yes	
Measured/design AP50					5.0000
Infiltration rate					0.3868 (18)
Number of sides sheltered					3 (19)
Shelter factor			(20) = 1 - [0.075 x (19)] =		0.7750 (20)
Infiltration rate adjusted to include shelter factor			(21) = (18) x (20) =		0.2997 (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	0.3822	0.3747	0.3672	0.3297	0.3222	0.2847	0.2847	0.2773	0.2997	0.3222	0.3372	0.3522 (22b)
Effective ac	0.5730	0.5702	0.5674	0.5544	0.5519	0.5405	0.5405	0.5384	0.5449	0.5519	0.5569	0.5620 (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					
TER Opening Type (Uw = 1.40)			13.0400	1.3258	17.2879		(27)					
External Wall 1	27.6300	13.0400	14.5900	0.1800	2.6262		(29a)					
Shelterrd Corrirodir	8.1000		8.1000	0.1800	1.4580		(29a)					
Shelterredd uNHEATED	5.0500		5.0500	0.1800	0.9090		(29a)					
Total net area of external elements Aum(A, m2)			40.7800				(31)					
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 22.2811		(33)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							3.5185 (36)					
Total fabric heat loss							(33) + (36) = 25.7996 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	55.3110	55.0373	54.7691	53.5089	53.2732	52.1756	52.1756	51.9724	52.5984	53.2732	53.7501	54.2487 (38)
Heat transfer coeff	81.1106	80.8369	80.5686	79.3085	79.0727	77.9752	77.9752	77.7720	78.3980	79.0727	79.5497	80.0483 (39)
Average = Sum(39)m / 12 =												79.3074 (39)
HLP	0.6933	0.6909	0.6886	0.6779	0.6758	0.6665	0.6665	0.6647	0.6701	0.6758	0.6799	0.6842 (40)
HLP (average)												0.6778 (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												2.8509 (42)
Average daily hot water use (litres/day)												101.9098 (43)
Daily hot water use	112.1008	108.0244	103.9480	99.8716	95.7952	91.7188	91.7188	95.7952	99.8716	103.9480	108.0244	112.1008 (44)
Energy conte	166.2422	145.3965	150.0361	130.8051	125.5106	108.3061	100.3616	115.1664	116.5418	135.8183	148.2562	160.9967 (45)
Energy content (annual)												Total = Sum(45)m = 1603.4377 (45)
Distribution loss (46)m = 0.15 x (45)m	24.9363	21.8095	22.5054	19.6208	18.8266	16.2459	15.0542	17.2750	17.4813	20.3727	22.2384	24.1495 (46)
Water storage loss:												
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)
Enter (49) or (54) in (55)												0.7527 (55)
Total storage loss												

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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	(56)
Primary 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	(57)
Total heat required for water heating calculated for each month	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)
Solar input	212.8371	187.4822	196.6310	175.8970	172.1056	153.3980	146.9565	161.7613	161.6337	182.4132	193.3481	207.5916	(62)
Output from w/h	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)
Heat gains from water heating, kWh/month	Solar input (sum of months) = Sum(63)m = 0.0000 (63)												
	212.8371	187.4822	196.6310	175.8970	172.1056	153.3980	146.9565	161.7613	161.6337	182.4132	193.3481	207.5916	(64)
	Total per year (kWh/year) = Sum(64)m = 2152.0551 (64)												
	92.5514	82.0129	87.1629	79.5662	79.0082	72.0853	70.6461	75.5687	74.8236	82.4355	85.3687	90.8073	(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	142.5469	142.5469	142.5469	142.5469	142.5469	142.5469	142.5469	142.5469	142.5469	142.5469	142.5469	142.5469	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	28.2876	25.1248	20.4328	15.4690	11.5632	9.7622	10.5484	13.7112	18.4031	23.3670	27.2727	29.0738	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	281.2545	284.1731	276.8184	261.1613	241.3970	222.8213	210.4116	207.4931	214.8477	230.5048	250.2692	268.8448	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.2547	37.2547	37.2547	37.2547	37.2547	37.2547	37.2547	37.2547	37.2547	37.2547	37.2547	37.2547	(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)	-114.0375	-114.0375	-114.0375	-114.0375	-114.0375	-114.0375	-114.0375	-114.0375	-114.0375	-114.0375	-114.0375	-114.0375	(71)
Water heating gains (Table 5)	124.3971	122.0430	117.1545	110.5086	106.1938	100.1184	94.9545	101.5709	103.9217	110.8004	118.5676	122.0528	(72)
Total internal gains	502.7033	500.1049	483.1698	455.9029	427.9181	401.4660	384.6785	391.5392	405.9366	433.4363	464.8735	488.7355	(73)

6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access	Gains							
	m2	Table 6a	Specific data	Specific data	factor	W							
		W/m2	or Table 6b	or Table 6c	Table 6d								
Northeast	5.5200	11.2829	0.6300	0.7000	0.7700	19.0341 (75)							
Southeast	7.5200	36.7938	0.6300	0.7000	0.7700	84.5599 (77)							
Solar gains	103.5941	182.7814	266.8829	358.8290	427.6108	435.8198	415.4737	362.4317	298.4522	206.5403	125.2332	87.9099	(83)
Total gains	606.2974	682.8863	750.0527	814.7320	855.5289	837.2857	800.1523	753.9709	704.3887	639.9766	590.1067	576.6454	(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	100.1718	100.5110	100.8457	102.4480	102.7535	104.1998	104.1998	104.4721	103.6379	102.7535	102.1374	101.5012	
alpha	7.6781	7.7007	7.7230	7.8299	7.8502	7.9467	7.9467	7.9648	7.9092	7.8502	7.8092	7.7667	
util living area	0.9988	0.9967	0.9881	0.9452	0.8097	0.5920	0.4285	0.4738	0.7436	0.9652	0.9965	0.9992	(86)
MIT	20.3443	20.4562	20.6257	20.8335	20.9625	20.9971	20.9998	20.9996	20.9849	20.8202	20.5455	20.3258	(87)
Th 2	20.3468	20.3489	20.3509	20.3604	20.3622	20.3706	20.3706	20.3721	20.3673	20.3622	20.3586	20.3548	(88)
util rest of house	0.9985	0.9956	0.9843	0.9290	0.7682	0.5356	0.3674	0.4095	0.6848	0.9515	0.9952	0.9990	(89)
MIT 2	19.4540	19.6190	19.8661	20.1648	20.3266	20.3686	20.3705	20.3719	20.3558	20.1525	19.7576	19.4336	(90)
Living area fraction	19.7637	19.9102	20.1303	20.3974	20.5478	20.5872	20.5894	20.5902	20.5746	20.3848	20.0317	19.7439	(91)
Temperature adjustment	19.7637	19.9102	20.1303	20.3974	20.5478	20.5872	20.5894	20.5902	20.5746	20.3848	20.0317	19.7439	(92)
adjusted MIT	19.7637	19.9102	20.1303	20.3974	20.5478	20.5872	20.5894	20.5902	20.5746	20.3848	20.0317	19.7439	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	605.1154	679.2930	737.0730	757.7053	668.0138	464.8544	310.9693	325.6516	496.3674	609.3229	586.8021	575.8568	(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	1254.2715	1213.3773	1098.1773	911.8456	699.6197	466.8559	311.0737	325.8838	507.5978	773.7103	1028.7138	1244.2669	(97)
Month fracti	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	(97a)
Space heating kWh	482.9721	358.9046	268.6616	110.9810	23.5148	0.0000	0.0000	0.0000	0.0000	122.3042	318.1764	497.2972	(98)
Space heating													2182.8119 (99)
Space heating per m2													(98) / (4) = 18.6565 (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													2334.5582 (211)
Space heating requirement	482.9721	358.9046	268.6616	110.9810	23.5148	0.0000	0.0000	0.0000	0.0000	122.3042	318.1764	497.2972	(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)	516.5477	383.8552	287.3386	118.6962	25.1495	0.0000	0.0000	0.0000	0.0000	130.8067	340.2956	531.8686	(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	212.8371	187.4822	196.6310	175.8970	172.1056	153.3980	146.9565	161.7613	161.6337	182.4132	193.3481	207.5916	(64)
Efficiency of water heater (217)m	86.9344	86.5194	85.6469	83.6249	80.9505	79.8000	79.8000	79.8000	79.8000	83.7755	86.1345	87.0621	(217)
Fuel for water heating, kWh/month	244.8249	216.6939	229.5834	210.3404	212.6060	192.2281	184.1560	202.7084	202.5484	217.7403	224.4722	238.4409	(219)
Water heating fuel used													2576.3428 (219)
Annual totals kWh/year													
Space heating fuel - main system													2334.5582 (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)													499.5672 (232)
Total delivered energy for all uses													5485.4682 (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	2334.5582	0.2160	504.2646 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2576.3428	0.2160	556.4901 (264)
Space and water heating			1060.7546 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	499.5672	0.5190	259.2754 (268)
Total CO2, kg/m2/year			1358.9550 (272)
Emissions per m2 for space and water heating			9.0663 (272a)
Fuel factor (mains gas)			1.0000
Emissions per m2 for lighting			2.2160 (272b)
Emissions per m2 for pumps and fans			0.3327 (272c)
Target Carbon Dioxide Emission Rate (TER) = (9.0663 * 1.00) + 2.2160 + 0.3327, rounded to 2 d.p.			11.6200 (273)