

Energy Calculations Ltd

SAP ♦ CODE ♦ SBEM ♦ DESIGN

01754-761035



SAP Report Submission for Building Regulations Compliance

Client:

Project: Flat 7, 18, Parkside Road
READING, RG30 2DB

Contact: Matthew Carter
Energy Calculations Limited
mcarter@energycalculations.co.uk

Report Issue Date: 01/03/2021

EXCELLENCE
IN ENERGY
ASSESSMENT

PREDICTED ENERGY ASSESSMENT

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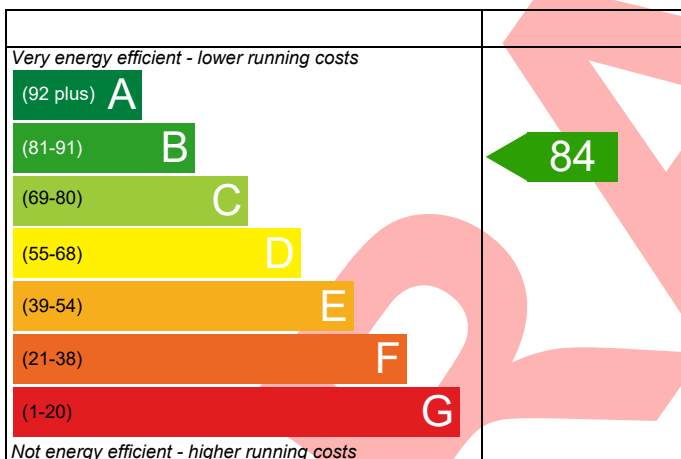
Flat 7, 18, Parkside Road,
READING,
RG30 2DB

Dwelling type: Flat, Mid-Terrace
Date of assessment: 01/03/2021
Produced by: Energy Calculations Limited
Total floor area: 44.2 m²

This document is a Predicted Energy Assessment for properties marketed when they are incomplete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, this rating will be updated and an official Energy Performance Certificate will be created for the property. This will include more detailed information about the energy performance of the completed property.

The energy performance has been assessed using the Government approved SAP2012 methodology and is rated in terms of the energy use per square meter of floor area; the energy efficiency is based on fuel costs and the environmental impact is based on carbon dioxide (CO₂) emissions.

Energy Efficiency Rating

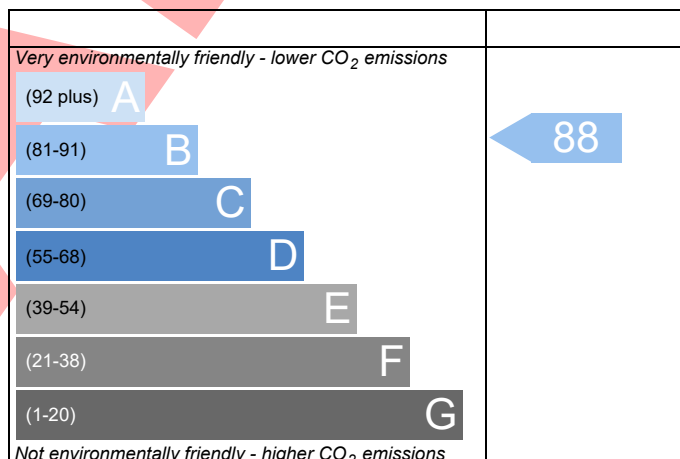


England

EU Directive
2002/91/EC

The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.

Environmental Impact (CO₂) Rating



England

EU Directive
2002/91/EC

The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO₂) emissions. The higher the rating the less impact it has on the environment.

This report has not been submitted through the Elmhurst Energy members' portal, therefore results are subject to change when the dwelling is completed.

THERMAL BRIDGING

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Calculation Type: New Build (As Designed)

Property Reference	015728	Issued on Date	01/03/2021
Assessment Reference	003	Prop Type Ref	
Property	Flat 7, 18, Parkside Road, READING, RG30 2DB		
SAP Rating	84 B	DER	21.03
Environmental	88 B	TER	31.09
CO ₂ Emissions (t/year)	0.76	% DER<TER	32.37
General Requirements Compliance	Pass	DFEE	47.58
		TFEE	50.81
		% DFEE<TFEE	6.35
Assessor Details	Mr. Matthew Carter, Energy Calculations Limited, Tel: 01754 761035, mcarter@energycalculations.co.uk		Assessor ID
			7869-0001
Client			

	Junction detail	Source Type	Psi (W/mK)	Length (m)	Result	Reference
External wall	E2 Other lintels (including other steel lintels)	Table K1 - Approved	0.300	4.20	1.26	
External wall	E3 Sill	Table K1 - Approved	0.040	4.20	0.17	
External wall	E4 Jamb	Table K1 - Approved	0.050	20.80	1.04	
External wall	E20 Exposed floor (normal)	Table K1 - Default	0.320	12.76	4.08	
External wall	E7 Party floor between dwellings (in blocks of flats)	Table K1 - Approved	0.070	18.66	1.31	
External wall	E16 Corner (normal)	Table K1 - Approved	0.090	7.20	0.65	
External wall	E17 Corner (inverted – internal area greater than external area)	Table K1 - Approved	-0.090	9.60	-0.86	
External wall	E18 Party wall between dwellings	Table K1 - Approved	0.060	12.00	0.72	
Party wall	P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	Table K1 - Default	0.000	14.71	0.00	

Total: **8.36** W/mK:
Y-Value: **0.112** W/m²K:

FULL SAP CALCULATION PRINTOUT

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Assessor Details	Mr. Matthew Carter, Energy Calculations Limited, Tel: 01754 761035, mcarter@energycalculations.co.uk			Assessor ID	7869-0001
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REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

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

DWELLING AS DESIGNED

Mid-floor flat, total floor area 44 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

Fuel factor: 1.55 (electricity)

Target Carbon Dioxide Emission Rate (TER) 31.09 kgCO₂/m²

Dwelling Carbon Dioxide Emission Rate (DER) 21.03 kgCO₂/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 50.8 kWh/m²/yr

Dwelling Fabric Energy Efficiency (DFEE) 47.6 kWh/m²/yr OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.22 (max. 0.30)	0.22 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.13 (max. 0.25)	0.13 (max. 0.70)	OK
Roof	(no roof)		
Openings	1.40 (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:	5.00 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main heating system: Heat pump with radiators or underfloor - Electric
Panasonic WH-MDC05F3E5

Secondary heating system: None

5 Cylinder insulation

Hot water storage	Measured cylinder loss: 1.86 kWh/day	
Permitted by DBSCG 2.30	OK	
Primary pipework insulated:	Yes	OK

6 Controls

Space heating controls:	Time and temperature zone control	OK
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Hot water controls:

Cylinderstat	OK
Independent timer for DHW	OK

7 Low energy lights

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

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (Thames Valley):	Slight	OK
Based on:		
Overshading:	Average	
Windows facing West:	8.76 m ² , No overhang	
Air change rate:	6.00 ach	
Blinds/curtains:	None	

10 Key features

Party wall U-value	0.00 W/m ² K
Photovoltaic array	300.00 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 (m ²)	Storey height (m)	Volume (m ³)
Ground floor	44.2000 (1b)	x 2.4000 (2b)	= 106.0800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	44.2000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 106.0800 (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) =					Air changes per hour 20.0000 / (5) = 0.1885 (8)
Pressure test					Yes
Measured/design AP50					5.0000
Infiltration rate					0.4385 (18)
Number of sides sheltered					2 (19)
Shelter factor				(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor				(21) = (18) x (20) =	0.3728 (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												
	0.4753	0.4659	0.4566	0.4100	0.4007	0.3541	0.3541	0.3448	0.3728	0.4007	0.4194	0.4380 (22b)
Effective ac	0.6129	0.6086	0.6043	0.5841	0.5803	0.5627	0.5627	0.5594	0.5695	0.5803	0.5879	0.5959 (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
Windows (Uw = 1.40)			8.7600	1.3258	11.6136		(27)
Door to Stairs			1.8900	1.4000	2.6460		(26)
Exposed Floor			44.2000	0.1278	5.6501		(28b)
Main Wall	27.9300	8.7600	19.1700	0.2200	4.2174	60.0000	1150.2000 (29a)
Wall to stairs	2.6900	1.8900	0.8000	0.1864	0.1491	190.0000	152.0000 (29a)
Total net area of external elements Aum(A, m ²)			74.8200				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	24.2762			(33)
Party Wall 1			44.7800	0.0000	0.0000	180.0000	8060.4000 (32)
Party Ceilings 1			44.2000			40.0000	1768.0000 (32b)
Internal Wall 1			37.0500			75.0000	2778.7500 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	13909.3500 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							314.6912 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							8.3614 (36)
Total fabric heat loss						(33) + (36) =	32.6376 (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	21.4568	21.3032	21.1528	20.4459	20.3137	19.6981	19.6981	19.5841	19.9352	20.3137	20.5812	20.8609 (38)
Heat transfer coeff	54.0944	53.9409	53.7904	53.0836	52.9514	52.3357	52.3357	52.2217	52.5729	52.9514	53.2189	53.4986 (39)
Average = Sum(39)m / 12 =												53.0830 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.2239	1.2204	1.2170	1.2010	1.1980	1.1841	1.1841	1.1815	1.1894	1.1980	1.2040	1.2104 (40)
HLP (average)												1.2010 (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												1.5219 (42)
Average daily hot water use (litres/day)												70.3450 (43)
Daily hot water use	77.3795	74.5657	71.7519	68.9381	66.1243	63.3105	63.3105	66.1243	68.9381	71.7519	74.5657	77.3795 (44)
Energy conte	114.7516	100.3625	103.5651	90.2906	86.6359	74.7602	69.2763	79.4956	80.4451	93.7510	102.3365	111.1308 (45)
Energy content (annual)										Total = Sum(45)m =		1106.8012 (45)
Distribution loss (46)m = 0.15 x (45)m	17.2127	15.0544	15.5348	13.5436	12.9954	11.2140	10.3915	11.9243	12.0668	14.0626	15.3505	16.6696 (46)
Water storage loss:												

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CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Store volume													210.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.8600 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													1.0044 (55)
Total storage loss													
31.1364	28.1232	31.1364	30.1320	31.1364	30.1320	31.1364	31.1364	30.1320	31.1364	30.1320	31.1364	30.1320	(56)
If cylinder contains dedicated solar storage													
31.1364	28.1232	31.1364	30.1320	31.1364	30.1320	31.1364	31.1364	30.1320	31.1364	30.1320	31.1364	30.1320	(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													
169.1504	149.4969	157.9639	142.9346	141.0347	127.4042	123.6751	133.8944	133.0891	148.1498	154.9805	165.5296	165.5296	(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 =													
Output from w/h													
169.1504	149.4969	157.9639	142.9346	141.0347	127.4042	123.6751	133.8944	133.0891	148.1498	154.9805	165.5296	165.5296	(64)
Heat gains from water heating, kWh/month													
81.6740	72.6780	77.9544	72.1368	72.3255	66.9730	66.5534	69.9513	68.8632	74.6912	76.1421	80.4700	80.4700	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	76.0948	76.0948	76.0948	76.0948	76.0948	76.0948	76.0948	76.0948	76.0948	76.0948	76.0948	76.0948	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
11.8823	10.5538	8.5829	6.4978	4.8572	4.1006	4.4309	5.7594	7.7303	9.8154	11.4560	12.2125	12.2125	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
132.2220	133.5941	130.1365	122.7759	113.4844	104.7517	98.9177	97.5456	101.0032	108.3638	117.6553	126.3880	126.3880	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
30.6095	30.6095	30.6095	30.6095	30.6095	30.6095	30.6095	30.6095	30.6095	30.6095	30.6095	30.6095	30.6095	(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)													
-60.8758	-60.8758	-60.8758	-60.8758	-60.8758	-60.8758	-60.8758	-60.8758	-60.8758	-60.8758	-60.8758	-60.8758	-60.8758	(71)
Water heating gains (Table 5)													
109.7768	108.1519	104.7775	100.1900	97.2117	93.0180	89.4535	94.0206	95.6433	100.3914	105.7529	108.1586	108.1586	(72)
Total internal gains													
299.7096	298.1281	289.3253	275.2921	261.3817	247.6988	238.6305	243.1541	250.2052	264.3991	280.6927	292.5877	292.5877	(73)

6. Solar gains

[Jan]													
Area													
m2													
Solar flux													
Table 6a													
W/m2													
Specific data													
or Table 6b													
Specific data													
or Table 6c													
Access													
factor													
Table 6d													
Gains													
W													
West	8.7600	19.6403	0.6300	0.7000	0.7700	52.5803	80						
Solar gains	52.5803	102.8583	169.3929	247.0495	302.7684	309.9373	295.0730	253.4633	197.0110	122.0500	65.5615	43.2395	(83)
Total gains	352.2899	400.9864	458.7183	522.3416	564.1501	557.6361	533.7035	496.6174	447.2162	386.4491	346.2541	335.8272	(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)													
tau	71.4253	71.6286	71.8290	72.7854	72.9671	73.8254	73.8254	73.9866	73.4924	72.9671	72.6003	72.2208	
alpha	5.7617	5.7752	5.7886	5.8524	5.8645	5.9217	5.9217	5.9324	5.8995	5.8645	5.8400	5.8147	
util living area	0.9973	0.9938	0.9804	0.9265	0.7905	0.5886	0.4298	0.4803	0.7528	0.9590	0.9936	0.9980	(86)
Weekday	18.8872	19.0451	19.3098	19.6281	19.8034	19.8610	19.8652	19.8671	19.8394	19.6004	19.1968	18.8722	
Weekend	20.5026	20.5719	20.6900	20.8355	20.9306	20.9646	20.9695	20.9689	20.9480	20.8171	20.6342	20.4921	
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0	
24 / 9	0	0	0	0	0	0	0	0	0	0	0	0	
16 / 9	0	0	0	0	0	0	0	0	0	0	0	0	
MIT	20.2323	20.3377	20.5216	20.7432	20.8928	20.9456	20.9530	20.9521	20.9188	20.7178	20.4289	20.2161	(87)
Th 2	19.9010	19.9037	19.9064	19.9192	19.9216	19.9328	19.9328	19.9348	19.9285	19.9216	19.9168	19.9117	(88)
util rest of house	0.9962	0.9912	0.9722	0.8977	0.7253	0.4963	0.3265	0.3710	0.6601	0.9365	0.9905	0.9971	(89)
Weekday	18.8872	19.0451	19.3098	19.6281	19.8034	19.8610	19.8652	19.8671	19.8394	19.6004	19.1968	18.8722	
Weekend	18.8872	19.0451	19.3098	19.6281	19.8034	19.8610	19.8652	19.8671	19.8394	19.6004	19.1968	18.8722	
MIT	18.8872	19.0451	19.3098	19.6281	19.8034	19.8610	19.8652	19.8671	19.8394	19.6004	19.1968	18.8722	(90)
Living area fraction													
MIT	19.6693	19.7967	20.0144	20.2765	20.4368	20.4916	20.4977	20.4979	20.4670	20.2501	19.9132	19.6536	(92)
Temperature adjustment													
adjusted MIT	19.6693	19.7967	20.0144	20.2765	20.4368	20.4916	20.4977	20.4979	20.4670	20.2501	19.9132	19.6536	(93)

8. Space heating requirement

Utilisation	0.9959	0.9909	0.9731	0.9083	0.7581	0.5454	0.3814	0.4293	0.7091	0.9445	0.9905	0.9968	(94)
Useful gains	350.8436	397.3266	446.3990	474.4384	427.6629	304.1470	203.5648	213.1734	317.1044	364.9923	342.9663	334.7663	(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													
831.3934	803.5416	726.9453	603.9043	462.6272	308.3435	203.9890	214.0012	334.7337	510.9842	681.9031	826.7461	826.7461	(97)
Month fracti	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	1.0000	(97a)
Space heating kWh													
357.5291	272.9765	208.7265	93.2154	26.0134	0.0000	0.0000	0.0000	0.0000	108.6179	244.0345	366.0330	366.0330	(98)
Space heating													(98)
													1677.1462

FULL SAP CALCULATION PRINTOUT

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CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Space heating per m2 (98) / (4) = 37.9445 (99)

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 %)													197.2875 (206)
Efficiency of secondary/supplementary heating system, %													100.0000 (208)
Space heating requirement													850.1024 (211)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Space heating requirement	357.5291	272.9765	208.7265	93.2154	26.0134	0.0000	0.0000	0.0000	0.0000	108.6179	244.0345	366.0330	(98)
Space heating efficiency (main heating system 1)	197.2875	197.2875	197.2875	197.2875	197.2875	0.0000	0.0000	0.0000	0.0000	197.2875	197.2875	197.2875	(210)
Space heating fuel (main heating system)	181.2223	138.3648	105.7981	47.2485	13.1855	0.0000	0.0000	0.0000	0.0000	55.0556	123.6948	185.5327	(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	169.1504	149.4969	157.9639	142.9346	141.0347	127.4042	123.6751	133.8944	133.0891	148.1498	154.9805	165.5296	(64)
Efficiency of water heater	169.4400	169.4400	169.4400	169.4400	169.4400	169.4400	169.4400	169.4400	169.4400	169.4400	169.4400	169.4400	(216)
Fuel for water heating, kWh/month	99.8291	88.2300	93.2270	84.3570	83.2358	75.1914	72.9905	79.0217	78.5464	87.4349	91.4663	97.6922	(219)
Water heating fuel used												1031.2224	(219)
Annual totals kWh/year													
Space heating fuel - main system												850.1024	(211)
Space heating fuel - secondary												0.0000	(215)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												0.0000	(231)
Electricity for lighting (calculated in Appendix L)												209.8451	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
Total delivered energy for all uses												2091.1699	(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	850.1024	0.5190	441.2032	(261)
Space heating - secondary	0.0000	0.5190	0.0000	(263)
Water heating (other fuel)	1031.2224	0.5190	535.2044	(264)
Space and water heating			976.4076	(265)
Pumps and fans	0.0000	0.0000	0.0000	(267)
Energy for lighting	209.8451	0.5190	108.9096	(268)
Energy saving/generation technologies				
PV Unit	-300.0000	0.5190	-155.7000	(269)
Total CO2, kg/year			929.6172	(272)
Dwelling Carbon Dioxide Emission Rate (DER)			21.0300	(273)

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

DER			21.0300	ZC1
Total Floor Area		TFA	44.2000	
Assumed number of occupants		N	1.5219	
CO2 emission factor in Table 12 for electricity displaced from grid		EF	0.5190	
CO2 emissions from appliances, equation (L14)			17.7267	ZC2
CO2 emissions from cooking, equation (L16)			3.5187	ZC3
Total CO2 emissions			42.2754	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			42.2754	ZC8

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

Energy Calculations Ltd
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CALCULATION OF TARGET EMISSIONS 09 Jan 2014

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	44.2000 (1b)	x 2.4000 (2b)	= 106.0800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	44.2000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 106.0800 (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				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) = 0.1885 (8)
Pressure test					Yes
Measured/design AP50					5.0000
Infiltration rate					0.4385 (18)
Number of sides sheltered					2 (19)
Shelter factor					(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor					(21) = (18) x (20) = 0.3728 (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												
	0.4753	0.4659	0.4566	0.4100	0.4007	0.3541	0.3541	0.3448	0.3728	0.4007	0.4194	0.4380 (22b)
Effective ac	0.6129	0.6086	0.6043	0.5841	0.5803	0.5627	0.5627	0.5594	0.5695	0.5803	0.5879	0.5959 (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			1.8900	1.0000	1.8900		(26)
TER Opening Type (Uw = 1.40)			8.7600	1.3258	11.6136		(27)
Exposed Floor			44.2000	0.1300	5.7460		(28b)
Main Wall	27.9300	8.7600	19.1700	0.1800	3.4506		(29a)
Wall to stairs	2.6900	1.8900	0.8000	0.1800	0.1440		(29a)
Total net area of external elements Aum(A, m ²)			74.8200				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		22.8442		(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)							7.3534 (36)
Total fabric heat loss							(33) + (36) = 30.1976 (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	21.4568	21.3032	21.1528	20.4459	20.3137	19.6981	19.6981	19.5841	19.9352	20.3137	20.5812	20.8609 (38)
Heat transfer coeff	51.6544	51.5009	51.3504	50.6436	50.5113	49.8957	49.8957	49.7817	50.1329	50.5113	50.7789	51.0585 (39)
Average = Sum(39)m / 12 =												50.6430 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.1687	1.1652	1.1618	1.1458	1.1428	1.1289	1.1289	1.1263	1.1342	1.1428	1.1488	1.1552 (40)
HLP (average)												1.1458 (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												1.5219 (42)
Average daily hot water use (litres/day)												70.3450 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	77.3795	74.5657	71.7519	68.9381	66.1243	63.3105	63.3105	66.1243	68.9381	71.7519	74.5657	77.3795 (44)
Energy conte	114.7516	100.3625	103.5651	90.2906	86.6359	74.7602	69.2763	79.4956	80.4451	93.7510	102.3365	111.1308 (45)
Energy content (annual)												Total = Sum(45)m = 1106.8012 (45)
Distribution loss (46)m = 0.15 x (45)m	17.2127	15.0544	15.5348	13.5436	12.9954	11.2140	10.3915	11.9243	12.0668	14.0626	15.3505	16.6696 (46)
Water storage loss:												
Store volume												210.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.7016 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.9188 (55)

FULL SAP CALCULATION PRINTOUT

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Total storage loss	28.4842	25.7277	28.4842	27.5653	28.4842	27.5653	28.4842	28.4842	27.5653	28.4842	27.5653	28.4842 (56)
If cylinder contains dedicated solar storage	28.4842	25.7277	28.4842	27.5653	28.4842	27.5653	28.4842	28.4842	27.5653	28.4842	27.5653	28.4842 (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	166.4982	147.1013	155.3117	140.3679	138.3825	124.8376	121.0229	131.2422	130.5224	145.4975	152.4138	162.8774 (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	166.4982	147.1013	155.3117	140.3679	138.3825	124.8376	121.0229	131.2422	130.5224	145.4975	152.4138	162.8774 (64)
Heat gains from water heating, kWh/month	79.5522	70.7616	75.8327	70.0835	70.2037	64.9197	64.4317	67.8296	66.8099	72.5695	74.0888	78.3483 (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	76.0948	76.0948	76.0948	76.0948	76.0948	76.0948	76.0948	76.0948	76.0948	76.0948	76.0948	76.0948 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	11.8823	10.5538	8.5829	6.4978	4.8572	4.1006	4.4309	5.7594	7.7303	9.8154	11.4560	12.2125 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	132.2220	133.5941	130.1365	122.7759	113.4844	104.7517	98.9177	97.5456	101.0032	108.3638	117.6553	126.3880 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	30.6095	30.6095	30.6095	30.6095	30.6095	30.6095	30.6095	30.6095	30.6095	30.6095	30.6095	30.6095 (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)	-60.8758	-60.8758	-60.8758	-60.8758	-60.8758	-60.8758	-60.8758	-60.8758	-60.8758	-60.8758	-60.8758	-60.8758 (71)
Water heating gains (Table 5)	106.9250	105.3000	101.9256	97.3382	94.3598	90.1662	86.6017	91.1688	92.7915	97.5396	102.9011	105.3068 (72)
Total internal gains	299.8577	298.2763	289.4735	275.4403	261.5298	247.8469	238.7787	243.3023	250.3534	264.5472	280.8408	292.7358 (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
West				8.7600	19.6403		0.6300		0.7000		0.7700		52.5803 (80)
Solar gains	52.5803	102.8583	169.3929	247.0495	302.7684	309.9373	295.0730	253.4633	197.0110	122.0500	65.5615	43.2395	(83)
Total gains	352.4381	401.1345	458.8664	522.4898	564.2982	557.7843	533.8517	496.7656	447.3643	386.5972	346.4023	335.9753	(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	59.4227	59.5999	59.7745	60.6088	60.7674	61.5172	61.5172	61.6580	61.2262	60.7674	60.4473	60.1162
alpha	4.9615	4.9733	4.9850	5.0406	5.0512	5.1011	5.1011	5.1105	5.0817	5.0512	5.0298	5.0077
util living area	0.9930	0.9859	0.9636	0.8933	0.7501	0.5578	0.4086	0.4562	0.7132	0.9335	0.9856	0.9944 (86)
MIT	19.9144	20.0810	20.3588	20.6894	20.9011	20.9825	20.9970	20.9949	20.9428	20.6501	20.2255	19.8883 (87)
Th 2	19.9452	19.9480	19.9507	19.9636	19.9660	19.9773	19.9773	19.9794	19.9730	19.9660	19.9611	19.9560 (88)
util rest of house	0.9908	0.9814	0.9522	0.8622	0.6898	0.4750	0.3151	0.3575	0.6290	0.9065	0.9802	0.9926 (89)
MIT 2	18.5217	18.7646	19.1626	19.6216	19.8779	19.9668	19.9763	19.9775	19.9323	19.5839	18.9852	18.4917 (90)
Living area fraction	19.3315	19.5300	19.8581	20.2425	20.4728	20.5574	20.5698	20.5691	20.5198	20.2039	19.7064	19.3037 (92)
Temperature adjustment	19.3315	19.5300	19.8581	20.2425	20.4728	20.5574	20.5698	20.5691	20.5198	20.2039	19.7064	19.3037 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9891	0.9792	0.9510	0.8713	0.7205	0.5226	0.3695	0.4150	0.6756	0.9136	0.9786	0.9911 (94)
Ext temp.	348.5802	392.7823	436.3647	455.2653	406.6044	291.5253	197.2822	206.1411	302.2612	353.1951	338.9775	332.9983 (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	776.4412	753.4584	685.9458	574.4235	443.1269	297.2476	198.0765	207.5445	321.8451	485.1039	640.1390	771.1754 (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 m2	318.3286	242.3744	185.6883	85.7939	27.1727	0.0000	0.0000	0.0000	0.0000	98.1401	216.8363	326.0038 (98)
												1500.3382 (98)
												33.9443 (99)

8c. Space cooling requirement

Not applicable

FULL SAP CALCULATION PRINTOUT

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CALCULATION OF TARGET EMISSIONS 09 Jan 2014

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													1604.6398 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	318.3286	242.3744	185.6883	85.7939	27.1727	0.0000	0.0000	0.0000	0.0000	98.1401	216.8363	326.0038	(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)	340.4584	259.2239	198.5972	91.7582	29.0617	0.0000	0.0000	0.0000	0.0000	104.9627	231.9105	348.6671	(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	166.4982	147.1013	155.3117	140.3679	138.3825	124.8376	121.0229	131.2422	130.5224	145.4975	152.4138	162.8774	(64)
Efficiency of water heater (217)m	86.5162	86.1377	85.2912	83.5472	81.3792	79.8000	79.8000	79.8000	79.8000	83.7905	85.7539	86.6300	(217)
Fuel for water heating, kWh/month	192.4475	170.7745	182.0957	168.0104	170.0466	156.4381	151.6578	164.4639	163.5619	173.6443	177.7340	188.0149	(219)
Water heating fuel used												2058.8897	(219)
Annual totals kWh/year													
Space heating fuel - main system												1604.6398	(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)												209.8451	(232)
Total delivered energy for all uses												3948.3746	(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	1604.6398	0.2160	346.6022 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2058.8897	0.2160	444.7202 (264)
Space and water heating			791.3224 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	209.8451	0.5190	108.9096 (268)
Total CO2, kg/m2/year			939.1570 (272)
Emissions per m2 for space and water heating			17.9032 (272a)
Fuel factor (electricity)			1.5500
Emissions per m2 for lighting			2.4640 (272b)
Emissions per m2 for pumps and fans			0.8807 (272c)
Target Carbon Dioxide Emission Rate (TER) = (17.9032 * 1.55) + 2.4640 + 0.8807, rounded to 2 d.p.			31.0900 (273)

FULL SAP CALCULATION PRINTOUT

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CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	44.2000 (1b)	x 2.4000 (2b)	= 106.0800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	44.2000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 106.0800 (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) =					Air changes per hour
Pressure test					20.0000 / (5) = 0.1885 (8)
Measured/design AP50					Yes
Infiltration rate					5.0000
Number of sides sheltered					0.4385 (18)
					2 (19)
Shelter factor				(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor				(21) = (18) x (20) =	0.3728 (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												
	0.4753	0.4659	0.4566	0.4100	0.4007	0.3541	0.3541	0.3448	0.3728	0.4007	0.4194	0.4380 (22b)
Effective ac	0.6129	0.6086	0.6043	0.5841	0.5803	0.5627	0.5627	0.5594	0.5695	0.5803	0.5879	0.5959 (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
Windows (Uw = 1.40)			8.7600	1.3258	11.6136		(27)
Door to Stairs			1.8900	1.4000	2.6460		(26)
Exposed Floor			44.2000	0.1278	5.6501		(28b)
Main Wall	27.9300	8.7600	19.1700	0.2200	4.2174	60.0000	1150.2000 (29a)
Wall to stairs	2.6900	1.8900	0.8000	0.1864	0.1491	190.0000	152.0000 (29a)
Total net area of external elements Aum(A, m ²)			74.8200				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	24.2762			(33)
Party Wall 1			44.7800	0.0000	0.0000	180.0000	8060.4000 (32)
Party Ceilings 1			44.2000			30.0000	1326.0000 (32b)
Internal Wall 1			37.0500			75.0000	2778.7500 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 13467.3500 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							304.6912 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							8.3614 (36)
Total fabric heat loss							(33) + (36) = 32.6376 (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	21.4568	21.3032	21.1528	20.4459	20.3137	19.6981	19.6981	19.5841	19.9352	20.3137	20.5812	20.8609 (38)
Heat transfer coeff	54.0944	53.9409	53.7904	53.0836	52.9514	52.3357	52.3357	52.2217	52.5729	52.9514	53.2189	53.4986 (39)
Average = Sum(39)m / 12 =												53.0830 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.2239	1.2204	1.2170	1.2010	1.1980	1.1841	1.1841	1.1815	1.1894	1.1980	1.2040	1.2104 (40)
HLP (average)												1.2010 (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												1.5219 (42)
Average daily hot water use (litres/day)												70.3450 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	77.3795	74.5657	71.7519	68.9381	66.1243	63.3105	63.3105	66.1243	68.9381	71.7519	74.5657	77.3795 (44)
Energy conte	114.7516	100.3625	103.5651	90.2906	86.6359	74.7602	69.2763	79.4956	80.4451	93.7510	102.3365	111.1308 (45)
Energy content (annual)										Total = Sum(45)m =		1106.8012 (45)
Distribution loss (46)m = 0.15 x (45)m												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss:												

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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)
Primary 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 (59)
Heat gains from water heating, kWh/month	24.3847	21.3270	22.0076	19.1867	18.4101	15.8865	14.7212	16.8928	17.0946	19.9221	21.7465	23.6153 (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	76.0948	76.0948	76.0948	76.0948	76.0948	76.0948	76.0948	76.0948	76.0948	76.0948	76.0948	76.0948	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	11.8823	10.5538	8.5829	6.4978	4.8572	4.1006	4.4309	5.7594	7.7303	9.8154	11.4560	12.2125	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	132.2220	133.5941	130.1365	122.7759	113.4844	104.7517	98.9177	97.5456	101.0032	108.3638	117.6553	126.3880	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	30.6095	30.6095	30.6095	30.6095	30.6095	30.6095	30.6095	30.6095	30.6095	30.6095	30.6095	30.6095	(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)	-60.8758	-60.8758	-60.8758	-60.8758	-60.8758	-60.8758	-60.8758	-60.8758	-60.8758	-60.8758	-60.8758	-60.8758	(71)
Water heating gains (Table 5)	32.7752	31.7367	29.5801	26.6483	24.7448	22.0647	19.7866	22.7054	23.7425	26.7770	30.2035	31.7410	(72)
Total internal gains	222.7079	221.7129	214.1280	201.7504	188.9148	176.7454	168.9636	171.8389	178.3044	190.7846	205.1432	216.1700	(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
West					8.7600	19.6403	0.6300	0.7000			0.7700			52.5803 (80)
Solar gains	52.5803	102.8583	169.3929	247.0495	302.7684	309.9373	295.0730	253.4633	197.0110	122.0500	65.5615	43.2395	(83)	
Total gains	275.2882	324.5712	383.5209	448.7998	491.6832	486.6827	464.0366	425.3022	375.3153	312.8346	270.7047	259.4095	(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	69.1556	69.3524	69.5464	70.4724	70.6484	71.4795	71.4795	71.6355	71.1571	70.6484	70.2933	69.9258	
alpha	5.6104	5.6235	5.6364	5.6982	5.7099	5.7653	5.7653	5.7757	5.7438	5.7099	5.6862	5.6617	
util living area	0.9991	0.9975	0.9906	0.9570	0.8516	0.6612	0.4918	0.5556	0.8368	0.9825	0.9979	0.9994	(86)
MIT	19.8747	20.0240	20.2828	20.6176	20.8674	20.9763	20.9963	20.9929	20.9124	20.5625	20.1564	19.8522	(87)
Th 2	19.9010	19.9037	19.9064	19.9192	19.9216	19.9328	19.9328	19.9348	19.9285	19.9216	19.9168	19.9117	(88)
util rest of house	0.9987	0.9965	0.9865	0.9381	0.7947	0.5633	0.3750	0.4320	0.7537	0.9716	0.9968	0.9991	(89)
MIT 2	18.8819	19.0331	19.2918	19.6246	19.8414	19.9239	19.9321	19.9333	19.8861	19.5806	19.1762	18.8683	(90)
Living area fraction	19.4592	19.6092	19.8680	20.2019	20.4380	20.5358	20.5509	20.5494	20.4828	20.1515	19.7461	19.4404	(91)
MIT	19.4592	19.6092	19.8680	20.2019	20.4380	20.5358	20.5509	20.5494	20.4828	20.1515	19.7461	19.4404	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.4592	19.6092	19.8680	20.2019	20.4380	20.5358	20.5509	20.5494	20.4828	20.1515	19.7461	19.4404	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	274.8874	323.3094	378.2622	423.5595	405.1081	301.7842	205.6817	214.5038	300.3101	304.8338	269.7907	259.1391	(94)
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	(95)
Heat loss rate W	820.0258	793.4285	719.0712	599.9476	462.6881	310.6539	206.7711	216.6893	335.5625	505.7648	673.0127	815.3408	(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	405.5829	315.9200	253.5620	126.9994	42.8395	0.0000	0.0000	0.0000	0.0000	149.4927	290.3198	413.8140	(98)
Space heating												1998.5303	(98)
Space heating per m2												45.2156	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
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	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	491.9560	387.2845	396.8853	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9340	0.9699	0.9542	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	459.4984	375.6364	378.7148	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	627.0176	599.4838	555.0415	0.0000	0.0000	0.0000	0.0000	(103)
Month fracti	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	(103a)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	120.6139	166.5424	131.1871	0.0000	0.0000	0.0000	0.0000	(104)

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Space cooling												418.3434 (104)
Cooled fraction												1.0000 (105)
Intermittency factor (Table 10b)												
	0.0000	0.0000	0.0000	0.0000	0.2500	0.2500	0.2500	0.0000	0.0000	0.0000	0.0000 (106)	
Space cooling kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	30.1535	41.6356	32.7968	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling												104.5858 (107)
Space cooling per m2												2.3662 (108)
Energy for space heating												45.2156 (99)
Energy for space cooling												2.3662 (108)
Total												47.5818 (109)
Dwelling Fabric Energy Efficiency (DFEE)												47.6 (109)

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CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	44.2000 (1b)	x 2.4000 (2b)	= 106.0800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	44.2000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 106.0800 (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					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) = 0.1885 (8)
Pressure test					Yes
Measured/design AP50					5.0000
Infiltration rate					0.4385 (18)
Number of sides sheltered					2 (19)
Shelter factor					(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor					(21) = (18) x (20) = 0.3728 (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	0.4753	0.4659	0.4566	0.4100	0.4007	0.3541	0.3541	0.3448	0.3728	0.4007	0.4194	0.4380 (22b)
Effective ac	0.6129	0.6086	0.6043	0.5841	0.5803	0.5627	0.5627	0.5594	0.5695	0.5803	0.5879	0.5959 (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			1.8900	1.0000	1.8900		(26)
TER Opening Type (Uw = 1.40)			8.7600	1.3258	11.6136		(27)
Exposed Floor			44.2000	0.1300	5.7460		(28b)
Main Wall	27.9300	8.7600	19.1700	0.1800	3.4506		(29a)
Wall to stairs	2.6900	1.8900	0.8000	0.1800	0.1440		(29a)
Total net area of external elements Aum(A, m ²)			74.8200				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		22.8442		(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)							7.3534 (36)
Total fabric heat loss							(33) + (36) = 30.1976 (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	21.4568	21.3032	21.1528	20.4459	20.3137	19.6981	19.6981	19.5841	19.9352	20.3137	20.5812	20.8609 (38)
Heat transfer coeff	51.6544	51.5009	51.3504	50.6436	50.5113	49.8957	49.8957	49.7817	50.1329	50.5113	50.7789	51.0585 (39)
Average = Sum(39)m / 12 =												50.6430 (39)
HLP	1.1687	1.1652	1.1618	1.1458	1.1428	1.1289	1.1289	1.1263	1.1342	1.1428	1.1488	1.1552 (40)
HLP (average)												1.1458 (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												1.5219 (42)
Average daily hot water use (litres/day)												70.3450 (43)
Daily hot water use	77.3795	74.5657	71.7519	68.9381	66.1243	63.3105	63.3105	66.1243	68.9381	71.7519	74.5657	77.3795 (44)
Energy conte	114.7516	100.3625	103.5651	90.2906	86.6359	74.7602	69.2763	79.4956	80.4451	93.7510	102.3365	111.1308 (45)
Energy content (annual)										Total = Sum(45)m =		1106.8012 (45)
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
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)

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Primary 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 (59)
Heat gains from water heating, kWh/month	24.3847	21.3270	22.0076	19.1867	18.4101	15.8865	14.7212	16.8928	17.0946	19.9221	21.7465	23.6153 (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	76.0948	76.0948	76.0948	76.0948	76.0948	76.0948	76.0948	76.0948	76.0948	76.0948	76.0948	76.0948	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	11.8823	10.5538	8.5829	6.4978	4.8572	4.1006	4.4309	5.7594	7.7303	9.8154	11.4560	12.2125	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	132.2220	133.5941	130.1365	122.7759	113.4844	104.7517	98.9177	97.5456	101.0032	108.3638	117.6553	126.3880	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	30.6095	30.6095	30.6095	30.6095	30.6095	30.6095	30.6095	30.6095	30.6095	30.6095	30.6095	30.6095	(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)	-60.8758	-60.8758	-60.8758	-60.8758	-60.8758	-60.8758	-60.8758	-60.8758	-60.8758	-60.8758	-60.8758	-60.8758	(71)
Water heating gains (Table 5)	32.7752	31.7367	29.5801	26.6483	24.7448	22.0647	19.7866	22.7054	23.7425	26.7770	30.2035	31.7410	(72)
Total internal gains	222.7079	221.7129	214.1280	201.7504	188.9148	176.7454	168.9636	171.8389	178.3044	190.7846	205.1432	216.1700	(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	
West					8.7600	19.6403		0.6300	0.7000	0.7700		52.5803 (80)	
Solar gains	52.5803	102.8583	169.3929	247.0495	302.7684	309.9373	295.0730	253.4633	197.0110	122.0500	65.5615	43.2395	(83)
Total gains	275.2882	324.5712	383.5209	448.7998	491.6832	486.6827	464.0366	425.3022	375.3153	312.8346	270.7047	259.4095	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)

Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	21.0000 (85)
tau	59.4227	59.5999	59.7745	60.6088	60.7674	61.5172	61.5172	61.6580	61.2262	60.7674	60.4473	60.1162	
alpha	4.9615	4.9733	4.9850	5.0406	5.0512	5.1011	5.1011	5.1105	5.0817	5.0512	5.0298	5.0077	
util living area	0.9976	0.9942	0.9819	0.9343	0.8151	0.6277	0.4676	0.5277	0.7997	0.9692	0.9950	0.9983	(86)
MIT	19.7549	19.9268	20.2197	20.5886	20.8533	20.9704	20.9945	20.9902	20.9025	20.5274	20.0724	19.7288	(87)
Th 2	19.9452	19.9480	19.9507	19.9636	19.9660	19.9773	19.9773	19.9794	19.9730	19.9660	19.9611	19.9560	(88)
util rest of house	0.9968	0.9923	0.9756	0.9119	0.7599	0.5391	0.3618	0.4161	0.7207	0.9543	0.9930	0.9977	(89)
MIT 2	18.8149	18.9883	19.2796	19.6425	19.8726	19.9647	19.9760	19.9768	19.9219	19.5947	19.1445	18.7977	(90)
Living area fraction	19.3615	19.5340	19.8262	20.1926	20.4428	20.5495	20.5682	20.5661	20.4921	20.1370	19.6840	19.3391	(91)
MIT	19.3615	19.5340	19.8262	20.1926	20.4428	20.5495	20.5682	20.5661	20.4921	20.1370	19.6840	19.3391	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.3615	19.5340	19.8262	20.1926	20.4428	20.5495	20.5682	20.5661	20.4921	20.1370	19.6840	19.3391	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9963	0.9913	0.9747	0.9175	0.7869	0.5899	0.4235	0.4812	0.7633	0.9573	0.9923	0.9972	(94)
Useful gains	274.2592	321.7531	373.8145	411.7645	386.9115	287.0760	196.5165	204.6540	286.4732	299.4627	268.6179	258.6810	(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	777.9909	753.6636	684.3071	571.8971	441.6117	296.8538	197.9976	207.3945	320.4521	481.7270	639.0019	772.9793	(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	374.7764	290.2438	231.0066	115.2955	40.6969	0.0000	0.0000	0.0000	0.0000	135.6046	266.6765	382.6380	(98)
Space heating												1836.9382	(98)
Space heating per m2												41.5597	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
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	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	469.0199	369.2285	378.3412	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9310	0.9658	0.9503	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	436.6350	356.6041	359.5440	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	627.0176	599.4838	555.0415	0.0000	0.0000	0.0000	0.0000	(103)
Month fracti	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	(103a)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	137.0755	180.7025	145.4501	0.0000	0.0000	0.0000	0.0000	(104)
Space cooling												463.2281	(104)
Cooled fraction												1.0000	(105)
Intermittency factor (Table 10b)	0.0000	0.0000	0.0000	0.0000	0.0000	0.2500	0.2500	0.2500	0.0000	0.0000	0.0000	0.0000	(106)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

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CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	34.2689	45.1756	36.3625	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling													115.8070 (107)
Space cooling per m2													2.6201 (108)
Energy for space heating													41.5597 (99)
Energy for space cooling													2.6201 (108)
Total													44.1798 (109)
Target Fabric Energy Efficiency (TFEE)													50.8 (109)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

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CALCULATION OF HEAT DEMAND 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF HEAT DEMAND 09 Jan 2014

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	44.2000 (1b)	x 2.4000 (2b)	= 106.0800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	44.2000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 106.0800 (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) =					Air changes per hour
Pressure test					20.0000 / (5) = 0.1885 (8)
Measured/design AP50					Yes
Infiltration rate					5.0000
Number of sides sheltered					0.4385 (18)
					2 (19)
Shelter factor				(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor				(21) = (18) x (20) =	0.3728 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.4000	4.1000	4.1000	3.9000	3.9000	3.4000	3.4000	3.3000	3.4000	3.8000	3.7000	4.0000 (22)
Wind factor	1.1000	1.0250	1.0250	0.9750	0.9750	0.8500	0.8500	0.8250	0.8500	0.9500	0.9250	1.0000 (22a)
Adj infilt rate												
	0.4100	0.3821	0.3821	0.3634	0.3634	0.3168	0.3168	0.3075	0.3168	0.3541	0.3448	0.3728 (22b)
Effective ac	0.5841	0.5730	0.5730	0.5660	0.5660	0.5502	0.5502	0.5473	0.5502	0.5627	0.5594	0.5695 (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
Windows (Uw = 1.40)			8.7600	1.3258	11.6136		(27)
Door to Stairs			1.8900	1.4000	2.6460		(26)
Exposed Floor			44.2000	0.1278	5.6501		(28b)
Main Wall	27.9300	8.7600	19.1700	0.2200	4.2174	60.0000	1150.2000 (29a)
Wall to stairs	2.6900	1.8900	0.8000	0.1864	0.1491	190.0000	152.0000 (29a)
Total net area of external elements Aum(A, m ²)			74.8200				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	24.2762			(33)
Party Wall 1			44.7800	0.0000	0.0000	180.0000	8060.4000 (32)
Party Ceilings 1			44.2000			40.0000	1768.0000 (32b)
Internal Wall 1			37.0500			75.0000	2778.7500 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 13909.3500 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							314.6912 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							8.3614 (36)
Total fabric heat loss							(33) + (36) = 32.6376 (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	20.4459	20.0583	20.0583	19.8151	19.8151	19.2603	19.2603	19.1585	19.2603	19.6981	19.5841	19.9352 (38)
Heat transfer coeff	53.0836	52.6960	52.6960	52.4528	52.4528	51.8980	51.8980	51.7961	51.8980	52.3357	52.2217	52.5729 (39)
Average = Sum(39)m / 12 =												52.3335 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.2010	1.1922	1.1922	1.1867	1.1867	1.1742	1.1742	1.1719	1.1742	1.1841	1.1815	1.1894 (40)
HLP (average)												1.1840 (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												1.5219 (42)
Average daily hot water use (litres/day)												70.3450 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	77.3795	74.5657	71.7519	68.9381	66.1243	63.3105	63.3105	66.1243	68.9381	71.7519	74.5657	77.3795 (44)
Energy conte	114.7516	100.3625	103.5651	90.2906	86.6359	74.7602	69.2763	79.4956	80.4451	93.7510	102.3365	111.1308 (45)
Energy content (annual)										Total = Sum(45)m =		1106.8012 (45)
Distribution loss (46)m = 0.15 x (45)m												
	17.2127	15.0544	15.5348	13.5436	12.9954	11.2140	10.3915	11.9243	12.0668	14.0626	15.3505	16.6696 (46)
Water storage loss:												

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

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CALCULATION OF HEAT DEMAND 09 Jan 2014

Store volume													210.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.8600 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													1.0044 (55)
Total storage loss													
	31.1364	28.1232	31.1364	30.1320	31.1364	30.1320	31.1364	31.1364	30.1320	31.1364	30.1320	31.1364	(56)
If cylinder contains dedicated solar storage													
	31.1364	28.1232	31.1364	30.1320	31.1364	30.1320	31.1364	31.1364	30.1320	31.1364	30.1320	31.1364	(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													
	169.1504	149.4969	157.9639	142.9346	141.0347	127.4042	123.6751	133.8944	133.0891	148.1498	154.9805	165.5296	(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													
	169.1504	149.4969	157.9639	142.9346	141.0347	127.4042	123.6751	133.8944	133.0891	148.1498	154.9805	165.5296	(64)
								Total per year (kWh/year) = Sum(64)m =				1747.3032	(64)
RHI water heating demand												1747	(64)
Heat gains from water heating, kWh/month													
	81.6740	72.6780	77.9544	72.1368	72.3255	66.9730	66.5534	69.9513	68.8632	74.6912	76.1421	80.4700	(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	91.3138	91.3138	91.3138	91.3138	91.3138	91.3138	91.3138	91.3138	91.3138	91.3138	91.3138	91.3138 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	29.7057	26.3844	21.4572	16.2445	12.1430	10.2516	11.0772	14.3986	19.3257	24.5385	28.6400	30.5314 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	197.3463	199.3941	194.2337	183.2476	169.3797	156.3458	147.6383	145.5905	150.7510	161.7370	175.6050	188.6389 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	45.6533	45.6533	45.6533	45.6533	45.6533	45.6533	45.6533	45.6533	45.6533	45.6533	45.6533	45.6533 (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)	-60.8758	-60.8758	-60.8758	-60.8758	-60.8758	-60.8758	-60.8758	-60.8758	-60.8758	-60.8758	-60.8758	-60.8758 (71)
Water heating gains (Table 5)	109.7768	108.1519	104.7775	100.1900	97.2117	93.0180	89.4535	94.0206	95.6433	100.3914	105.7529	108.1586 (72)
Total internal gains	412.9201	410.0216	396.5595	375.7733	354.8255	335.7066	324.2603	330.1009	341.8112	362.7581	386.0891	403.4201 (73)

6. Solar gains

[Jan]													
Area													
m2													
Solar flux													
Table 6a													
W/m2													
Specific data													
or Table 6b													
Specific data													
or Table 6c													
Access													
factor													
Table 6d													
Gains													
W													
West													
8.7600													
23.7835													
0.6300													
0.7000													
0.7700													
63.6724													(80)
Solar gains	63.6724	108.7997	177.5739	262.2734	312.6252	338.3181	318.9942	279.6995	219.9400	138.4937	78.2073	52.6622	(83)
Total gains	476.5925	518.8213	574.1334	638.0467	667.4507	674.0246	643.2545	609.8003	561.7513	501.2518	464.2964	456.0822	(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	72.7854	73.3207	73.3207	73.6607	73.6607	74.4481	74.4481	74.5945	74.4481	73.8254	73.9866	73.4924
alpha	5.8524	5.8880	5.8880	5.9107	5.9107	5.9632	5.9632	5.9730	5.9632	5.9217	5.9324	5.8995
util living area												
	0.9852	0.9736	0.9330	0.8220	0.6331	0.4145	0.2742	0.3056	0.5638	0.8565	0.9665	0.9878 (86)
Tweekday	19.2158	19.3578	19.5832	19.7786	19.8519	19.8735	19.8739	19.8759	19.8707	19.7794	19.4982	19.2027
Tweekend	20.6431	20.7053	20.8119	20.9122	20.9594	20.9698	20.9705	20.9705	20.9662	20.9081	20.7656	20.6336
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	0	0	0	0	0	0	0	0	0	0	0	0
16 / 9	0	0	0	0	0	0	0	0	0	0	0	0
MIT	20.4492	20.5441	20.7096	20.8629	20.9373	20.9536	20.9544	20.9544	20.9472	20.8582	20.6340	20.4345 (87)
Th 2	19.9192	19.9262	19.9262	19.9306	19.9306	19.9407	19.9407	19.9426	19.9407	19.9328	19.9348	19.9285 (88)
util rest of house												
	0.9796	0.9639	0.9098	0.7722	0.5594	0.3339	0.1888	0.2159	0.4720	0.8018	0.9522	0.9831 (89)
Tweekday	19.2158	19.3578	19.5832	19.7786	19.8519	19.8735	19.8739	19.8759	19.8707	19.7794	19.4982	19.2027
Tweekend	19.2158	19.3578	19.5832	19.7786	19.8519	19.8735	19.8739	19.8759	19.8707	19.7794	19.4982	19.2027
MIT 2	19.2158	19.3578	19.5832	19.7786	19.8519	19.8735	19.8739	19.8759	19.8707	19.7794	19.4982	19.2027 (90)
Living area fraction												
MIT	19.9330	20.0476	20.2382	20.4091	20.4830	20.5015	20.5022	20.5030	20.4967	20.4067	20.1586	19.9190 (91)
Temperature adjustment												0.0000
adjusted MIT	19.9330	20.0476	20.2382	20.4091	20.4830	20.5015	20.5022	20.5030	20.4967	20.4067	20.1586	19.9190 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9797	0.9652	0.9173	0.7957	0.5982	0.3767	0.2341	0.2635	0.5208	0.8280	0.9557	0.9830 (94)
Useful gains	466.9098	500.7602	526.6386	507.6665	399.2663	253.9035	150.5970	160.6820	292.5625	415.0184	443.7332	448.3463 (95)
Ext temp.	4.9000	5.5000	7.3000	9.7000	12.7000	15.6000	17.6000	17.4000	14.8000	11.4000	7.8000	4.9000 (96)
Heat loss rate W												
	798.0054	766.5996	681.7906	561.7201	408.2400	254.3784	150.6171	160.7232	295.6449	471.3712	645.3885	789.5903 (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												
	246.3351	178.6441	115.4331	38.9186	6.6764	0.0000	0.0000	0.0000	0.0000	41.9265	145.1918	253.8855 (98)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

Energy Calculations Ltd
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CALCULATION OF HEAT DEMAND 09 Jan 2014

Space heating	1027.0110 (98)
RHI space heating demand	1027 (98)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

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CALCULATION OF ENERGY RATINGS 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF ENERGY RATINGS 09 Jan 2014

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	44.2000 (1b)	x 2.4000 (2b)	= 106.0800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	44.2000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 106.0800 (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) =					Air changes per hour
Pressure test					20.0000 / (5) = 0.1885 (8)
Measured/design AP50					Yes
Infiltration rate					5.0000
Number of sides sheltered					0.4385 (18)
					2 (19)
Shelter factor				(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor				(21) = (18) x (20) =	0.3728 (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												
	0.4753	0.4659	0.4566	0.4100	0.4007	0.3541	0.3541	0.3448	0.3728	0.4007	0.4194	0.4380 (22b)
Effective ac	0.6129	0.6086	0.6043	0.5841	0.5803	0.5627	0.5627	0.5594	0.5695	0.5803	0.5879	0.5959 (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
Windows (Uw = 1.40)			8.7600	1.3258	11.6136		(27)
Door to Stairs			1.8900	1.4000	2.6460		(26)
Exposed Floor			44.2000	0.1278	5.6501		(28b)
Main Wall	27.9300	8.7600	19.1700	0.2200	4.2174	60.0000	1150.2000 (29a)
Wall to stairs	2.6900	1.8900	0.8000	0.1864	0.1491	190.0000	152.0000 (29a)
Total net area of external elements Aum(A, m ²)			74.8200				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	24.2762			(33)
Party Wall 1			44.7800	0.0000	0.0000	180.0000	8060.4000 (32)
Party Ceilings 1			44.2000			40.0000	1768.0000 (32b)
Internal Wall 1			37.0500			75.0000	2778.7500 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 13909.3500 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							314.6912 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							8.3614 (36)
Total fabric heat loss							(33) + (36) = 32.6376 (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	21.4568	21.3032	21.1528	20.4459	20.3137	19.6981	19.6981	19.5841	19.9352	20.3137	20.5812	20.8609 (38)
Heat transfer coeff	54.0944	53.9409	53.7904	53.0836	52.9514	52.3357	52.3357	52.2217	52.5729	52.9514	53.2189	53.4986 (39)
Average = Sum(39)m / 12 =												53.0830 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.2239	1.2204	1.2170	1.2010	1.1980	1.1841	1.1841	1.1815	1.1894	1.1980	1.2040	1.2104 (40)
HLP (average)												1.2010 (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												1.5219 (42)
Average daily hot water use (litres/day)												70.3450 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	77.3795	74.5657	71.7519	68.9381	66.1243	63.3105	63.3105	66.1243	68.9381	71.7519	74.5657	77.3795 (44)
Energy conte	114.7516	100.3625	103.5651	90.2906	86.6359	74.7602	69.2763	79.4956	80.4451	93.7510	102.3365	111.1308 (45)
Energy content (annual)										Total = Sum(45)m =		1106.8012 (45)
Distribution loss (46)m = 0.15 x (45)m												
	17.2127	15.0544	15.5348	13.5436	12.9954	11.2140	10.3915	11.9243	12.0668	14.0626	15.3505	16.6696 (46)
Water storage loss:												

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

Energy Calculations Ltd
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CALCULATION OF ENERGY RATINGS 09 Jan 2014

Store volume													210.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.8600 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													1.0044 (55)
Total storage loss													
	31.1364	28.1232	31.1364	30.1320	31.1364	30.1320	31.1364	31.1364	30.1320	31.1364	30.1320	31.1364	(56)
If cylinder contains dedicated solar storage													
	31.1364	28.1232	31.1364	30.1320	31.1364	30.1320	31.1364	31.1364	30.1320	31.1364	30.1320	31.1364	(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													
	169.1504	149.4969	157.9639	142.9346	141.0347	127.4042	123.6751	133.8944	133.0891	148.1498	154.9805	165.5296	(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													
	169.1504	149.4969	157.9639	142.9346	141.0347	127.4042	123.6751	133.8944	133.0891	148.1498	154.9805	165.5296	(64)
Heat gains from water heating, kWh/month								Total per year (kWh/year) = Sum(64)m =					1747.3032 (64)
	81.6740	72.6780	77.9544	72.1368	72.3255	66.9730	66.5534	69.9513	68.8632	74.6912	76.1421	80.4700	(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	91.3138	91.3138	91.3138	91.3138	91.3138	91.3138	91.3138	91.3138	91.3138	91.3138	91.3138	91.3138	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	29.7057	26.3844	21.4572	16.2445	12.1430	10.2516	11.0772	14.3986	19.3257	24.5385	28.6400	30.5314	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	197.3463	199.3941	194.2337	183.2476	169.3797	156.3458	147.6383	145.5905	150.7510	161.7370	175.6050	188.6389	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	45.6533	45.6533	45.6533	45.6533	45.6533	45.6533	45.6533	45.6533	45.6533	45.6533	45.6533	45.6533	(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)													
	-60.8758	-60.8758	-60.8758	-60.8758	-60.8758	-60.8758	-60.8758	-60.8758	-60.8758	-60.8758	-60.8758	-60.8758	(71)
Water heating gains (Table 5)													
	109.7768	108.1519	104.7775	100.1900	97.2117	93.0180	89.4535	94.0206	95.6433	100.3914	105.7529	108.1586	(72)
Total internal gains													
	412.9201	410.0216	396.5595	375.7733	354.8255	335.7066	324.2603	330.1009	341.8112	362.7581	386.0891	403.4201	(73)

6. Solar gains

[Jan]													
	Area												
	m2												
	Solar flux												
	Table 6a												
	W/m2												
	Specific data												
	or Table 6b												
	Specific data												
	or Table 6c												
	Access												
	factor												
	Table 6d												
	Gains												
	W												
West	8.7600							0.7000					52.5803 (80)
Solar gains	52.5803	102.8583	169.3929	247.0495	302.7684	309.9373	295.0730	253.4633	197.0110	122.0500	65.5615	43.2395	(83)
Total gains	465.5004	512.8798	565.9524	622.8228	657.5939	645.6439	619.3332	583.5642	538.8222	484.8081	451.6505	446.6596	(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	71.4253	71.6286	71.8290	72.7854	72.9671	73.8254	73.8254	73.9866	73.4924	72.9671	72.6003	72.2208	
alpha	5.7617	5.7752	5.7886	5.8524	5.8645	5.9217	5.9217	5.9324	5.8995	5.8645	5.8400	5.8147	
util living area													
	0.9893	0.9799	0.9517	0.8669	0.7089	0.5136	0.3711	0.4104	0.6504	0.9028	0.9774	0.9913	(86)
Weekend	19.0935	19.2394	19.4688	19.7156	19.8269	19.8634	19.8654	19.8674	19.8517	19.7080	19.3776	19.0766	
Weekend	20.5949	20.6599	20.7653	20.8831	20.9477	20.9675	20.9700	20.9697	20.9598	20.8741	20.7168	20.5833	
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0	
24 / 9	0	0	0	0	0	0	0	0	0	0	0	0	
16 / 9	0	0	0	0	0	0	0	0	0	0	0	0	
MIT	20.3748	20.4740	20.6377	20.8174	20.9193	20.9500	20.9536	20.9533	20.9372	20.8056	20.5579	20.3569	(87)
Th 2	19.9010	19.9037	19.9064	19.9192	19.9216	19.9328	19.9328	19.9348	19.9285	19.9216	19.9168	19.9117	(88)
util rest of house													
	0.9852	0.9725	0.9344	0.8260	0.6409	0.4306	0.2815	0.3161	0.5597	0.8619	0.9677	0.9880	(89)
Weekend	19.0935	19.2394	19.4688	19.7156	19.8269	19.8634	19.8654	19.8674	19.8517	19.7080	19.3776	19.0766	
Weekend	19.0935	19.2394	19.4688	19.7156	19.8269	19.8634	19.8654	19.8674	19.8517	19.7080	19.3776	19.0766	
MIT	19.0935	19.2394	19.4688	19.7156	19.8269	19.8634	19.8654	19.8674	19.8517	19.7080	19.3776	19.0766	(90)
Living area fraction													
MIT	19.8385	19.9572	20.1485	20.3562	20.4621	20.4952	20.4981	20.4988	20.4828	20.3462	20.0639	19.8210	(91)
Temperature adjustment													
adjusted MIT	19.8385	19.9572	20.1485	20.3562	20.4621	20.4952	20.4981	20.4988	20.4828	20.3462	20.0639	19.8210	(92)
													0.0000
													19.8210 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	0.9849	0.9729	0.9387	0.8437	0.6760	0.4747	0.3291	0.3662	0.6078	0.8796	0.9692	0.9876	(94)
Useful gains	458.4726	498.9739	531.2726	525.4645	444.5217	306.4854	203.8215	213.6935	327.5113	426.4479	437.7460	441.1387	(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													
	840.5458	812.1996	734.1566	608.1382	463.9635	308.5302	204.0123	214.0471	335.5631	516.0755	689.9222	835.7018	(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													
	284.2625	210.4877	150.9457	59.5251	14.4647	0.0000	0.0000	0.0000	0.0000	66.6829	181.5668	293.5549	(98)
Space heating													1261.4904 (98)

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Space heating per m2 (98) / (4) = 28.5405 (99)

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 %) 197.2875 (206)
Efficiency of secondary/supplementary heating system, % 100.0000 (208)
Space heating requirement 639.4172 (211)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	284.2625	210.4877	150.9457	59.5251	14.4647	0.0000	0.0000	0.0000	0.0000	66.6829	181.5668	293.5549	(98)
Space heating efficiency (main heating system 1)	197.2875	197.2875	197.2875	197.2875	197.2875	0.0000	0.0000	0.0000	0.0000	197.2875	197.2875	197.2875	(210)
Space heating fuel (main heating system)	144.0854	106.6908	76.5105	30.1717	7.3318	0.0000	0.0000	0.0000	0.0000	33.7999	92.0316	148.7955	(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
169.1504 149.4969 157.9639 142.9346 141.0347 127.4042 123.6751 133.8944 133.0891 148.1498 154.9805 165.5296 (64)
Efficiency of water heater (217)m 169.4400 169.4400 169.4400 169.4400 169.4400 169.4400 169.4400 169.4400 169.4400 169.4400 169.4400 169.4400 (216)
Fuel for water heating, kWh/month 99.8291 88.2300 93.2270 84.3570 83.2358 75.1914 72.9905 79.0217 78.5464 87.4349 91.4663 97.6922 (219)
Water heating fuel used 1031.2224 (219)
Annual totals kWh/year
Space heating fuel - main system 639.4172 (211)
Space heating fuel - secondary 0.0000 (215)

Electricity for pumps and fans:
Total electricity for the above, kWh/year 0.0000 (231)
Electricity for lighting (calculated in Appendix L) 209.8451 (232)

Energy saving/generation technologies (Appendices M ,N and Q)
Total delivered energy for all uses 1880.4846 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	639.4172	13.1900	84.3391 (240)	
Space heating - secondary	0.0000	0.0000	0.0000 (242)	
Water heating (other fuel)	1031.2224	13.1900	136.0182 (247)	
Pumps and fans for heating	0.0000	0.0000	0.0000 (249)	
Energy for lighting	209.8451	13.1900	27.6786 (250)	
Additional standing charges			0.0000 (251)	
Energy saving/generation technologies				
PV Unit	0.0000	13.1900	0.0000 (252)	
Total energy cost			248.0359 (255)	

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12): 0.4200 (256)
Energy cost factor (ECF) [(255) x (256)] / [(4) + 45.0] = 1.1679 (257)
SAP value 83.7080
SAP rating (Section 12) 84 (258)
SAP band B

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	639.4172	0.5190	331.8575 (261)	
Space heating - secondary	0.0000	0.5190	0.0000 (263)	
Water heating (other fuel)	1031.2224	0.5190	535.2044 (264)	
Space and water heating			867.0619 (265)	
Pumps and fans	0.0000	0.0000	0.0000 (267)	
Energy for lighting	209.8451	0.5190	108.9096 (268)	
Energy saving/generation technologies				
PV Unit	-300.0000	0.5190	-155.7000 (269)	
Total kg/year			820.2715 (272)	
CO2 emissions per m2			18.5600 (273)	
EI value			87.6775	
EI rating			88 (274)	
EI band			B	

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Calculation of stars for heating and DHW

Main heating energy efficiency	$13.19 \times (1 + 0.29 \times 0.25) / 1.9729 = 7.170$, stars = 3
Main heating environmental impact	$0.519 \times (1 + 0.29 \times 0.25) / 1.9729 = 0.2821$, stars = 4
Water heating energy efficiency	$13.19 / 1.6944 = 7.784$, stars = 2
Water heating environmental impact	$0.519 / 1.6944 = 0.3063$, stars = 4

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CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY 09 Jan 2014

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	44.2000 (1b)	x 2.4000 (2b)	= 106.0800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	44.2000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 106.0800 (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) =				Air changes per hour
Pressure test					20.0000 / (5) = 0.1885 (8)
Measured/design AP50					Yes
Infiltration rate					5.0000
Number of sides sheltered					0.4385 (18)
					2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =				0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =				0.3728 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.4000	4.1000	4.1000	3.9000	3.9000	3.4000	3.4000	3.3000	3.4000	3.8000	3.7000	4.0000 (22)
Wind factor	1.1000	1.0250	1.0250	0.9750	0.9750	0.8500	0.8500	0.8250	0.8500	0.9500	0.9250	1.0000 (22a)
Adj infilt rate	0.4100	0.3821	0.3821	0.3634	0.3634	0.3168	0.3168	0.3075	0.3168	0.3541	0.3448	0.3728 (22b)
Effective ac	0.5841	0.5730	0.5730	0.5660	0.5660	0.5502	0.5502	0.5473	0.5502	0.5627	0.5594	0.5695 (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	
Windows (Uw = 1.40)			8.7600	1.3258	11.6136			(27)
Door to Stairs			1.8900	1.4000	2.6460			(26)
Exposed Floor			44.2000	0.1278	5.6501			(28b)
Main Wall	27.9300	8.7600	19.1700	0.2200	4.2174	60.0000	1150.2000	(29a)
Wall to stairs	2.6900	1.8900	0.8000	0.1864	0.1491	190.0000	152.0000	(29a)
Total net area of external elements Aum(A, m2)			74.8200					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	24.2762				(33)
Party Wall 1			44.7800	0.0000	0.0000	180.0000	8060.4000	(32)
Party Ceilings 1			44.2000			40.0000	1768.0000	(32b)
Internal Wall 1			37.0500			75.0000	2778.7500	(32c)
Heat capacity Cm = Sum(A x k)				(28)...(30) + (32) + (32a)...(32e) =	13909.3500			(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K					314.6912			(35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							8.3614	(36)
Total fabric heat loss					(33) + (36) =		32.6376	(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	20.4459	20.0583	20.0583	19.8151	19.8151	19.2603	19.2603	19.1585	19.2603	19.6981	19.5841	19.9352 (38)
Heat transfer coeff	53.0836	52.6960	52.6960	52.4528	52.4528	51.8980	51.8980	51.7961	51.8980	52.3357	52.2217	52.5729 (39)
Average = Sum(39)m / 12 =												52.3335 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.2010	1.1922	1.1922	1.1867	1.1867	1.1742	1.1742	1.1719	1.1742	1.1841	1.1815	1.1894 (40)
HLP (average)												1.1840 (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												1.5219 (42)
Average daily hot water use (litres/day)												70.3450 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	77.3795	74.5657	71.7519	68.9381	66.1243	63.3105	63.3105	66.1243	68.9381	71.7519	74.5657	77.3795 (44)
Energy conte	114.7516	100.3625	103.5651	90.2906	86.6359	74.7602	69.2763	79.4956	80.4451	93.7510	102.3365	111.1308 (45)
Energy content (annual)										Total = Sum(45)m =		1106.8012 (45)
Distribution loss (46)m = 0.15 x (45)m												
	17.2127	15.0544	15.5348	13.5436	12.9954	11.2140	10.3915	11.9243	12.0668	14.0626	15.3505	16.6696 (46)
Water storage loss:												

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															210.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):															1.8600	(48)
Temperature factor from Table 2b															0.5400	(49)
Enter (49) or (54) in (55)															1.0044	(55)
Total storage loss																
	31.1364	28.1232	31.1364	30.1320	31.1364	30.1320	31.1364	31.1364	30.1320	31.1364	30.1320	31.1364	(56)			
If cylinder contains dedicated solar storage																
	31.1364	28.1232	31.1364	30.1320	31.1364	30.1320	31.1364	31.1364	30.1320	31.1364	30.1320	31.1364	(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																
	169.1504	149.4969	157.9639	142.9346	141.0347	127.4042	123.6751	133.8944	133.0891	148.1498	154.9805	165.5296	(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	(64)	
Output from w/h																
	169.1504	149.4969	157.9639	142.9346	141.0347	127.4042	123.6751	133.8944	133.0891	148.1498	154.9805	165.5296	(63)			
Total per year (kWh/year) = Sum(64)m =														1747.3032	(64)	
Heat gains from water heating, kWh/month																
	81.6740	72.6780	77.9544	72.1368	72.3255	66.9730	66.5534	69.9513	68.8632	74.6912	76.1421	80.4700	(65)			

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Space heating per m2 (98) / (4) = 23.2355 (99)

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 %)													194.9732 (206)
Efficiency of secondary/supplementary heating system, %													100.0000 (208)
Space heating requirement													526.7447 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	246.3351	178.6441	115.4331	38.9186	6.6764	0.0000	0.0000	0.0000	0.0000	41.9265	145.1918	253.8855	(98)
Space heating efficiency (main heating system 1)	194.9732	194.9732	194.9732	194.9732	194.9732	0.0000	0.0000	0.0000	0.0000	194.9732	194.9732	194.9732	(210)
Space heating fuel (main heating system)	126.3431	91.6250	59.2046	19.9610	3.4243	0.0000	0.0000	0.0000	0.0000	21.5037	74.4676	130.2156	(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	169.1504	149.4969	157.9639	142.9346	141.0347	127.4042	123.6751	133.8944	133.0891	148.1498	154.9805	165.5296	(64)
Efficiency of water heater (217)m	169.4400	169.4400	169.4400	169.4400	169.4400	169.4400	169.4400	169.4400	169.4400	169.4400	169.4400	169.4400	(216)
Fuel for water heating, kWh/month	99.8291	88.2300	93.2270	84.3570	83.2358	75.1914	72.9905	79.0217	78.5464	87.4349	91.4663	97.6922	(219)
Water heating fuel used												1031.2224	(219)
Annual totals kWh/year													
Space heating fuel - main system												526.7447	(211)
Space heating fuel - secondary												0.0000	(215)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												0.0000	(231)
Electricity for lighting (calculated in Appendix L)												209.8451	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
Total delivered energy for all uses												1767.8122	(238)

10a. Fuel costs - using BEDF prices (472)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	526.7447	18.9000	99.5548	(240)
Space heating - secondary	0.0000	0.0000	0.0000	(242)
Water heating (other fuel)	1031.2224	18.9000	194.9010	(247)
Pumps and fans for heating	0.0000	0.0000	0.0000	(249)
Energy for lighting	209.8451	18.9000	39.6607	(250)
Additional standing charges			0.0000	(251)
Energy saving/generation technologies				
PV Unit	0.0000	18.9000	0.0000	(252)
Total energy cost			334.1165	(255)

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	526.7447	0.5190	273.3805	(261)
Space heating - secondary	0.0000	0.5190	0.0000	(263)
Water heating (other fuel)	1031.2224	0.5190	535.2044	(264)
Space and water heating			808.5849	(265)
Pumps and fans	0.0000	0.0000	0.0000	(267)
Energy for lighting	209.8451	0.5190	108.9096	(268)
Energy saving/generation technologies				
PV Unit	-300.0000	0.5190	-155.7000	(269)
Total kg/year			761.7945	(272)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	526.7447	3.0700	1617.1063	(261)
Space heating - secondary	0.0000	3.0700	0.0000	(263)
Water heating (other fuel)	1031.2224	3.0700	3165.8527	(264)
Space and water heating			4782.9591	(265)
Pumps and fans	0.0000	0.0000	0.0000	(267)
Energy for lighting	209.8451	3.0700	644.2244	(268)
Energy saving/generation technologies				
PV Unit	-300.0000	3.0700	-921.0000	(269)
Primary energy kWh/year			4506.1835	(272)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

Energy Calculations Ltd
SAP • CODE • SBEM • DESIGN

CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY 09 Jan 2014

Primary energy kWh/m²/year

101.9499 (273)

SAP 2012 EPC IMPROVEMENTS

Current energy efficiency rating: B 84
Current environmental impact rating: B 88

(For testing purposes):

A	Not considered
B	Not considered
C	Not considered
D	Not considered
E Low energy lighting	Already installed
F	Not considered
G	Not considered
H	Not considered
I	Not considered
J	Not considered
K	Not considered
M	Not considered
N Solar water heating	Not applicable
O	Not considered
P	Not considered
R	Not considered
S	Not considered
T	Not considered
U Solar photovoltaic panels	Not applicable
A2	Not considered
A3	Not considered
T2	Not considered
W	Not considered
X	Not considered
Y	Not considered
J2	Not considered
Q2	Not considered
Z1	Not considered
Z2	Not considered
Z3	Not considered
Z4	Not considered
Z5	Not considered
V2 Wind turbine	Not applicable
L2	Not considered
Q3	Not considered
O3	Not considered

Recommended measures: SAP change Cost change CO2 change
(none)

Recommended measures	Typical annual savings	Energy efficiency	Environmental impact
(none)			
Total Savings	£0	0.00 kg/m ²	

Potential energy efficiency rating: B 84
Potential environmental impact rating: B 88

Fuel prices for cost data on this page from database revision number 472 TEST (30 Jan 2021)
Recommendation texts revision number 4.9c (22 Feb 2014)

Typical heating and lighting costs of this home (per year, Thames Valley):

	Current	Potential	Saving
Electricity	£334	£334	£0
Space heating	£100	£100	£0
Water heating	£195	£195	£0
Lighting	£40	£40	£0
Total cost of fuels	£334	£334	£0
Total cost of uses	£335	£335	£0
Delivered energy	40 kWh/m ²	40 kWh/m ²	0 kWh/m ²
Carbon dioxide emissions	0.8 tonnes	0.8 tonnes	0.0 tonnes
CO2 emissions per m ²	17 kg/m ²	17 kg/m ²	0 kg/m ²
Primary energy	102 kWh/m ²	102 kWh/m ²	0 kWh/m ²

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

Energy Calculations Ltd
SAP ♦ CODE ♦ SBEM ♦ DESIGN

CALCULATION OF ENERGY RATINGS FOR IMPROVED DWELLING 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF ENERGY RATINGS FOR IMPROVED DWELLING 09 Jan 2014

No improvements selected / applicable

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

Energy Calculations Ltd
SAP ♦ CODE ♦ SBEM ♦ DESIGN

CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING 09 Jan 2014

No improvements selected / applicable

SAP 2012 OVERHEATING ASSESSMENT FOR New Build (As Designed) 9.92

Overheating Calculation Input Data

Dwelling type	MidTerrace Flat
Number of storeys	1
Cross ventilation possible	Yes
SAP Region	Thames Valley
Front of dwelling faces	West
Overshading	Average or unknown
Thermal mass parameter	314.7 (calculated from construction elements)
Night ventilation	No
Ventilation rate during hot weather (ach)	6.00 (Windows fully open)

Overheating Calculation

Summer ventilation heat loss coefficient	210.04 (P1)
Transmission heat loss coefficient	32.64 (37)
Summer heat loss coefficient	242.68 (P2)

Overhangs	Ratio	Z_overhangs	Overhang type
Orientation			
West	0.000	1.000	None
Solar shading			
Orientation	Z blinds	Solar access	Z overhangs Z summer
West	1.000	0.90	1.000 0.900 (P8)
[Jul]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b
			FF Specific data or Table 6c
West	8.7600	117.5071	0.6300 0.7000
total:			0.9000 367.6984

Solar gains	Jun	Jul	Aug	
Internal gains	390	368	323	(P3)
Total summer gains	336	324	330	
	726	692	654	(P5)
Summer gain/loss ratio	2.99	2.85	2.69	(P6)
Summer external temperature	16.00	17.90	17.80	
Thermal mass temperature increment (TMP = 314.7)	0.00	0.00	0.00	
Threshold temperature	18.99	20.75	20.49	(P7)
Likelihood of high internal temperature	Not significant	Slight	Not significant	
Assessment of likelihood of high internal temperature:	Slight			

BASIC COMPLIANCE REPORT

Energy Calculations Ltd
SAP • CODE • SBEM • DESIGN

Calculation Type: New Build (As Designed)

Property Reference	015728	Issued on Date	01/03/2021
Assessment Reference	003	Prop Type Ref	
Property	Flat 7, 18, Parkside Road, READING, RG30 2DB		
SAP Rating	84 B	DER	21.03
Environmental	88 B	TER	31.09
CO ₂ Emissions (t/year)	0.76	% DER<TER	32.37
General Requirements Compliance	Pass	DFEE	47.58
		TFEE	50.81
		% DFEE<TFEE	6.35
Assessor Details	Mr. Matthew Carter, Energy Calculations Limited, Tel: 01754 761035, mcarter@energycalculations.co.uk		Assessor ID
			7869-0001
Client			

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Criterion 1 – Achieving the TER and TFE rate

1a TER and DER

Fuel for main heating	Electricity		
Fuel factor	1.55 (electricity)		
Target Carbon Dioxide Emission Rate (TER)	31.09	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	21.03	kgCO ₂ /m ²	Pass
	-10.06 (-32.4%)	kgCO ₂ /m ²	

1b TFE and DFEE

Target Fabric Energy Efficiency (TFEE)	50.81	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	47.58	kWh/m ² /yr	
	-3.2 (-6.3%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.22 (max. 0.30)	0.22 (max. 0.70)	Pass
Party wall	0.00 (max. 0.20)	-	Pass
Floor	0.13 (max. 0.25)	0.13 (max. 0.70)	Pass
Openings	1.40 (max. 2.00)	1.40 (max. 3.30)	Pass

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	5.00 (design value)	
Maximum	10.0	Pass

Limiting System Efficiencies

4 Heating efficiency

Main heating system	Heat pump with radiators or underfloor - Electric Panasonic WH-MDC05F3E5	
Secondary heating system	None	

5 Cylinder insulation

BASIC COMPLIANCE REPORT

Energy Calculations Ltd
SAP • CODE • SBEM • DESIGN

Calculation Type: New Build (As Designed)

Hot water storage

Measured cylinder loss: 1.86 kWh/day
Permitted by DBSCG 2.30

Pass

Primary pipework insulated

Yes

Pass

6 Controls

Space heating controls

Time and temperature zone control

Pass

Hot water controls

Cylinderstat

Pass

Independent timer for DHW

Pass

7 Low energy lights

Percentage of fixed lights with low-energy fittings

100

%

Minimum

75

%

Pass

8 Mechanical ventilation

Not applicable

Criterion 3 – Limiting the effects of heat gains in summer

9 Summertime temperature

Overheating risk (Thames Valley)

Slight

Pass

Based on:

Overshading

Average

Windows facing West

8.76 m², No overhang

Air change rate

6.00 ach

Blinds/curtains

None

Criterion 4 – Building performance consistent with DER and DFEE rate

Party Walls

Type

U-value

Solid Wall

0.00

W/m²K

Pass

Air permeability and pressure testing

3 Air permeability

Air permeability at 50 pascals

5.00 (design value)

Maximum

10.0

Pass

10 Key features

Party wall U-value

0.00

W/m²K

Photovoltaic array

300.00

kWh/Year

This report has not been submitted through the Elmhurst Energy members' portal, therefore results are subject to change when the dwelling is completed.

SUMMARY FOR INPUT DATA

Energy Calculations Ltd
SAP • CODE • SBEM • DESIGN

Calculation Type: New Build (As Designed)

Property Reference	015728	Issued on Date	01/03/2021
Assessment Reference	003	Prop Type Ref	
Property	Flat 7, 18, Parkside Road, READING, RG30 2DB		
SAP Rating	84 B	DER	21.03
Environmental	88 B	TER	31.09
CO ₂ Emissions (t/year)	0.76	% DER<TER	32.37
General Requirements Compliance	Pass	DFEE	47.58
		TFEE	50.81
		% DFEE<TFEE	6.35
Assessor Details	Mr. Matthew Carter, Energy Calculations Limited, Tel: 01754 761035, mcarter@energycalculations.co.uk		Assessor ID
			7869-0001
Client			

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	West						
Property Tenure	Unknown						
Transaction Type	New dwelling						
Terrain Type	Urban						
1.0 Property Type	Flat, Mid-Terrace						
2.0 Number of Storeys	1						
3.0 Date Built	2020						
4.0 Sheltered Sides	2						
5.0 Sunlight/Shade	Average or unknown						
6.0 Measurements							
Ground Floor:		Heat Loss Perimeter		Internal Floor Area		Average Storey Height	
		12.76 m		44.20 m²		2.40 m	
7.0 Living Area	25.70		m²				
8.0 Thermal Mass Parameter	Precise calculation		kJ/m²K				
Thermal Mass	314.69						
9.0 External Walls							
Description	Type	Construction		U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area (m²)	Nett Area (m²)
Main Wall	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure		0.22	60.00	27.93	19.17
Wall to stairs	Cavity Wall	Cavity wall : dense plaster, dense block, filled cavity, any outside structure		0.22	190.00	2.69	0.80
9.1 Party Walls							
Description	Type	Construction		U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	
Party Wall 1	Solid Wall	Dense plaster both sides, dense blocks, cavity or cavity fill		0.00	180.00	44.78	
9.2 Internal Walls							
Description	Construction				Kappa (kJ/m²K)	Area (m²)	
Internal Wall 1	Dense block, plasterboard on dabs				75.00	37.05	
10.1 Party Ceilings							
Description	Construction				Kappa (kJ/m²K)	Area (m²)	
Party Ceilings 1	Precast concrete planks floor, screed, carpeted				30.00	44.20	
11.0 Heat Loss Floors							

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Designed)

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)
Exposed Floor	Exposed Floor - Solid	Other	0.14	0.00	44.20

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	G-value	Frame Type	Frame Factor	U Value (W/m²K)
External Door	Manufacturer	Half Glazed Door	Double Low-E Soft 0.05			0.63		0.70	1.40
Windows	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.40
Door to Stairs	SAP table	Door to Corridor							1.40

13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width (m)	Height (m)	Count	Area (m²)	Curtain Closed
Door	Door to Corridor	[2] Wall to stairs	East							1.89	
Windows	Window	[1] Main Wall	West	None	0.00					8.76	

14.0 Conservatory

None

15.0 Draught Proofing

100

%

16.0 Draught Lobby

Yes

17.0 Thermal Bridging

Calculate Bridges

17.1 List of Bridges

Source Type	Bridge Type	Length	Psi	Imported
Table K1 - Approved	E2 Other lintels (including other steel lintels)	4.20	0.300	No
Table K1 - Approved	E3 Sill	4.20	0.040	No
Table K1 - Approved	E4 Jamb	20.80	0.050	No
Table K1 - Default	E20 Exposed floor (normal)	12.76	0.320	No
Table K1 - Approved	E7 Party floor between dwellings (in blocks of flats)	18.66	0.070	No
Table K1 - Approved	E16 Corner (normal)	7.20	0.090	No
Table K1 - Approved	E17 Corner (inverted – internal area greater than external area)	9.60	-0.090	No
Table K1 - Approved	E18 Party wall between dwellings	12.00	0.060	No
Table K1 - Default	P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	14.71	0.000	No

Y-value	0.112	W/m²K
---------	-------	-------

18.0 Pressure Testing

Yes

Designed AP₅₀

5.00

m³/(h.m²) @ 50 Pa

Property Tested ?

As Built AP₅₀

m³/(h.m²) @ 50 Pa

19.0 Mechanical Ventilation

Summer Overheating

Windows open in hot weather

Windows fully open

Cross ventilation possible

Yes

Night Ventilation

No

Air change rate

6.00

Mechanical Ventilation

Mechanical Ventilation System Present

No

20.0 Fans, Open Fireplaces, Flues

	MHS	SHS	Other	Total
Number of Chimneys	0		0	0
Number of open flues	0		0	0

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Designed)

Number of intermittent fans	2
Number of passive vents	0
Number of flueless gas fires	0

21.0 Fixed Cooling System

22.0 Lighting

Internal

Total number of light fittings	9	
Total number of L.E.L. fittings	9	
Percentage of L.E.L. fittings	100.00	%

External

External lights fitted	Yes
Light and motion sensor	Yes

23.0 Electricity Tariff

24.0 Main Heating 1

	Database	
Percentage of Heat	100	%
Database Ref. No.	102968	
Fuel Type	Electricity	
Main Heating	PET	
SAP Code	224	
In Winter	0.0	
In Summer	0.0	
Controls	CHD Time and temperature zone control	
PCDF Controls	0	
Sap Code	2207	
Is MHS Pumped	Pump in heated space	
Heat Emitter	Underfloor	
Underfloor Heating	Yes - Pipes in thin screed	
Flow Temperature	≤ 35°C	

25.0 Main Heating 2

Community Heating

28.0 Water Heating

	HWP From main heating 1	
Water Heating	Main Heating 1	
Flue Gas Heat Recovery System	No	
Waste Water Heat Recovery Instantaneous System 1	No	
Waste Water Heat Recovery Instantaneous System 2	No	
Waste Water Heat Recovery Storage System	No	
Solar Panel	No	
Water use ≤ 125 litres/person/day	Yes	
SAP Code	901	
Immersion Only Heating Hot Water	Yes	

29.0 Hot Water Cylinder

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Designed)

Cylinder Stat	Yes	
Cylinder In Heated Space	Yes	
Independent Time Control	Yes	
Insulation Type	Measured Loss	
Cylinder Volume	210.00	L
Loss	1.86	kWh/day
Pipes insulation	Fully insulated primary pipework	
31.0 Thermal Store	None	
32.0 Photovoltaic Unit	More Dwellings, One Block	
Apportioned	300.00	kWh/Year

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None

BLOCK COMPLIANCE

Energy Calculations Ltd
SAP • CODE • SBEM • DESIGN

Calculation Type: New Build (As Designed)

Block Reference	000516	Issued on Date	01/03/2021
Block Name	Parkside Road		
Assessor Details	Mr. Matthew Carter, Energy Calculations Limited, Tel: 01754 761035, mcarter@energycalculations.co.uk		Assessor ID 7869-0001
Client			

Block Compliance Report - DER

Block Reference: 000516		Block Name: Parkside Road			
Property-Assessment Reference	Multiplier	Floor Area (m ²)	DER (kgCO ₂ /m ²)	TER (kgCO ₂ /m ²)	% DER/TER
015722-003	1	73.4	16.43	27.83	40.96 %
015723-003	1	53	21.18	34.27	38.19 %
015724-003	1	50	19.12	28.78	33.57 %
015725-003	1	62.62	17.20	27.70	37.90 %
015726-003	1	45.84	19.12	29.28	34.69 %
015727-003	1	50.5	18.06	27.97	35.44 %
015728-003	1	44.2	21.03	31.09	32.37 %
015729-003	1	78.1	14.72	23.84	38.25 %
015730-003	1	63.8	17.28	28.45	39.26 %
015731-003	1	60.7	17.13	27.10	36.79 %
015732-003	1	43.25	21.26	29.47	27.86 %
015733-003	1	78.25	15.78	27.04	41.63 %
Totals:	12	703.66	218.31	342.81	
Average DER = 17.80 kgCO ₂ /m ²		% DER/TER	PASS		
Average TER = 28.24 kgCO ₂ /m ²		36.97 %			

Block Compliance Report - DFEE

Block Reference: 000516		Block Name: Parkside Road			
Property-Assessment Reference	Multiplier	Floor Area (m ²)	DFEE (kWh/m ² /yr)	TFEE (kWh/m ² /yr)	% DFEE/TFEE
015722-003	1	73.4	51.81	54.01	4.08 %
015723-003	1	53	67.01	66.99	-0.03 %
015724-003	1	50	45.25	46.33	2.34 %
015725-003	1	62.62	49.26	49.72	0.92 %
015726-003	1	45.84	46.34	45.82	-1.15 %
015727-003	1	50.5	45.03	44.75	-0.61 %
015728-003	1	44.2	47.58	50.81	6.35 %
015729-003	1	78.1	41.12	42.82	3.99 %
015730-003	1	63.8	50.50	52.76	4.28 %
015731-003	1	60.7	45.65	47.49	3.89 %
015732-003	1	43.25	42.47	43.04	1.31 %
015733-003	1	78.25	50.76	53.42	4.97 %
Totals:	12	703.66	582.78	597.97	
Average DFEE = 48.63 kWh/m ² /yr		% DFEE/TFEE	PASS		
Average TFEE = 50.00 kWh/m ² /yr		2.74 %			