

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

Property Reference	Unit 3 Eldon Terrace			Issued on Date	03/06/2021
Assessment Reference	001	Prop Type Ref			
Property					
SAP Rating	86 B	DER	12.88	TER	16.96
Environmental	90 B	% DER<TER	24.04		
CO ₂ Emissions (t/year)	0.86	DFEE	29.61	TFEE	44.50
General Requirements Compliance	Pass	% DFEE<TFEE	33.46		
Assessor Details	Mr. Andrew Sadler, Build Pass Ltd, Tel: 01962 657180, andrew@buildpass.co.uk			Assessor ID	P628-0001
Client					

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REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

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DWELLING AS DESIGNED

Semi-Detached House, total floor area 80 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
Fuel factor:1.00 (mains gas)
Target Carbon Dioxide Emission Rate (TER) 16.96 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 12.88 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)44.5 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)29.6 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.18 (max. 0.30)	0.18 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.12 (max. 0.25)	0.12 (max. 0.70)	OK
Roof	0.13 (max. 0.20)	0.17 (max. 0.35)	OK
Openings	1.17 (max. 2.00)	1.40 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals: 4.00 (design value)
Maximum 10.0 OK

4 Heating efficiency

Main heating system: Boiler system with radiators or underfloor - Mains gas
Data from database
Worcester Greenstar 25Si Compact ErP
Combi boiler
Efficiency: 89.8% SEDBUK2009
Minimum: 88.0% OK

Secondary heating system: None

5 Cylinder insulation

Hot water storage No cylinder

6 Controls

Space heating controls: Time and temperature zone control OK

Hot water controls: No cylinder

Boiler interlock Yes OK

7 Low energy lights

Percentage of fixed lights with low-energy fittings:100%
Minimum 75% OK

8 Mechanical ventilation

Continuous extract system (decentralised)
Specific fan power: 0.1600 0.1600
Maximum 0.7 OK

9 Summertime temperature

Overheating risk (Thames Valley): Not significant OK
Based on:
Overshading: Average
Windows facing North: 3.36 m², No overhang
Windows facing South: 8.26 m², No overhang
Air change rate: 8.00 ach
Blinds/curtains: None

10 Key features

External wall U-value 0.13 W/m²K
Party wall U-value 0.00 W/m²K
Floor U-value 0.12 W/m²K
Door U-value 0.85 W/m²K

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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	28.9000 (1b)	x 2.2000 (2b)	= 63.5800 (1b) - (3b)
First floor	28.9000 (1c)	x 2.6000 (2c)	= 75.1400 (1c) - (3c)
Second floor	22.1600 (1d)	x 2.1700 (2d)	= 48.0872 (1d) - (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	79.9600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 186.8072 (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					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) =					Air changes per hour 0.0000 / (5) = 0.0000 (8)
Pressure test					Yes
Measured/design AP50					4.0000
Infiltration rate					0.2000 (18)
Number of sides sheltered					1 (19)
Shelter factor			(20) = 1 - [0.075 x (19)] =		0.9250 (20)
Infiltration rate adjusted to include shelter factor			(21) = (18) x (20) =		0.1850 (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	0.2359	0.2313	0.2266	0.2035	0.1989	0.1758	0.1758	0.1711	0.1850	0.1989	0.2081	0.2174 (22b)
Mechanical extract ventilation - decentralised												0.5000 (23a)
If mechanical ventilation:												
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (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			2.1000	0.8500	1.7850		(26)
Windows (Uw = 1.20)			11.6200	1.1450	13.3053		(27)
Roof Lights (Uw = 1.40)			1.5200	1.3258	2.0152		(27a)
Heat Loss Floor 1			28.9000	0.1200	3.4680		(28a)
External Wall 1	86.8600	12.7200	74.1400	0.1800	13.3452		(29a)
Dormer Cheeks	2.0000	1.0000	1.0000	0.1300	0.1300		(29a)
External Roof 1	28.3000	1.5200	26.7800	0.1300	3.4814		(30)
Dormer Roof	0.6000		0.6000	0.1700	0.1020		(30)
Total net area of external elements Aum(A, m ²)			146.6600				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		37.6321		(33)
Party Wall 1			40.3900	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							6.9800 (36)
Total fabric heat loss						(33) + (36) =	44.6121 (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	30.8232	30.8232	30.8232	30.8232	30.8232	30.8232	30.8232	30.8232	30.8232	30.8232	30.8232	30.8232 (38)
Heat transfer coeff	75.4353	75.4353	75.4353	75.4353	75.4353	75.4353	75.4353	75.4353	75.4353	75.4353	75.4353	75.4353 (39)
Average = Sum(39)m / 12 =												75.4353 (39)
HLP	0.9434	0.9434	0.9434	0.9434	0.9434	0.9434	0.9434	0.9434	0.9434	0.9434	0.9434	0.9434 (40)
HLP (average)												0.9434 (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												2.4621 (42)
Average daily hot water use (litres/day)												92.6749 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	101.9424	98.2354	94.5284	90.8214	87.1144	83.4074	83.4074	87.1144	90.8214	94.5284	98.2354	101.9424 (44)

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CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Energy content (annual)	151.1776	132.2209	136.4402	118.9518	114.1371	98.4917	91.2670	104.7302	105.9810	123.5107	134.8216	146.4075 (45)
Distribution loss (46)m = 0.15 x (45)m	22.6766	19.8331	20.4660	17.8428	17.1206	14.7737	13.6900	15.7095	15.8972	18.5266	20.2232	1458.1373 (45)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	29.4928	26.6386	29.4928	28.5414	29.4928	28.5414	29.4928	29.4928	28.5414	29.4928	28.5414	29.4928 (61)
Total heat required for water heating calculated for each month	180.6704	158.8596	165.9329	147.4932	143.6299	127.0331	120.7598	134.2230	134.5224	153.0034	163.3630	175.9003 (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)
FGHRS	-21.6515	-18.5987	-18.1246	-14.5483	-13.3430	-11.5018	-10.8134	-12.1866	-12.2657	-15.2467	-18.9191	-21.3742 eq. (G5)
Output from w/h	159.0189	140.2609	147.8083	132.9449	130.2869	115.5313	109.9464	122.0364	122.2568	137.7568	144.4439	154.5260 (64)
Heat gains from water heating, kWh/month	57.6398	50.6231	52.7395	46.6868	45.3238	39.8838	37.7195	42.1960	42.3740	48.4405	51.9635	56.0537 (65)
Total per year (kWh/year) = Sum(64)m =												1616.8175 (64)

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

Metabolic gains (Table 5), Watts												
(66)m	123.1051	123.1051	123.1051	123.1051	123.1051	123.1051	123.1051	123.1051	123.1051	123.1051	123.1051	123.1051 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	20.2078	17.9484	14.5966	11.0506	8.2605	6.9738	7.5355	9.7949	13.1467	16.6927	19.4829	20.7695 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.3569	221.6332	215.8971	203.6857	188.2711	173.7835	164.1049	161.8286	167.5647	179.7761	195.1907	209.6783 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.3105	35.3105	35.3105	35.3105	35.3105	35.3105	35.3105	35.3105	35.3105	35.3105	35.3105	35.3105 (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)	-98.4841	-98.4841	-98.4841	-98.4841	-98.4841	-98.4841	-98.4841	-98.4841	-98.4841	-98.4841	-98.4841	-98.4841 (71)
Water heating gains (Table 5)	77.4728	75.3320	70.8865	64.8428	60.9191	55.3942	50.6982	56.7150	58.8528	65.1082	72.1716	75.3410 (72)
Total internal gains	379.9691	377.8451	364.3118	342.5107	320.3821	299.0830	285.2701	291.2701	302.4957	324.5085	349.7766	368.7203 (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				3.3600	10.6334	0.6300	0.0000	0.7700	17.3317 (74)			
South				8.2600	46.7521	0.6300	0.0000	0.7700	187.3321 (78)			
North				0.6400	16.1759	0.6300	0.7000	1.0000	4.1089 (82)			
South				0.8800	43.9921	0.6300	0.7000	1.0000	15.3652 (82)			

Solar gains	224.1379	375.7416	503.6153	615.5260	688.2933	684.5714	659.3477	603.7038	541.5462	411.9075	267.2290	192.6887 (83)
Total gains	604.1070	753.5868	867.9271	958.0367	1008.6755	983.6545	944.6178	894.9739	844.0419	736.4160	617.0057	561.4090 (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	73.6098	73.6098	73.6098	73.6098	73.6098	73.6098	73.6098	73.6098	73.6098	73.6098	73.6098	73.6098
Feb	5.9073	5.9073	5.9073	5.9073	5.9073	5.9073	5.9073	5.9073	5.9073	5.9073	5.9073	5.9073
Mar	0.9932	0.9765	0.9340	0.8337	0.6685	0.4870	0.3509	0.3868	0.6026	0.8808	0.9816	0.9954 (86)
MIT	20.3500	20.5158	20.6948	20.8496	20.9290	20.9506	20.9536	20.9532	20.9431	20.8296	20.5486	20.3055 (87)
Th 2	20.1308	20.1308	20.1308	20.1308	20.1308	20.1308	20.1308	20.1308	20.1308	20.1308	20.1308	20.1308 (88)
util rest of house	0.9911	0.9699	0.9170	0.7978	0.6146	0.4226	0.2818	0.3142	0.5324	0.8448	0.9752	0.9940 (89)
MIT 2	19.2650	19.5029	19.7518	19.9523	20.0418	20.0613	20.0632	20.0631	20.0559	19.9335	19.5522	19.2004 (90)
Living area fraction	19.5007	19.7229	19.9566	20.1472	20.2345	20.2545	20.2566	20.2564	20.2486	20.1282	19.7686	19.4404 (92)
Temperature adjustment	19.3507	19.5729	19.8066	19.9972	20.0845	20.1045	20.1066	20.1064	20.0986	19.9782	19.6186	-0.1500
adjusted MIT												19.2904 (93)

8. Space heating requirement

Utilisation	0.9886	0.9646	0.9095	0.7918	0.6116	0.4206	0.2799	0.3122	0.5298	0.8375	0.9704	0.9922 (94)
Useful gains	597.2179	726.8864	789.4224	758.5722	616.8960	413.7576	264.4186	279.3968	447.1566	616.7587	598.7320	557.0043 (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	1135.3553	1106.8561	1003.7897	837.1205	632.4893	415.2321	264.5219	279.5960	452.5097	707.4435	944.3474	1138.3515 (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	400.3742	255.3396	159.4893	56.5548	11.6015	0.0000	0.0000	0.0000	0.0000	67.4695	248.8430	432.5223 (98)
Space heating												1632.1942 (98)
Space heating per m2										(98) / (4) =		20.4126 (99)

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CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

8c. Space cooling requirement

Not applicable

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 %)													90.7000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													1799.5526 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	400.3742	255.3396	159.4893	56.5548	11.6015	0.0000	0.0000	0.0000	0.0000	67.4695	248.8430	432.5223	(98)
Space heating efficiency (main heating system 1)	90.7000	90.7000	90.7000	90.7000	90.7000	0.0000	0.0000	0.0000	0.0000	90.7000	90.7000	90.7000	(210)
Space heating fuel (main heating system)	441.4269	281.5211	175.8426	62.3537	12.7910	0.0000	0.0000	0.0000	0.0000	74.3876	274.3584	476.8713	(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	159.0189	140.2609	147.8083	132.9449	130.2869	115.5313	109.9464	122.0364	122.2568	137.7568	144.4439	154.5260	(64)
Efficiency of water heater	89.6166	89.3527	88.8818	88.0722	87.2912	87.0000	87.0000	87.0000	87.0000	88.1826	89.3051	87.0000	(216)
Fuel for water heating, kWh/month	177.4436	156.9745	166.2976	150.9499	149.2555	132.7946	126.3752	140.2717	140.5250	156.2176	161.7421	172.2777	(219)
Water heating fuel used													1831.1250 (219)
Annual totals kWh/year													
Space heating fuel - main system													1799.5526 (211)
Space heating fuel - secondary													0.0000 (215)
Electricity for pumps and fans:													
(MEVDecentralised, Database: total watage = 8.2800, total flow = 45.0000, SFP = 0.1840)													
mechanical ventilation fans (SFP = 0.1840)													41.9345 (230a)
central heating pump													30.0000 (230c)
main heating flue fan													45.0000 (230e)
Total electricity for the above, kWh/year													116.9345 (231)
Electricity for lighting (calculated in Appendix L)													356.8769 (232)
Total delivered energy for all uses													4104.4890 (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	1799.5526	0.2160	388.7034	(261)
Space heating - secondary	0.0000	0.0000	0.0000	(263)
Water heating (other fuel)	1831.1250	0.2160	395.5230	(264)
Space and water heating			784.2264	(265)
Pumps and fans	116.9345	0.5190	60.6890	(267)
Energy for lighting	356.8769	0.5190	185.2191	(268)
Total CO2, kg/year			1030.1345	(272)
Dwelling Carbon Dioxide Emission Rate (DER)			12.8800	(273)

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

DER		12.8800	ZC1
Total Floor Area	TFA	79.9600	
Assumed number of occupants	N	2.4621	
CO2 emission factor in Table 12 for electricity displaced from grid	EF	0.5190	
CO2 emissions from appliances, equation (L14)		16.2564	ZC2
CO2 emissions from cooking, equation (L16)		2.2272	ZC3
Total CO2 emissions		31.3637	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		31.3637	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	28.9000 (1b)	x 2.2000 (2b)	= 63.5800 (1b) - (3b)
First floor	28.9000 (1c)	x 2.6000 (2c)	= 75.1400 (1c) - (3c)
Second floor	22.1600 (1d)	x 2.1700 (2d)	= 48.0872 (1d) - (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	79.9600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 186.8072 (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					3 * 10 = 30.0000 (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) =					Air changes per hour 30.0000 / (5) = 0.1606 (8)
Pressure test					Yes
Measured/design AP50					5.0000
Infiltration rate					0.4106 (18)
Number of sides sheltered					1 (19)
Shelter factor			(20) = 1 - [0.075 x (19)] =		0.9250 (20)
Infiltration rate adjusted to include shelter factor			(21) = (18) x (20) =		0.3798 (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	0.4842	0.4747	0.4653	0.4178	0.4083	0.3608	0.3608	0.3513	0.3798	0.4083	0.4273	0.4463 (22b)
Effective ac	0.6172	0.6127	0.6082	0.5873	0.5833	0.5651	0.5651	0.5617	0.5721	0.5833	0.5913	0.5996 (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			2.1000	1.0000	2.1000		(26)
TER Opening Type (Uw = 1.40)			11.6200	1.3258	15.4053		(27)
TER Room Window (Uw = 1.70)			1.5200	1.5918	2.4195		(27a)
Heat Loss Floor 1			28.9000	0.1300	3.7570		(28a)
External Wall 1	86.8600	12.7200	74.1400	0.1800	13.3452		(29a)
Dormer Cheeks	2.0000	1.0000	1.0000	0.1800	0.1800		(29a)
External Roof 1	28.3000	1.5200	26.7800	0.1300	3.4814		(30)
Dormer Roof	0.6000		0.6000	0.1300	0.0780		(30)
Total net area of external elements Aum(A, m ²)			146.6600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	40.7664		(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)							9.4270 (36)
Total fabric heat loss						(33) + (36) =	50.1934 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	38.0510	37.7703	37.4952	36.2030	35.9613	34.8358	34.8358	34.6274	35.2693	35.9613	36.4504	36.9617 (38)
Heat transfer coeff	88.2444	87.9637	87.6886	86.3964	86.1547	85.0292	85.0292	84.8208	85.4627	86.1547	86.6437	87.1550 (39)
Average = Sum(39)m / 12 =												86.3953 (39)
HLP	1.1036	1.1001	1.0967	1.0805	1.0775	1.0634	1.0634	1.0608	1.0688	1.0775	1.0836	1.0900 (40)
HLP (average)												1.0805 (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												2.4621 (42)
Average daily hot water use (litres/day)												92.6749 (43)
Daily hot water use	101.9424	98.2354	94.5284	90.8214	87.1144	83.4074	83.4074	87.1144	90.8214	94.5284	98.2354	101.9424 (44)
Energy conte	151.1776	132.2209	136.4402	118.9518	114.1371	98.4917	91.2670	104.7302	105.9810	123.5107	134.8216	146.4075 (45)
Energy content (annual)										Total = Sum(45)m =		1458.1373 (45)
Distribution loss (46)m = 0.15 x (45)m	22.6766	19.8331	20.4660	17.8428	17.1206	14.7737	13.6900	15.7095	15.8972	18.5266	20.2232	21.9611 (46)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

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Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Combi loss	50.9589	45.2152	48.1706	44.7886	44.3926	41.1324	42.5035	44.3926	44.7886	48.1706	48.4449	50.9589	(61)
Total heat required for water heating calculated for each month	202.1365	177.4361	184.6108	163.7405	158.5297	139.6241	133.7705	149.1228	150.7697	171.6813	183.2664	197.3664	(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	202.1365	177.4361	184.6108	163.7405	158.5297	139.6241	133.7705	149.1228	150.7697	171.6813	183.2664	197.3664	(64)
Heat gains from water heating, kWh/month	63.0063	55.2673	57.4090	50.7486	49.0487	43.0316	40.9722	45.9209	46.4359	53.1100	56.9394	61.4202	(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	123.1051	123.1051	123.1051	123.1051	123.1051	123.1051	123.1051	123.1051	123.1051	123.1051	123.1051	123.1051	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	20.2078	17.9484	14.5966	11.0506	8.2605	6.9738	7.5355	9.7949	13.1467	16.6927	19.4829	20.7695	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.3569	221.6332	215.8971	203.6857	188.2711	173.7835	164.1049	161.8286	167.5647	179.7761	195.1907	209.6783	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.3105	35.3105	35.3105	35.3105	35.3105	35.3105	35.3105	35.3105	35.3105	35.3105	35.3105	35.3105	(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)	-98.4841	-98.4841	-98.4841	-98.4841	-98.4841	-98.4841	-98.4841	-98.4841	-98.4841	-98.4841	-98.4841	-98.4841	(71)
Water heating gains (Table 5)	84.6859	82.2429	77.1627	70.4842	65.9257	59.7661	55.0701	61.7217	64.4942	71.3844	79.0825	82.5540	(72)
Total internal gains	387.1822	384.7561	370.5879	348.1521	325.3888	303.4549	289.6420	296.2767	308.1371	330.7846	356.6876	375.9334	(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				3.3600	10.6334	0.6300	0.7000	0.7700	10.9190 (74)			
South				8.2600	46.7521	0.6300	0.7000	0.7700	118.0192 (78)			
North				0.6400	16.1759	0.6300	0.7000	1.0000	4.1089 (82)			
South				0.8800	43.9921	0.6300	0.7000	1.0000	15.3652 (82)			
Solar gains	148.4123	249.9699	338.1909	418.6472	472.9305	472.4401	412.4611	365.4567	274.8811	177.1587	127.4500	(83)
Total gains	535.5945	634.7260	708.7788	766.7993	798.3193	775.8950	743.8196	708.7378	673.5938	605.6657	533.8463	503.3834 (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	62.9250	63.1258	63.3238	64.2709	64.4513	65.3043	65.3043	65.4648	64.9731	64.4513	64.0875	63.7115		
alpha	5.1950	5.2084	5.2216	5.2847	5.2968	5.3536	5.3536	5.3643	5.3315	5.2968	5.2725	5.2474		
util living area	0.9967	0.9915	0.9785	0.9396	0.8427	0.6663	0.4966	0.5402	0.7812	0.9555	0.9923	0.9976	(86)	
MIT	19.8867	20.0673	20.3145	20.6135	20.8471	20.9676	20.9943	20.9913	20.9243	20.6223	20.1980	19.8576	(87)	
Th 2	19.9979	20.0008	20.0036	20.0168	20.0193	20.0308	20.0308	20.0330	20.0264	20.0193	20.0143	20.0090	(88)	
util rest of house	0.9956	0.9887	0.9713	0.9190	0.7926	0.5796	0.3906	0.4320	0.7031	0.9360	0.9893	0.9968	(89)	
MIT 2	18.5197	18.7842	19.1425	19.5711	19.8729	20.0097	20.0288	20.0295	19.9690	19.5928	18.9855	18.4853	(90)	
Living area fraction	18.8166	19.0629	19.3971	19.7976	20.0845	20.2178	20.2385	20.2384	20.1765	19.8165	19.2489	18.7834	(92)	
MIT	18.8166	19.0629	19.3971	19.7976	20.0845	20.2178	20.2385	20.2384	20.1765	19.8165	19.2489	18.7834	(93)	
Temperature adjustment													0.0000	
adjusted MIT	18.8166	19.0629	19.3971	19.7976	20.0845	20.2178	20.2385	20.2384	20.1765	19.8165	19.2489	18.7834		

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Useful gains	0.9937	0.9851	0.9656	0.9135	0.7963	0.5972	0.4137	0.4555	0.7163	0.9309	0.9861	0.9953	(94)	
Ext temp.	532.2200	625.2961	684.3808	700.4403	635.7319	463.3428	307.7246	322.8456	482.5030	563.8283	526.4045	501.0204	(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	1281.0117	1245.8251	1130.9283	941.5114	722.3638	477.6786	309.3804	325.5770	519.3141	794.0432	1052.6243	1271.0146	(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 per m ²	557.1010	416.9955	332.2314	173.5712	64.4541	0.0000	0.0000	0.0000	0.0000	171.2799	378.8782	572.8757	(98)	
												2667.3869	(98)	
												33.3590	(99)	

8c. Space cooling requirement

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

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Not applicable

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 %)													93.4000	(206)
Efficiency of secondary/supplementary heating system, %													0.0000	(208)
Space heating requirement													2855.8746	(211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Space heating requirement	557.1010	416.9955	332.2314	173.5712	64.4541	0.0000	0.0000	0.0000	0.0000	171.2799	378.8782	572.8757	(98)	
Space heating efficiency (main heating system 1)	93.4000	93.4000	93.4000	93.4000	93.4000	0.0000	0.0000	0.0000	0.0000	93.4000	93.4000	93.4000	(210)	
Space heating fuel (main heating system)	596.4679	446.4620	355.7081	185.8364	69.0087	0.0000	0.0000	0.0000	0.0000	183.3832	405.6512	613.3573	(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														
Water heating requirement	202.1365	177.4361	184.6108	163.7405	158.5297	139.6241	133.7705	149.1228	150.7697	171.6813	183.2664	197.3664	(64)	
Efficiency of water heater (217)m	87.4709	87.1288	86.5132	85.1981	82.9798	80.3000	80.3000	80.3000	80.3000	85.0453	86.8391	87.5774	(216)	
Fuel for water heating, kWh/month	231.0901	203.6481	213.3902	192.1879	191.0461	173.8781	166.5884	185.7071	187.7580	201.8704	211.0413	225.3621	(219)	
Water heating fuel used												2383.5678	(219)	
Annual totals kWh/year														
Space heating fuel - main system												2855.8746	(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)												356.8769	(232)	
Total delivered energy for all uses												5671.3194	(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	2855.8746	0.2160	616.8689 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2383.5678	0.2160	514.8506 (264)
Space and water heating			1131.7196 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	356.8769	0.5190	185.2191 (268)
Total CO2, kg/m2/year			1355.8637 (272)
Emissions per m2 for space and water heating			14.1536 (272a)
Fuel factor (mains gas)			1.0000
Emissions per m2 for lighting			2.3164 (272b)
Emissions per m2 for pumps and fans			0.4868 (272c)
Target Carbon Dioxide Emission Rate (TER) = (14.1536 * 1.00) + 2.3164 + 0.4868, rounded to 2 d.p.			16.9600 (273)