

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

Property Reference	010591		Issued on Date	10/02/2022	
Assessment Reference	B08-TY-13	Prop Type Ref	8.TY.13		
Property					
SAP Rating	85 B	DER	9.91	TER	22.26
Environmental	92 A	% DER<TER	55.48		
CO ₂ Emissions (t/year)	0.80	DFEE	44.38	TFEE	45.06
General Requirements Compliance	Pass	% DFEE<TFEE	1.51		
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 103 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) 22.26 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 9.91 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)45.1 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)44.4 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): Slight OK
Based on:
Overshading: Average
Windows facing North East: 3.76 m², No overhang
Windows facing South West: 6.23 m², No overhang
Windows facing North West: 24.32 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
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	103.0000 (1b)	x 2.5000 (2b)	= 257.5000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	103.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 257.5000 (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 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 = 1.20)			34.3100	1.1450	39.2863		(27)
External Wall 1	66.2500	34.3100	31.9400	0.1200	3.8328		(29a)
Sheltered Corridor	9.6300		9.6300	0.1842	1.7735		(29a)
Sheltered Unheated	24.1500		24.1500	0.1842	4.4475		(29a)
Total net area of external elements Aum(A, m2)			100.0300				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	49.3401		(33)
Party Wall 1			41.3800	0.0000	0.0000		(32)
Party Floor 1			103.0000				(32d)
Party Ceilings 1			103.0000				(32b)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							11.2690 (36)
Total fabric heat loss						(33) + (36) =	60.6091 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	21.8572	21.6102	21.3632	20.1285	19.8815	18.6467	18.6467	18.3997	19.1406	19.8815	20.3754	20.8693 (38)
Heat transfer coeff	82.4662	82.2193	81.9723	80.7375	80.4905	79.2558	79.2558	79.0088	79.7497	80.4905	80.9845	81.4784 (39)
Average = Sum(39)m / 12 =												80.6758 (39)
HLP	0.8006	0.7982	0.7958	0.7839	0.7815	0.7695	0.7695	0.7671	0.7743	0.7815	0.7863	0.7911 (40)
HLP (average)												0.7833 (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												2.7656 (42)
Average daily hot water use (litres/day)												99.8834 (43)
Daily hot water use	109.8717	105.8764	101.8810	97.8857	93.8904	89.8950	89.8950	93.8904	97.8857	101.8810	105.8764	109.8717 (44)
Energy conte	162.9366	142.5054	147.0528	128.2042	123.0150	106.1526	98.3660	112.8764	114.2245	133.1176	145.3083	157.7954 (45)
Energy content (annual)												Total = Sum(45)m = 1571.5545 (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:	24.4405	21.3758	22.0579	19.2306	18.4522	15.9229	14.7549	16.9315	17.1337	19.9676	21.7962	23.6693 (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	218.2134	192.4328	202.3296	181.6979	178.2918	159.6462	153.6428	168.1532	167.7181	188.3944	198.8020	213.0722 (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	218.2134	192.4328	202.3296	181.6979	178.2918	159.6462	153.6428	168.1532	167.7181	188.3944	198.8020	213.0722 (64)
Heat gains from water heating, kWh/month	98.3979	87.3250	93.1165	85.4228	85.1239	78.0907	76.9281	81.7528	80.7746	88.4830	91.1099	96.6884 (65)

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

Metabolic gains (Table 5), Watts												
(66)m	138.2808	138.2808	138.2808	138.2808	138.2808	138.2808	138.2808	138.2808	138.2808	138.2808	138.2808	138.2808 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	23.2762	20.6737	16.8130	12.7285	9.5147	8.0327	8.6797	11.2821	15.1429	19.2273	22.4411	23.9231 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	261.0884	263.7977	256.9704	242.4359	224.0887	206.8449	195.3250	192.6157	199.4430	213.9775	232.3247	249.5685 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.8281	36.8281	36.8281	36.8281	36.8281	36.8281	36.8281	36.8281	36.8281	36.8281	36.8281	36.8281 (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)	-110.6246	-110.6246	-110.6246	-110.6246	-110.6246	-110.6246	-110.6246	-110.6246	-110.6246	-110.6246	-110.6246	-110.6246 (71)
Water heating gains (Table 5)	132.2552	129.9479	125.1566	118.6428	114.4139	108.4593	103.3980	109.8828	112.1869	118.9288	126.5416	129.9575 (72)
Total internal gains	481.1041	478.9036	463.4242	438.2915	412.5015	387.8211	371.8869	378.2649	391.2570	416.6179	445.7917	467.9334 (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	3.7600	11.2829	0.2900	0.7000	0.7700	5.9681 (75)
Southwest	6.2300	36.7938	0.2900	0.7000	0.7700	32.2472 (79)
Northwest	24.3200	11.2829	0.2900	0.7000	0.7700	38.6025 (81)
Solar gains	76.8178	145.6537	238.6134	361.5659	465.1456	488.2450
Total gains	557.9219	624.5573	702.0376	799.8574	877.6471	876.0662

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	86.7359	86.9964	87.2585	88.5930	88.8648	90.2493	90.2493	90.5314	89.6904	88.8648	88.3228	87.7874
alpha	6.7824	6.7998	6.8172	6.9062	6.9243	7.0166	7.0166	7.0354	6.9794	6.9243	6.8882	6.8525
util living area	0.9987	0.9968	0.9885	0.9427	0.7947	0.5737	0.4188	0.4789	0.7729	0.9725	0.9967	0.9991 (86)
MIT	20.2015	20.3169	20.5179	20.7822	20.9501	20.9954	20.9996	20.9989	20.9696	20.7409	20.4268	20.1830 (87)
Th 2	20.2528	20.2549	20.2569	20.2673	20.2694	20.2799	20.2799	20.2820	20.2757	20.2694	20.2653	20.2611 (88)
util rest of house	0.9983	0.9958	0.9847	0.9250	0.7487	0.5115	0.3506	0.4049	0.7086	0.9606	0.9954	0.9988 (89)
MIT 2	19.1708	19.3409	19.6340	20.0128	20.2226	20.2769	20.2797	20.2815	20.2521	19.9641	19.5099	19.1503 (90)
Living area fraction												fLA = Living area / (4) = 0.4555 (91)
MIT	19.6404	19.7855	20.0366	20.3633	20.5540	20.6042	20.6076	20.6083	20.5790	20.3180	19.9276	19.6208 (92)
Temperature adjustment												0.0000
adjusted MIT	19.6404	19.7855	20.0366	20.3633	20.5540	20.6042	20.6076	20.6083	20.5790	20.3180	19.9276	19.6208 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	556.7105	621.3867	690.3341	741.9442	673.4531	472.8438	317.3973	331.9204	494.9205	565.5663	537.6021	531.0792 (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	1265.0607	1223.8728	1109.6285	925.5173	712.6638	475.8689	317.6265	332.4940	516.6956	782.2040	1038.8330	1256.4585 (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	527.0126	404.8706	311.9550	132.1726	29.1728	0.0000	0.0000	0.0000	0.0000	161.1785	360.8862	539.6821 (98)
Space heating												2466.9305 (98)
Space heating per m2												(98) / (4) = 23.9508 (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 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	2466.9305	(98)
Space heat from Heat pump = (98) x 1.00 x 1.00 x 1.05	2590.2771	(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	2222.3943	(64)
Water heat from Heat pump = (64) x 1.00 x 1.00 x 1.05	2333.5140	(310a)
Electricity used for heat distribution	49.2379	(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)	215.9781	(330a)
Total electricity for the above, kWh/year	215.9781	(331)
Electricity for lighting (calculated in Appendix L)	411.0654	(332)
Energy saving/generation technologies (Appendices M ,N and Q)		
Total delivered energy for all uses	5550.8345	(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	1641.2637	0.5190	851.8158 (367)
Electrical energy for heat distribution	49.2379	0.5190	25.5545 (372)
Total CO2 associated with community systems (negative value allowed since DFEE <= TFEE)			877.3703 (373)
Space and water heating			877.3703 (376)
Pumps and fans	215.9781	0.5190	112.0926 (378)
Energy for lighting	411.0654	0.5190	213.3429 (379)
Energy saving/generation technologies			
PV Unit	-350.0000	0.5190	-181.6500 (380)
Total CO2, kg/year			1021.1559 (383)
Dwelling Carbon Dioxide Emission Rate (DER)			9.9100 (384)

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

DER	9.9100	ZC1
Total Floor Area	TFA 103.0000	
Assumed number of occupants	N 2.7656	
CO2 emission factor in Table 12 for electricity displaced from grid	EF 0.5190	
CO2 emissions from appliances, equation (L14)	15.0209	ZC2
CO2 emissions from cooking, equation (L16)	1.7998	ZC3
Total CO2 emissions	26.7307	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	26.7307	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	103.0000 (1b)	2.5000 (2b)	257.5000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	103.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	257.5000 (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) =	0.1553 (8)
Pressure test					Yes
Measured/design AP50					5.0000
Infiltration rate					0.4053 (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) =		0.3141 (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	0.4005	0.3927	0.3848	0.3456	0.3377	0.2984	0.2984	0.2906	0.3141	0.3377	0.3534	0.3691 (22b)
	0.5802	0.5771	0.5740	0.5597	0.5570	0.5445	0.5445	0.5422	0.5493	0.5570	0.5624	0.5681 (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)			25.7400	1.3258	34.1250		(27)					
External Wall 1	66.2500	25.7400	40.5100	0.1800	7.2918		(29a)					
Sheltered Corridor	9.6300		9.6300	0.1800	1.7334		(29a)					
Sheltered Unheated	24.1500		24.1500	0.1800	4.3470		(29a)					
Total net area of external elements Aum(A, m2)			100.0300				(31)					
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 47.4972		(33)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							7.4366 (36)					
Total fabric heat loss							(33) + (36) = 54.9338 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	49.3034	49.0387	48.7793	47.5608	47.3328	46.2715	46.2715	46.0750	46.6803	47.3328	47.7940	48.2762 (38)
Heat transfer coeff	104.2372	103.9725	103.7131	102.4946	102.2666	101.2053	101.2053	101.0088	101.6141	102.2666	102.7278	103.2100 (39)
Average = Sum(39)m / 12 =												102.4935 (39)
HLP	1.0120	1.0094	1.0069	0.9951	0.9929	0.9826	0.9826	0.9807	0.9865	0.9929	0.9974	1.0020 (40)
HLP (average)												0.9951 (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												2.7656 (42)
Average daily hot water use (litres/day)												99.8834 (43)
Daily hot water use	109.8717	105.8764	101.8810	97.8857	93.8904	89.8950	89.8950	93.8904	97.8857	101.8810	105.8764	109.8717 (44)
Energy conte	162.9366	142.5054	147.0528	128.2042	123.0150	106.1526	98.3660	112.8764	114.2245	133.1176	145.3083	157.7954 (45)
Energy content (annual)												Total = Sum(45)m = 1571.5545 (45)
Distribution loss (46)m = 0.15 x (45)m	24.4405	21.3758	22.0579	19.2306	18.4522	15.9229	14.7549	16.9315	17.1337	19.9676	21.7962	23.6693 (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	209.5315	184.5911	193.6477	173.2960	169.6099	151.2444	144.9609	159.4713	159.3163	179.7125	190.4001	204.3903	(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)												
	209.5315	184.5911	193.6477	173.2960	169.6099	151.2444	144.9609	159.4713	159.3163	179.7125	190.4001	204.3903	(64)
	Total per year (kWh/year) = Sum(64)m = 2120.1719 (64)												
	91.4523	81.0516	86.1710	78.7014	78.1784	71.3692	69.9826	74.8073	74.0531	81.5375	84.3885	89.7429	(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	138.2808	138.2808	138.2808	138.2808	138.2808	138.2808	138.2808	138.2808	138.2808	138.2808	138.2808	138.2808	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	23.2762	20.6737	16.8130	12.7285	9.5147	8.0327	8.6797	11.2821	15.1429	19.2273	22.4411	23.9231	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	261.0884	263.7977	256.9704	242.4359	224.0887	206.8449	195.3250	192.6157	199.4430	213.9775	232.3247	249.5685	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.8281	36.8281	36.8281	36.8281	36.8281	36.8281	36.8281	36.8281	36.8281	36.8281	36.8281	36.8281	(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)	-110.6246	-110.6246	-110.6246	-110.6246	-110.6246	-110.6246	-110.6246	-110.6246	-110.6246	-110.6246	-110.6246	-110.6246	(71)
Water heating gains (Table 5)	122.9198	120.6125	115.8212	109.3074	105.0785	99.1239	94.0626	100.5475	102.8515	109.5934	117.2062	120.6222	(72)
Total internal gains	474.7687	472.5682	457.0889	431.9561	406.1661	381.4857	365.5515	371.9295	384.9216	410.2825	439.4563	461.5981	(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	2.8200	11.2829	0.6300	0.7000	0.7700	9.7240 (75)							
Southwest	4.6700	36.7938	0.6300	0.7000	0.7700	52.5126 (79)							
Northwest	18.2500	11.2829	0.6300	0.7000	0.7700	62.9299 (81)							
Solar gains	125.1665	237.3375	388.8362	589.2295	758.0548	795.7100	749.1977	616.6516	457.1918	279.5917	154.3154	104.2727	(83)
Total gains	599.9352	709.9057	845.9251	1021.1856	1164.2209	1177.1958	1114.7492	988.5811	842.1134	689.8742	593.7717	565.8707	(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	68.6202	68.7949	68.9670	69.7869	69.9425	70.6759	70.6759	70.8134	70.3916	69.9425	69.6285	69.3032	
alpha	5.5747	5.5863	5.5978	5.6525	5.6628	5.7117	5.7117	5.7209	5.6928	5.6628	5.6419	5.6202	
util living area	0.9983	0.9952	0.9821	0.9188	0.7526	0.5419	0.3982	0.4667	0.7631	0.9679	0.9959	0.9988	(86)
MIT	19.9320	20.0947	20.3699	20.7167	20.9297	20.9908	20.9987	20.9969	20.9450	20.6285	20.2154	19.9048	(87)
Th 2	20.0733	20.0755	20.0776	20.0874	20.0893	20.0979	20.0979	20.0995	20.0946	20.0893	20.0855	20.0816	(88)
util rest of house	0.9977	0.9936	0.9761	0.8942	0.6973	0.4692	0.3173	0.3771	0.6876	0.9533	0.9942	0.9983	(89)
MIT 2	18.6409	18.8797	19.2789	19.7666	20.0259	20.0922	20.0974	20.0982	20.0531	19.6593	19.0640	18.6073	(90)
Living area fraction	fLA = Living area / (4) = 0.4555 (91)												
MIT	19.2291	19.4332	19.7759	20.1994	20.4376	20.5016	20.5080	20.5076	20.4594	20.1008	19.5885	19.1984	(92)
Temperature adjustment	0.0000												
adjusted MIT	19.2291	19.4332	19.7759	20.1994	20.4376	20.5016	20.5080	20.5076	20.4594	20.1008	19.5885	19.1984	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	0.9970	0.9922	0.9737	0.8976	0.7194	0.5021	0.3542	0.4180	0.7197	0.9536	0.9930	0.9978	(94)
Useful gains	598.1164	704.3352	823.6916	916.6316	837.5225	591.1018	394.8193	413.2232	606.0918	657.8331	589.6156	564.6136	(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	1556.1638	1511.0514	1376.8858	1158.1287	893.5668	597.2701	395.5062	414.9049	646.2040	971.6119	1282.9156	1547.9810	(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	712.7873	542.1132	411.5765	173.8779	41.6970	0.0000	0.0000	0.0000	0.0000	233.4514	499.1760	731.6253	(98)
Space heating	3346.3047 (98)												
Space heating per m2	(98) / (4) = 32.4884 (99)												

8c. Space cooling requirement

Not applicable

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													93.5000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													3578.9355 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	712.7873	542.1132	411.5765	173.8779	41.6970	0.0000	0.0000	0.0000	0.0000	233.4514	499.1760	731.6253	(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)	762.3394	579.8002	440.1888	185.9657	44.5957	0.0000	0.0000	0.0000	0.0000	249.6807	533.8781	782.4870	(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	209.5315	184.5911	193.6477	173.2960	169.6099	151.2444	144.9609	159.4713	159.3163	179.7125	190.4001	204.3903	(64)
Efficiency of water heater (217)m	87.8247	87.5192	86.7771	84.8228	81.7063	79.8000	79.8000	79.8000	79.8000	85.5127	87.2691	79.8000	(216)
Fuel for water heating, kWh/month	238.5791	210.9150	223.1553	204.3036	207.5849	189.5293	181.6552	199.8387	199.6445	210.1589	218.1759	232.4582	(219)
Water heating fuel used													2515.9987 (219)
Annual totals kWh/year													
Space heating fuel - main system													3578.9355 (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)													411.0654 (232)
Total delivered energy for all uses													6580.9995 (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	3578.9355	0.2160	773.0501 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2515.9987	0.2160	543.4557 (264)
Space and water heating			1316.5058 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	411.0654	0.5190	213.3429 (268)
Total CO2, kg/m2/year			1568.7737 (272)
Emissions per m2 for space and water heating			12.7816 (272a)
Fuel factor (electricity)			1.5500
Emissions per m2 for lighting			2.0713 (272b)
Emissions per m2 for pumps and fans			0.3779 (272c)
Target Carbon Dioxide Emission Rate (TER) = (12.7816 * 1.55) + 2.0713 + 0.3779, rounded to 2 d.p.			22.2600 (273)