

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

Property Reference	010573			Issued on Date	10/02/2022
Assessment Reference	B08-TY-11	Prop Type Ref	8.TY.11		
Property					
SAP Rating	86 B	DER	13.33	TER	15.38
Environmental	89 B	% DER<TER	13.34		
CO ₂ Emissions (t/year)	1.11	DFEE	40.59	TFEE	45.74
General Requirements Compliance	Pass	% DFEE<TFEE	11.26		
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 104 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) 15.38 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 13.33 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)45.7 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)40.6 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.16 (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: 16.69 m², No overhang
Windows facing East: 3.76 m², No overhang
Windows facing West: 3.76 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	104.0000 (1b)	x 2.5000 (2b)	= 260.0000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	104.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 260.0000 (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)			24.2100	1.1450	27.7214		(27)
External Wall 1	64.1000	24.2100	39.8900	0.1200	4.7868		(29a)
Sheltered Corridor	14.1300		14.1300	0.1842	2.6022		(29a)
Sheltered Unheated	39.2500		39.2500	0.1842	7.2284		(29a)
Total net area of external elements Aum(A, m ²)			117.4800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	42.3387		(33)
Party Wall 1			7.3800	0.0000	0.0000		(32)
Party Floor 1			104.0000				(32d)
Party Ceilings 1			104.0000				(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)							8.3391 (36)
Total fabric heat loss						(33) + (36) =	50.6778 (37)

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

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	22.0694	21.8200	21.5707	20.3239	20.0745	18.8277	18.8277	18.5784	19.3265	20.0745	20.5732	21.0719 (38)
Average = Sum(39)m / 12 =	72.7472	72.4979	72.2485	71.0017	70.7524	69.5056	69.5056	69.2562	70.0043	70.7524	71.2511	71.7498 (39)
HLP	0.6995	0.6971	0.6947	0.6827	0.6803	0.6683	0.6683	0.6659	0.6731	0.6803	0.6851	0.6899 (40)
HLP (average)												0.6821 (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												2.7736 (42)
Average daily hot water use (litres/day)												100.0729 (43)
Daily hot water use	110.0802	106.0773	102.0744	98.0715	94.0686	90.0657	90.0657	94.0686	98.0715	102.0744	106.0773	110.0802 (44)
Energy conte	163.2458	142.7758	147.3319	128.4475	123.2484	106.3540	98.5526	113.0906	114.4413	133.3702	145.5841	158.0949 (45)
Energy content (annual)												Total = Sum(45)m = 1574.5371 (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:	24.4869	21.4164	22.0998	19.2671	18.4873	15.9531	14.7829	16.9636	17.1662	20.0055	21.8376	23.7142 (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	218.5226	192.7033	202.6087	181.9412	178.5252	159.8477	153.8294	168.3674	167.9349	188.6470	199.0777	213.3717 (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	218.5226	192.7033	202.6087	181.9412	178.5252	159.8477	153.8294	168.3674	167.9349	188.6470	199.0777	213.3717 (64)
Heat gains from water heating, kWh/month	98.5007	87.4149	93.2093	85.5037	85.2015	78.1577	76.9902	81.8241	80.8467	88.5670	91.2016	96.7880 (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	138.6799	138.6799	138.6799	138.6799	138.6799	138.6799	138.6799	138.6799	138.6799	138.6799	138.6799	138.6799 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	23.4143	20.7963	16.9127	12.8040	9.5712	8.0804	8.7311	11.3491	15.2327	19.3414	22.5742	24.0650 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	262.6369	265.3622	258.4944	243.8737	225.4177	208.0716	196.4834	193.7580	200.6258	215.2465	233.7026	251.0486 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.8680	36.8680	36.8680	36.8680	36.8680	36.8680	36.8680	36.8680	36.8680	36.8680	36.8680	36.8680 (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)	-110.9439	-110.9439	-110.9439	-110.9439	-110.9439	-110.9439	-110.9439	-110.9439	-110.9439	-110.9439	-110.9439	-110.9439 (71)
Water heating gains (Table 5)	132.3934	130.0817	125.2813	118.7552	114.5182	108.5523	103.4814	109.9786	112.2870	119.0417	126.6689	130.0914 (72)
Total internal gains	483.0485	480.8442	465.2924	440.0369	414.1110	389.3083	373.2999	379.6896	392.7495	418.2336	447.5497	469.8090 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
North	16.6900	10.6334	0.2900	0.7000	0.7700	24.9665 (74)
East	3.7600	19.6403	0.2900	0.7000	0.7700	10.3888 (76)
West	3.7600	19.6403	0.2900	0.7000	0.7700	10.3888 (80)
Solar gains	45.7440	88.3575	148.0118	227.8505	295.0689	310.2746
Total gains	528.7925	569.2018	613.3042	667.8874	709.1799	699.5829

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	99.2783	99.6198	99.9636	101.7190	102.0775	103.9085	103.9085	104.2826	103.1683	102.0775	101.3630	100.6584
alpha	7.6186	7.6413	7.6642	7.7813	7.8052	7.9272	7.9272	7.9522	7.8779	7.8052	7.7575	7.7106
util living area	0.9990	0.9979	0.9931	0.9648	0.8506	0.6293	0.4592	0.5134	0.8038	0.9788	0.9974	0.9993 (86)
MIT	20.3245	20.4102	20.5682	20.7880	20.9459	20.9955	20.9997	20.9992	20.9739	20.7791	20.5191	20.3120 (87)
Th 2	20.3413	20.3434	20.3455	20.3561	20.3583	20.3689	20.3689	20.3710	20.3646	20.3583	20.3540	20.3498 (88)
util rest of house	0.9987	0.9972	0.9908	0.9531	0.8120	0.5702	0.3936	0.4439	0.7465	0.9695	0.9964	0.9990 (89)
MIT 2	19.4208	19.5477	19.7792	20.1005	20.3051	20.3659	20.3688	20.3707	20.3437	20.0934	19.7154	19.4092 (90)
Living area fraction												fLA = Living area / (4) = 0.3423 (91)
MIT	19.7301	19.8429	20.0493	20.3358	20.5245	20.5814	20.5847	20.5858	20.5594	20.3281	19.9905	19.7182 (92)
Temperature adjustment												0.0000
adjusted MIT	19.7301	19.8429	20.0493	20.3358	20.5245	20.5814	20.5847	20.5858	20.5594	20.3281	19.9905	19.7182 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9983	0.9965	0.9894	0.9527	0.8226	0.5903	0.4161	0.4678	0.7650	0.9690	0.9957	0.9987 (94)
Ext temp.	527.8872	567.2178	606.8297	636.2800	583.3757	412.9888	276.8045	289.5245	434.5752	507.0407	502.0738	507.0601 (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	1122.4993	1083.3296	978.9138	811.9632	624.3519	415.7402	276.9601	289.8950	452.1856	688.2886	918.4643	1113.4298 (97)
Space heating kWh	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000 (97a)
Space heating	442.3915	346.8272	276.8306	126.4919	30.4863	0.0000	0.0000	0.0000	0.0000	134.8485	299.8012	451.1391 (98)
Space heating per m2												(98) / (4) = 20.2771 (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	2108.8162	(98)
Space heat from Boilers = (98) x 1.00 x 1.00 x 1.05	2214.2570	(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	2225.3769	(64)
Water heat from Boilers = (64) x 1.00 x 1.00 x 1.05	2336.6457	(310a)
Electricity used for heat distribution	45.5090	(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)	218.0750	(330a)
Total electricity for the above, kWh/year	218.0750	(331)
Electricity for lighting (calculated in Appendix L)	413.5033	(332)
Total delivered energy for all uses	5182.4810	(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	4790.4239	0.2160	1034.7316 (367)
Electrical energy for heat distribution	45.5090	0.5190	23.6192 (372)
Total CO2 associated with community systems (negative value allowed since DFEE <= TFEE)			1058.3507 (373)
Space and water heating			1058.3507 (376)
Pumps and fans	218.0750	0.5190	113.1809 (378)
Energy for lighting	413.5033	0.5190	214.6082 (379)
Total CO2, kg/year			1386.1399 (383)
Dwelling Carbon Dioxide Emission Rate (DER)			13.3300 (384)

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

DER			13.3300	ZC1
Total Floor Area			104.0000	
Assumed number of occupants			2.7736	
CO2 emission factor in Table 12 for electricity displaced from grid			0.5190	
CO2 emissions from appliances, equation (L14)			14.9647	ZC2
CO2 emissions from cooking, equation (L16)			1.7843	ZC3
Total CO2 emissions			30.0790	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			30.0790	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	104.0000 (1b)	x 2.5000 (2b)	= 260.0000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	104.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 260.0000 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	0	0	0 * 40 =	0.0000 (6a)
Number of open flues	0	0	0	0 * 20 =	0.0000 (6b)
Number of intermittent fans				4 * 10 =	40.0000 (7a)
Number of passive vents				0 * 10 =	0.0000 (7b)
Number of flueless gas fires				0 * 40 =	0.0000 (7c)
Air changes per hour					
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =				40.0000 / (5) =	0.1538 (8)
Pressure test				Yes	
Measured/design AP50					5.0000
Infiltration rate					0.4038 (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) =		0.3130 (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	0.3991	0.3912	0.3834	0.3443	0.3365	0.2973	0.2973	0.2895	0.3130	0.3365	0.3521	0.3678 (22b)
Effective ac	0.5796	0.5765	0.5735	0.5593	0.5566	0.5442	0.5442	0.5419	0.5490	0.5566	0.5620	0.5676 (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 Opening Type (Uw = 1.40)			24.2100	1.3258	32.0966		(27)					
External Wall 1	64.1000	24.2100	39.8900	0.1800	7.1802		(29a)					
Sheltered Corridor	14.1300		14.1300	0.1800	2.5434		(29b)					
Sheltered Unheated	39.2500		39.2500	0.1800	7.0650		(29c)					
Total net area of external elements Aum(A, m ²)			117.4800				(31)					
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	48.8852	(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)							5.6714 (36)					
Total fabric heat loss						(33) + (36) =	54.5566 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	49.7315	49.4662	49.2062	47.9848	47.7563	46.6926	46.6926	46.4956	47.1024	47.7563	48.2186	48.7019 (38)
Heat transfer coeff	104.2880	104.0228	103.7627	102.5414	102.3129	101.2492	101.2492	101.0522	101.6589	102.3129	102.7752	103.2585 (39)
Average = Sum(39)m / 12 =												102.5403 (39)
HLP	1.0028	1.0002	0.9977	0.9860	0.9838	0.9736	0.9736	0.9717	0.9775	0.9838	0.9882	0.9929 (40)
HLP (average)												0.9860 (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												2.7736 (42)
Average daily hot water use (litres/day)												100.0729 (43)
Daily hot water use	110.0802	106.0773	102.0744	98.0715	94.0686	90.0657	90.0657	94.0686	98.0715	102.0744	106.0773	110.0802 (44)
Energy conte	163.2458	142.7758	147.3319	128.4475	123.2484	106.3540	98.5526	113.0906	114.4413	133.3702	145.5841	158.0949 (45)
Energy content (annual)										Total = Sum(45)m =		1574.5371 (45)
Distribution loss (46)m = 0.15 x (45)m	24.4869	21.4164	22.0998	19.2671	18.4873	15.9531	14.7829	16.9636	17.1662	20.0055	21.8376	23.7142 (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	209.8407	184.8616	193.9268	173.5393	169.8433	151.4459	145.1475	159.6855	159.5331	179.9651	190.6759	204.6898	(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)												
	209.8407	184.8616	193.9268	173.5393	169.8433	151.4459	145.1475	159.6855	159.5331	179.9651	190.6759	204.6898	(64)
	Total per year (kWh/year) = Sum(64)m = 2123.1545 (64)												
	91.5552	81.1415	86.2638	78.7823	78.2560	71.4362	70.0447	74.8785	74.1252	81.6215	84.4802	89.8425	(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	138.6799	138.6799	138.6799	138.6799	138.6799	138.6799	138.6799	138.6799	138.6799	138.6799	138.6799	138.6799	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	23.4143	20.7963	16.9127	12.8040	9.5712	8.0804	8.7311	11.3491	15.2327	19.3414	22.5742	24.0650	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	262.6369	265.3622	258.4944	243.8737	225.4177	208.0716	196.4834	193.7580	200.6258	215.2465	233.7026	251.0486	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.8680	36.8680	36.8680	36.8680	36.8680	36.8680	36.8680	36.8680	36.8680	36.8680	36.8680	36.8680	(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)	-110.9439	-110.9439	-110.9439	-110.9439	-110.9439	-110.9439	-110.9439	-110.9439	-110.9439	-110.9439	-110.9439	-110.9439	(71)
Water heating gains (Table 5)	123.0580	120.7463	115.9459	109.4198	105.1828	99.2169	94.1461	100.6432	102.9517	109.7064	117.3336	120.7560	(72)
Total internal gains	476.7131	474.5089	458.9570	433.7015	407.7756	382.9729	366.9645	373.3543	386.4141	411.8982	441.2143	463.4736	(73)

6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access	Gains							
	m ²	Table 6a	Specific data	Specific data	factor	W							
		W/m ²	or Table 6b	or Table 6c	Table 6d								
North	16.6900	10.6334	0.6300	0.7000	0.7700	54.2375 (74)							
East	3.7600	19.6403	0.6300	0.7000	0.7700	22.5687 (76)							
West	3.7600	19.6403	0.6300	0.7000	0.7700	22.5687 (80)							
Solar gains	99.3750	191.9491	321.5428	494.9856	641.0118	674.0449	634.2061	519.7816	380.8864	228.1562	123.1901	82.3339	(83)
Total gains	576.0881	666.4580	780.4999	928.6871	1048.7874	1057.0178	1001.1706	893.1359	767.3005	640.0544	564.4044	545.8075	(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	69.2526	69.4292	69.6032	70.4322	70.5895	71.3311	71.3311	71.4702	71.0436	70.5895	70.2720	69.9431	
alpha	5.6168	5.6286	5.6402	5.6955	5.7060	5.7554	5.7554	5.7647	5.7362	5.7060	5.6848	5.6629	
util living area	0.9987	0.9966	0.9880	0.9436	0.8065	0.5983	0.4426	0.5146	0.8108	0.9773	0.9969	0.9990	(86)
MIT	19.9178	20.0618	20.3188	20.6607	20.9016	20.9855	20.9978	20.9951	20.9261	20.5916	20.1943	19.8942	(87)
Th 2	20.0810	20.0832	20.0852	20.0950	20.0969	20.1054	20.1054	20.1070	20.1021	20.0969	20.0932	20.0893	(88)
util rest of house	0.9982	0.9955	0.9838	0.9247	0.7548	0.5210	0.3539	0.4178	0.7396	0.9664	0.9957	0.9987	(89)
MIT 2	18.6258	18.8377	19.2121	19.7007	20.0048	20.0963	20.1046	20.1050	20.0438	19.6153	19.0392	18.5975	(90)
Living area fraction	fLA = Living area / (4) = 0.3423 (91)												
MIT	19.0681	19.2567	19.5910	20.0293	20.3118	20.4006	20.4104	20.4097	20.3458	19.9495	19.4346	19.0414	(92)
Temperature adjustment	0.0000												
adjusted MIT	19.0681	19.2567	19.5910	20.0293	20.3118	20.4006	20.4104	20.4097	20.3458	19.9495	19.4346	19.0414	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	0.9975	0.9941	0.9808	0.9231	0.7680	0.5471	0.3844	0.4511	0.7607	0.9642	0.9944	0.9981	(94)
Useful gains	574.6463	662.5060	765.5368	857.2268	805.4468	578.2733	384.8153	402.8548	583.6498	617.1150	561.2429	544.7907	(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	1540.1339	1493.4282	1358.3530	1141.2180	881.0994	587.3103	385.7972	405.1905	634.9447	956.5755	1267.6883	1532.4973	(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	718.3228	558.3797	441.0553	204.4736	56.2855	0.0000	0.0000	0.0000	0.0000	252.5586	508.6406	734.8537	(98)
Space heating	3474.5699 (98)												
Space heating per m2	(98) / (4) = 33.4093 (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													3716.1175	(211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Space heating requirement	718.3228	558.3797	441.0553	204.4736	56.2855	0.0000	0.0000	0.0000	0.0000	252.5586	508.6406	734.8537	(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)	768.2597	597.1976	471.7169	218.6884	60.1984	0.0000	0.0000	0.0000	0.0000	270.1162	544.0007	785.9398	(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	209.8407	184.8616	193.9268	173.5393	169.8433	151.4459	145.1475	159.6855	159.5331	179.9651	190.6759	204.6898	(64)	
Efficiency of water heater (217)m	87.8373	87.5792	86.9398	85.2522	82.2196	79.8000	79.8000	79.8000	79.8000	85.7178	87.3080	79.8000	(216)	
Fuel for water heating, kWh/month	238.8971	211.0792	223.0587	203.5600	206.5727	189.7818	181.8891	200.1071	199.9162	209.9508	218.3944	232.7836	(219)	
Water heating fuel used													2515.9907	(219)
Annual totals kWh/year														
Space heating fuel - main system													3716.1175	(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)													413.5033	(232)
Total delivered energy for all uses													6720.6115	(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	3716.1175	0.2160	802.6814 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2515.9907	0.2160	543.4540 (264)
Space and water heating			1346.1354 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	413.5033	0.5190	214.6082 (268)
Total CO2, kg/m2/year			1599.6686 (272)
Emissions per m2 for space and water heating			12.9436 (272a)
Fuel factor (mains gas)			1.0000
Emissions per m2 for lighting			2.0635 (272b)
Emissions per m2 for pumps and fans			0.3743 (272c)
Target Carbon Dioxide Emission Rate (TER) = (12.9436 * 1.00) + 2.0635 + 0.3743, rounded to 2 d.p.			15.3800 (273)