

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

Property Reference	00229 Station Rd F.03				Issued on Date	08/11/2019
Assessment Reference	Option 2 Communal Gas	Prop Type Ref				
Property						
SAP Rating	80 C	DER	21.85	TER	23.07	
Environmental	86 B	% DER<TER	5.28			
CO ₂ Emissions (t/year)	0.92	DFEE	47.74	TFEE	63.77	
General Requirements Compliance	Pass	% DFEE<TFEE	25.14			
Assessor Details	Miss Jessica James, Jessica James, Tel: 02079938507, jess@jawsustainability.com				Assessor ID	R564-0001
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 48 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) 23.07 kgCO₂/m²

Dwelling Carbon Dioxide Emission Rate (DER) 21.85 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)63.8 kWh/m²/yr

Dwelling Fabric Energy Efficiency (DFEE)47.7 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.18 (max. 0.30)	0.30 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.09 (max. 0.25)	0.09 (max. 0.70)	OK
Roof	(no roof)		
Openings	1.42 (max. 2.00)	1.53 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.080

3 Air permeability

Air permeability at 50 pascals:	4.00 (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, programmer and 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:	0.50	
Maximum	1.5	OK
MVHR efficiency:	91%	
Minimum:	70%	OK

9 Summertime temperature

Overheating risk (Thames Valley): Medium OK

Based on:

Overshading:	Average
Windows facing East:	7.73 m ² , No overhang
Air change rate:	4.00 ach
Blinds/curtains:	None

10 Key features

External wall U-value	0.14 W/m ² K
External wall U-value	0.14 W/m ² K
External wall U-value	0.14 W/m ² K
Party wall U-value	0.00 W/m ² K
Door U-value	1.00 W/m ² K

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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	48.0000 (1b)	x 2.5000 (2b)	= 120.0000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	48.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 120.0000 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	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)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					0.0000 / (5) = 0.0000 (8)
Pressure test					Yes
Measured/design AP50					4.0000
Infiltration rate					0.2000 (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) =		0.1550 (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	0.1976	0.1938	0.1899	0.1705	0.1666	0.1473	0.1473	0.1434	0.1550	0.1666	0.1744	0.1821 (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) =												77.3500 (23c)
Effective ac	0.3109	0.3070	0.3031	0.2838	0.2799	0.2605	0.2605	0.2566	0.2683	0.2799	0.2876	0.2954 (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
DOOR			2.0000	1.0000	2.0000		(26)
WINDOWS (Uw = 1.53)			7.7300	1.4418	11.1448		(27)
COM			48.0000	0.0850	4.0800		(28b)
External Wall 1	24.9000	7.7300	17.1700	0.3000	5.1510		(29a)
Wall to stairs	16.2500		16.2500	0.1256	2.0407		(29a)
Wall to corridor	17.9500	2.0000	15.9500	0.1321	2.1062		(29a)
Unheated	7.2500		7.2500	0.1347	0.9767		(29a)
Total net area of external elements Aum(A, m ²)			114.3500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	27.4995		(33)
Party Wall 1			11.8500	0.0000	0.0000		(32)
Party Ceilings 1			48.0000				(32b)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							100.0000 (35)
Thermal bridges (User defined value 0.080 * total exposed area)							9.1480 (36)
Total fabric heat loss						(33) + (36) =	36.6475 (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	12.3107	12.1572	12.0038	11.2365	11.0831	10.3158	10.3158	10.1624	10.6227	11.0831	11.3900	11.6969 (38)
Heat transfer coeff	48.9581	48.8047	48.6512	47.8840	47.7305	46.9633	46.9633	46.8098	47.2702	47.7305	48.0374	48.3443 (39)
Average = Sum(39)m / 12 =												47.8456 (39)
HLP	1.0200	1.0168	1.0136	0.9976	0.9944	0.9784	0.9784	0.9752	0.9848	0.9944	1.0008	1.0072 (40)
HLP (average)												0.9968 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.6314 (42)
Average daily hot water use (litres/day)												72.9461 (43)
Daily hot water use	80.2407	77.3228	74.4050	71.4872	68.5693	65.6515	65.6515	68.5693	71.4872	74.4050	77.3228	80.2407 (44)
Energy conte	118.9946	104.0735	107.3945	93.6291	89.8394	77.5245	71.8379	82.4350	83.4196	97.2174	106.1204	115.2399 (45)

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CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Energy content (annual)												Total = Sum (45)m =	1147.7258 (45)
Distribution loss (46)m = 0.15 x (45)m													
	17.8492	15.6110	16.1092	14.0444	13.4759	11.6287	10.7757	12.3653	12.5129	14.5826	15.9181	17.2860	(46)
Water storage loss:													
Store volume												110.0000	(47)
b) If manufacturer declared loss factor is not known :													
Hot water storage loss factor from Table 2 (kWh/litre/day)												0.0152	(51)
Volume factor from Table 2a												1.0294	(52)
Temperature factor from Table 2b												0.6000	(53)
Enter (49) or (54) in (55)												1.0327	(55)
Total storage loss													
	32.0144	28.9162	32.0144	30.9817	32.0144	30.9817	32.0144	32.0144	30.9817	32.0144	30.9817	32.0144	(56)
If cylinder contains dedicated solar storage													
	32.0144	28.9162	32.0144	30.9817	32.0144	30.9817	32.0144	32.0144	30.9817	32.0144	30.9817	32.0144	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Total heat required for water heating calculated for each month													
	174.2714	154.0009	162.6713	147.1228	145.1162	131.0182	127.1147	137.7118	136.9132	152.4943	159.6141	170.5167	(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	174.2714	154.0009	162.6713	147.1228	145.1162	131.0182	127.1147	137.7118	136.9132	152.4943	159.6141	170.5167	(64)
												Total per year (kWh/year) = Sum (64)m =	1798.5656 (64)
Heat gains from water heating, kWh/month	83.7872	74.5464	79.9301	73.9266	74.0930	68.5719	68.1075	71.6311	70.5319	76.5462	78.0800	82.5387	(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	81.5707	81.5707	81.5707	81.5707	81.5707	81.5707	81.5707	81.5707	81.5707	81.5707	81.5707	81.5707	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	13.1943	11.7191	9.5306	7.2153	5.3935	4.5534	4.9201	6.3954	8.5839	10.8992	12.7210	13.5610	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	142.0415	143.5155	139.8012	131.8939	121.9123	112.5311	106.2638	104.7899	108.5042	116.4115	126.3930	135.7743	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.1571	31.1571	31.1571	31.1571	31.1571	31.1571	31.1571	31.1571	31.1571	31.1571	31.1571	31.1571	(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)	-65.2566	-65.2566	-65.2566	-65.2566	-65.2566	-65.2566	-65.2566	-65.2566	-65.2566	-65.2566	-65.2566	-65.2566	(71)
Water heating gains (Table 5)	112.6171	110.9321	107.4329	102.6759	99.5874	95.2387	91.5424	96.2783	97.9610	102.8847	108.4444	110.9391	(72)
Total internal gains	315.3242	313.6379	304.2359	289.2562	274.3644	259.7944	250.1976	254.9348	262.5203	277.6666	295.0296	307.7457	(73)

6. Solar gains

[Jan]													
	Area	Solar flux		g		FF		Access		Gains			
	m2	Table 6a		or Table 6b		or Table 6c		factor		W			
		W/m2						Table 6d					
East	7.7300	19.6403		0.6300		0.7000		0.7700		46.3979		(76)	
Solar gains	46.3979	90.7642	149.4757	218.0014	267.1689	273.4949	260.3783	223.6611	173.8464	107.6994	57.8528	38.1554	(83)
Total gains	361.7221	404.4021	453.7116	507.2576	541.5334	533.2893	510.5759	478.5959	436.3667	385.3660	352.8824	345.9011	(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	27.2342	27.3198	27.4060	27.8451	27.9346	28.3910	28.3910	28.4840	28.2066	27.9346	27.7561	27.5799	
alpha	2.8156	2.8213	2.8271	2.8563	2.8623	2.8927	2.8927	2.8989	2.8804	2.8623	2.8504	2.8387	
util living area	0.9413	0.9191	0.8743	0.7877	0.6636	0.5112	0.3866	0.4243	0.6269	0.8263	0.9162	0.9471	(86)
MIT	19.1403	19.3842	19.7938	20.2934	20.6675	20.8893	20.9634	20.9515	20.7922	20.2999	19.6483	19.1025	(87)
Th 2	20.0667	20.0694	20.0720	20.0853	20.0880	20.1014	20.1014	20.1040	20.0960	20.0880	20.0827	20.0774	(88)
util rest of house	0.9334	0.9085	0.8579	0.7605	0.6214	0.4518	0.3137	0.3499	0.5687	0.7976	0.9036	0.9400	(89)
MIT 2	17.5876	17.9380	18.5210	19.2229	19.7201	20.0005	20.0767	20.0696	19.8921	19.2495	18.3305	17.5399	(90)
Living area fraction	18.3582	18.6557	19.1526	19.7541	20.1902	20.4416	20.5167	20.5072	20.3388	fLA = Living area / (4) =	18.9845	18.3153	(91)
MIT	18.3582	18.6557	19.1526	19.7541	20.1902	20.4416	20.5167	20.5072	20.3388	19.7708	18.9845	18.3153	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.3582	18.6557	19.1526	19.7541	20.1902	20.4416	20.5167	20.5072	20.3388	19.7708	18.9845	18.3153	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9152	0.8888	0.8389	0.7496	0.6264	0.4749	0.3480	0.3841	0.5851	0.7863	0.8851	0.9226	(94)
Useful gains	331.0359	359.4421	380.6116	380.2505	339.2140	253.2798	177.6847	183.8422	255.3304	302.9967	312.3193	319.1414	(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	688.2613	671.3427	615.5666	519.7393	405.2433	274.3387	183.9413	192.2593	294.9081	437.7250	570.8988	682.3963	(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	265.7757	209.5972	174.8065	100.4319	49.1258	0.0000	0.0000	0.0000	0.0000	100.2379	186.1773	270.2616	(98)
Space heating												1356.4139	(98)
Space heating per m2												28.2586	(99)

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CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

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	1.2000 (306)
Space heating:	
Annual space heating requirement	1356.4139 (98)
Space heat from Boilers = (98) x 1.00 x 1.00 x 1.20	1627.6967 (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	1798.5656 (64)
Water heat from Boilers = (64) x 1.00 x 1.00 x 1.20	2158.2787 (310a)
Electricity used for heat distribution	37.8598 (313)
Annual totals kWh/year	
Electricity for pumps and fans:	
(BalancedWithHeatRecovery, DataSheet: in-use factor = 1.2500, SFP = 0.6250)	
mechanical ventilation fans (SFP = 0.6250)	91.5000 (330a)
Total electricity for the above, kWh/year	91.5000 (331)
Electricity for lighting (calculated in Appendix L)	233.0159 (332)
Total delivered energy for all uses	4110.4913 (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	3985.2373	0.2160	860.8113 (367)
Electrical energy for heat distribution	37.8598	0.5190	19.6492 (372)
Total CO2 associated with community systems (negative value allowed since DFEE <= TFEE)			880.4605 (373)
Space and water heating			880.4605 (376)
Pumps and fans	91.5000	0.5190	47.4885 (378)
Energy for lighting	233.0159	0.5190	120.9352 (379)
Total CO2, kg/year			1048.8842 (383)
Dwelling Carbon Dioxide Emission Rate (DER)			21.8500 (384)

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

DER		21.8500 ZC1
Total Floor Area	TFA	48.0000
Assumed number of occupants	N	1.6314
CO2 emission factor in Table 12 for electricity displaced from grid	EF	0.5190
CO2 emissions from appliances, equation (L14)		17.5356 ZC2
CO2 emissions from cooking, equation (L16)		3.2949 ZC3
Total CO2 emissions		42.6805 ZC4
Residual CO2 emissions offset from biofuel CHP		0.0000 ZC5
Additional allowable electricity generation, kWh/m²/year		0.0000 ZC6
Resulting CO2 emissions offset from additional allowable electricity generation		0.0000 ZC7
Net CO2 emissions		42.6805 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	48.0000 (1b)	x 2.5000 (2b)	= 120.0000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	48.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 120.0000 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					2 * 10 = 20.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(7a)+(7b)+(7c) =				20.0000 / (5) = 0.1667 (8)
Pressure test					Yes
Measured/design AP50					5.0000
Infiltration rate					0.4167 (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) =				0.3229 (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	0.4117	0.4036	0.3956	0.3552	0.3471	0.3068	0.3068	0.2987	0.3229	0.3471	0.3633	0.3794 (22b)
	0.5848	0.5815	0.5782	0.5631	0.5603	0.5471	0.5471	0.5446	0.5521	0.5603	0.5660	0.5720 (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			2.0000	1.0000	2.0000		(26)
TER Opening Type (Uw = 1.40)			7.7300	1.3258	10.2481		(27)
COM			48.0000	0.1300	6.2400		(28b)
External Wall 1	24.9000	7.7300	17.1700	0.1800	3.0906		(29a)
Wall to stairs	16.2500		16.2500	0.1800	2.9250		(29a)
Wall to corridor	17.9500	2.0000	15.9500	0.1800	2.8710		(29a)
Unheated	7.2500		7.2500	0.1800	1.3050		(29a)
Total net area of external elements Aum(A, m ²)			114.3500				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		28.6797		(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)							12.2916 (36)
Total fabric heat loss						(33) + (36) =	40.9713 (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	23.1563	23.0260	22.8983	22.2982	22.1860	21.6633	21.6633	21.5666	21.8646	22.1860	22.4131	22.6505 (38)
Heat transfer coeff	64.1277	63.9973	63.8696	63.2695	63.1573	62.6347	62.6347	62.5379	62.8360	63.1573	63.3844	63.6218 (39)
Average = Sum(39)m / 12 =												63.2690 (39)
HLP	1.3360	1.3333	1.3306	1.3181	1.3158	1.3049	1.3049	1.3029	1.3091	1.3158	1.3205	1.3255 (40)
HLP (average)												1.3181 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.6314 (42)
Average daily hot water use (litres/day)												72.9461 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	80.2407	77.3228	74.4050	71.4872	68.5693	65.6515	65.6515	68.5693	71.4872	74.4050	77.3228	80.2407 (44)
Energy content (annual)	118.9946	104.0735	107.3945	93.6291	89.8394	77.5245	71.8379	82.4350	83.4196	97.2174	106.1204	115.2399 (45)
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		1147.7258 (45)
Water storage loss:	17.8492	15.6110	16.1092	14.0444	13.4759	11.6287	10.7757	12.3653	12.5129	14.5826	15.9181	17.2860 (46)
Store volume												150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938 (48)

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Temperature factor from Table 2b												0.5400 (49)
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	22.5120	23.2624	22.5120	23.2624	(59)
Total heat required for water heating calculated for each month												
165.5895	146.1592	153.9894	138.7210	136.4343	122.6164	118.4328	129.0299	128.5114	143.8124	151.2123	161.8348	(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	(63)
Solar input (sum of months) = Sum(63)m =												0.0000 (63)
Output from w/h												
165.5895	146.1592	153.9894	138.7210	136.4343	122.6164	118.4328	129.0299	128.5114	143.8124	151.2123	161.8348	(64)
Heat gains from water heating, kWh/month												
76.8416	68.2730	72.9846	67.2052	67.1475	61.8504	61.1620	64.6856	63.8105	69.6007	71.3585	75.5932	(65)
Total per year (kWh/year) = Sum(64)m =												1696.3433 (64)

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	
81.5707	81.5707	81.5707	81.5707	81.5707	81.5707	81.5707	81.5707	81.5707	81.5707	81.5707	81.5707	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
13.1943	11.7191	9.5306	7.2153	5.3935	4.5534	4.9201	6.3954	8.5839	10.8992	12.7210	13.5610	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
142.0415	143.5155	139.8012	131.8939	121.9123	112.5311	106.2638	104.7899	108.5042	116.4115	126.3930	135.7743	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
31.1571	31.1571	31.1571	31.1571	31.1571	31.1571	31.1571	31.1571	31.1571	31.1571	31.1571	31.1571	(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	(70)
Losses e.g. evaporation (negative values) (Table 5)												
-65.2566	-65.2566	-65.2566	-65.2566	-65.2566	-65.2566	-65.2566	-65.2566	-65.2566	-65.2566	-65.2566	-65.2566	(71)
Water heating gains (Table 5)												
103.2818	101.5967	98.0976	93.3405	90.2520	85.9033	82.2070	86.9430	88.6257	93.5494	99.1091	101.6038	(72)
Total internal gains	308.9888	307.3025	297.9005	282.9208	268.0291	253.4590	243.8622	248.5994	256.1849	271.3312	288.6942	301.4103 (73)

6. Solar gains

[Jan]												
Area												
m2												
Solar flux												
Table 6a												
W/m2												
Specific data												
or Table 6b												
Specific data												
or Table 6c												
FF												
Access												
factor												
Table 6d												
Gains												
W												
East	7.7300	19.6403	0.6300	0.7000	0.7700	46.3979	(76)					
Solar gains	46.3979	90.7642	149.4757	218.0014	267.1689	273.4949	260.3783	223.6611	173.8464	107.6994	57.8528	38.1554 (83)
Total gains	355.3868	398.0667	447.3763	500.9223	535.1980	526.9539	504.2405	472.2606	430.0313	379.0306	346.5470	339.5657 (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	51.9797	52.0855	52.1897	52.6847	52.7783	53.2187	53.2187	53.3010	53.0482	52.7783	52.5892	52.3929
alpha	4.4653	4.4724	4.4793	4.5123	4.5186	4.5479	4.5479	4.5534	4.5365	4.5186	4.5059	4.4929
util living area	0.9951	0.9912	0.9798	0.9436	0.8547	0.6935	0.5301	0.5825	0.8227	0.9630	0.9909	0.9960 (86)
MIT	19.6426	19.7962	20.0760	20.4439	20.7532	20.9326	20.9842	20.9761	20.8483	20.4457	19.9797	19.6147 (87)
Th 2	19.8127	19.8149	19.8169	19.8267	19.8285	19.8370	19.8370	19.8386	19.8337	19.8285	19.8248	19.8209 (88)
util rest of house	0.9935	0.9882	0.9725	0.9225	0.8013	0.5932	0.3982	0.4484	0.7403	0.9448	0.9872	0.9947 (89)
MIT 2	18.0340	18.2588	18.6643	19.1893	19.5935	19.7939	19.8316	19.8294	19.7170	19.2034	18.5339	17.9991 (90)
Living area fraction	18.8323	19.0217	19.3648	19.8119	20.1690	20.3590	20.4036	20.3984	20.2784	19.8199	19.2514	18.8009 (92)
Temperature adjustment	18.8323	19.0217	19.3648	19.8119	20.1690	20.3590	20.4036	20.3984	20.2784	19.8199	19.2514	18.8009 (93)
adjusted MIT	18.8323	19.0217	19.3648	19.8119	20.1690	20.3590	20.4036	20.3984	20.2784	19.8199	19.2514	18.8009 (93)

8. Space heating requirement

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9916	0.9855	0.9690	0.9222	0.8185	0.6406	0.4641	0.5153	0.7751	0.9447	0.9848	0.9931 (94)
Useful gains	352.4023	392.3107	433.4975	461.9483	438.0853	337.5895	234.0178	243.3530	333.3348	358.0580	341.2665	337.2139 (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	931.9202	903.7533	821.6714	690.3918	534.8780	360.7129	238.2363	250.0533	388.2260	582.3027	770.2095	928.9326 (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	431.1613	343.6894	288.8014	164.4793	72.0137	0.0000	0.0000	0.0000	0.0000	166.8381	308.8390	440.2387 (98)
Space heating												2216.0609 (98)
Space heating per m2												46.1679 (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													2370.1187 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	431.1613	343.6894	288.8014	164.4793	72.0137	0.0000	0.0000	0.0000	0.0000	166.8381	308.8390	440.2387	(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)	461.1351	367.5823	308.8785	175.9137	77.0200	0.0000	0.0000	0.0000	0.0000	178.4365	330.3091	470.8435	(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	165.5895	146.1592	153.9894	138.7210	136.4343	122.6164	118.4328	129.0299	128.5114	143.8124	151.2123	161.8348	(64)
Efficiency of water heater (217)m	87.2536	87.0186	86.4679	85.2690	83.1983	79.8000	79.8000	79.8000	79.8000	85.2107	86.6799	87.3517	(216)
Fuel for water heating, kWh/month	189.7796	167.9632	178.0884	162.6863	163.9868	153.6546	148.4120	161.6916	161.0418	168.7727	174.4492	185.2681	(219)
Water heating fuel used												2015.7943	(219)
Annual totals kWh/year													
Space heating fuel - main system												2370.1187	(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)												233.0159	(232)
Total delivered energy for all uses												4693.9288	(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	2370.1187	0.2160	511.9456 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2015.7943	0.2160	435.4116 (264)
Space and water heating			947.3572 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	233.0159	0.5190	120.9352 (268)
Total CO2, kg/m2/year			1107.2174 (272)
Emissions per m2 for space and water heating			19.7366 (272a)
Fuel factor (mains gas)			1.0000
Emissions per m2 for lighting			2.5195 (272b)
Emissions per m2 for pumps and fans			0.8109 (272c)
Target Carbon Dioxide Emission Rate (TER) = (19.7366 * 1.00) + 2.5195 + 0.8109, rounded to 2 d.p.			23.0700 (273)