

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



FALCON
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LIMITED

Property Reference	MB Baseline plot 2		Issued on Date	24/01/2022	
Assessment Reference	Reduction	Prop Type Ref			
Property	Manor Barn, 2, Ecclesden lane, Angmering, BN16 4DQ				
SAP Rating	88 B	DEI	11.86	TSL	31.56
Environmental	89 B	% DER-TFR	62.42		
CO ₂ Emissions (t/year)	0.91	DEE	65.24	TFR	77.91
General Requirements Compliance	Pass	% DEE-TFR	16.27		
Assessor Details	Mr. Neil Vance			Assessor ID	M057-0001
Client					

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

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DWELLING AS DESIGNED

Semi-Detached House, total floor area 119 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) 31.56 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 11.86 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 77.9 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE) 65.2 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.12 (max. 0.30)	0.16 (max. 0.70)	OK
Floor	0.16 (max. 0.25)	0.16 (max. 0.70)	OK
Roof	0.16 (max. 0.20)	0.16 (max. 0.35)	OK
Openings	1.20 (max. 2.00)	1.20 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals:	3.00 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main heating system: Heat pump with radiators or underfloor - Electric
Mitsubishi Electric Ecodan 14.0 kW PU2-HWM140YHA

Secondary heating system: None

5 Cylinder insulation

Hot water storage	Nominal cylinder loss: 1.74 kWh/day	
Permitted by DBSCG 2.24	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 (South East England):	Medium	OK
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Based on:

Overshading:	Average
Windows facing North:	11.46 m ² , No overhang
Windows facing East:	18.54 m ² , No overhang
Windows facing South:	2.10 m ² , No overhang
Windows facing West:	29.09 m ² , No overhang
Air change rate:	6.00 ach
Blinds/curtains:	None

10 Key features

External wall U-value	0.00 W/m ² K
Air permeability	3.0 m ³ /m ² h
Photovoltaic array	1.95 kW

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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	71.0000 (1b)	x 3.2000 (2b)	= 227.2000 (1b) - (3b)
First floor	48.0000 (1c)	x 2.6000 (2c)	= 124.8000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	119.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	352.0000 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour							
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)							
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)							
Number of intermittent fans					5 * 10 = 50.0000 (7a)							
Number of passive vents					0 * 10 = 0.0000 (7b)							
Number of flueless gas fires					0 * 40 = 0.0000 (7c)							
					Air changes per hour							
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(7a)+(7b)+(7c) =			50.0000 / (5) =	0.1420 (8)							
Pressure test				Yes								
Measured/design AP50					3.0000							
Infiltration rate					0.2920 (18)							
Number of sides sheltered					1 (19)							
Shelter factor				(20) = 1 - [0.075 x (19)] =	0.9250 (20)							
Infiltration rate adjusted to include shelter factor				(21) = (18) x (20) =	0.2701 (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	0.3444	0.3377	0.3309	0.2972	0.2904	0.2566	0.2566	0.2499	0.2701	0.2904	0.3039	0.3174 (22b)
Effective ac	0.5593	0.5570	0.5548	0.5442	0.5422	0.5329	0.5329	0.5312	0.5365	0.5422	0.5462	0.5504 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K					
Opening 1 Windows (Uw = 1.20)			17.7600	1.1450	20.3359			(27)				
Opening 2 Glazed Door (Uw = 1.20)			43.4300	1.1450	49.7290			(27)				
Heat Loss Floor 1			74.0000	0.1600	11.8400			(28a)				
External Wall 1	164.0000	61.1900	102.8100	0.1600	16.4496			(29a)				
External Wall 2	36.0000		36.0000	0.0000	0.0000			(29a)				
External Roof 1 Main	71.0000		71.0000	0.1600	11.3600			(30)				
Total net area of external elements Aum(A, m2)			309.0000					(31)				
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	109.7145			(33)				
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K								100.0000 (35)				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)								27.6182 (36)				
Total fabric heat loss						(33) + (36) =		137.3327 (37)				
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 64.9702	Feb 64.7026	Mar 64.4404	Apr 63.2086	May 62.9781	Jun 61.9052	Jul 61.9052	Aug 61.7066	Sep 62.3185	Oct 62.9781	Nov 63.4443	Dec 63.9318 (38)
Heat transfer coeff	202.3029	202.0353	201.7731	200.5413	200.3108	199.2379	199.2379	199.0392	199.6512	200.3108	200.7770	201.2644 (39)
Average = Sum(39)m / 12 =												200.5402 (39)
HLP	Jan 1.7000	Feb 1.6978	Mar 1.6956	Apr 1.6852	May 1.6833	Jun 1.6743	Jul 1.6743	Aug 1.6726	Sep 1.6777	Oct 1.6833	Nov 1.6872	Dec 1.6913 (40)
HLP (average)												1.6852 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.8594 (42)
Average daily hot water use (litres/day)												102.1100 (43)
Daily hot water use	Jan 112.3210	Feb 108.2366	Mar 104.1522	Apr 100.0678	May 95.9834	Jun 91.8990	Jul 91.8990	Aug 95.9834	Sep 100.0678	Oct 104.1522	Nov 108.2366	Dec 112.3210 (44)
Energy conte	166.5687	145.6821	150.3308	131.0621	125.7572	108.5189	100.5587	115.3926	116.7707	136.0850	148.5475	161.3129 (45)
Energy content (annual)										Total = Sum(45)m =		1606.5872 (45)
Distribution loss (46)m = 0.15 x (45)m	24.9853	21.8523	22.5496	19.6593	18.8636	16.2778	15.0838	17.3089	17.5156	20.4128	22.2821	24.1969 (46)
Water storage loss:												
Store volume												200.0000 (47)
b) If manufacturer declared loss factor is not known :												

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CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Hot water storage loss factor from Table 2 (kWh/litre/day)												0.0103 (51)
Volume factor from Table 2a												0.8434 (52)
Temperature factor from Table 2b												0.5400 (53)
Enter (49) or (54) in (55)												0.9372 (55)
Total storage loss	29.0527	26.2411	29.0527	28.1155	29.0527	28.1155	29.0527	29.0527	28.1155	29.0527	28.1155	29.0527 (56)
If cylinder contains dedicated solar storage	29.0527	26.2411	29.0527	28.1155	29.0527	28.1155	29.0527	29.0527	28.1155	29.0527	28.1155	29.0527 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Total heat required for water heating calculated for each month	218.8838	192.9344	202.6459	181.6896	178.0723	159.1464	152.8738	167.7077	167.3982	188.4001	199.1750	213.6280 (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	218.8838	192.9344	202.6459	181.6896	178.0723	159.1464	152.8738	167.7077	167.3982	188.4001	199.1750	213.6280 (64)
Heat gains from water heating, kWh/month	97.2362	86.2412	91.8371	84.0801	83.6663	76.5845	75.2878	80.2201	79.3283	87.1003	89.8940	95.4886 (65)
Total per year (kWh/year) = Sum(64)m =												2222.5552 (64)

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

Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	142.9683	142.9683	142.9683	142.9683	142.9683	142.9683	142.9683	142.9683	142.9683	142.9683	142.9683	142.9683 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	25.3104	22.4805	18.2823	13.8409	10.3462	8.7347	9.4382	12.2681	16.4662	20.9077	24.4023	26.0138 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	283.9056	286.8516	279.4277	263.6229	243.6723	224.9216	212.3949	209.4488	216.8728	232.6775	252.6281	271.3789 (68)
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)	-114.3747	-114.3747	-114.3747	-114.3747	-114.3747	-114.3747	-114.3747	-114.3747	-114.3747	-114.3747	-114.3747	-114.3747 (71)
Water heating gains (Table 5)	130.6938	128.3351	123.4369	116.7780	112.4547	106.3674	101.1933	107.8227	110.1782	117.0704	124.8528	128.3449 (72)
Total internal gains	505.8002	503.5576	487.0374	460.1323	432.3638	405.9142	388.9169	395.4302	409.4077	436.5460	467.7738	491.6282 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
North	2.1000	10.6334	0.7600	0.7000	0.7700	8.2326 (74)
East	7.2600	19.6403	0.7600	0.7000	0.7700	52.5689 (76)
South	2.1000	46.7521	0.7600	0.7000	0.7700	36.1964 (78)
West	6.3000	19.6403	0.7600	0.7000	0.7700	45.6176 (80)
North	9.3600	10.6334	0.7600	0.7000	0.7700	36.6938 (74)
East	11.2800	19.6403	0.7600	0.7000	0.7700	81.6773 (76)
West	22.7900	19.6403	0.7600	0.7000	0.7700	165.0200 (80)

Solar gains	426.0065	819.8027	1332.4825	1940.1263	2390.5236	2456.4633	2334.5721	1994.0402	1546.5208	966.6883	528.3570	352.3455 (83)
Total gains	931.8067	1323.3604	1819.5199	2400.2586	2822.8874	2862.3775	2723.4890	2389.4704	1955.9285	1403.2343	996.1308	843.9736 (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	16.3396	16.3613	16.3825	16.4832	16.5021	16.5910	16.5910	16.6076	16.5567	16.5021	16.4638	16.4239
alpha	2.0893	2.0908	2.0922	2.0989	2.1001	2.1061	2.1061	2.1072	2.1038	2.1001	2.0976	2.0949
util living area	0.9500	0.9035	0.8182	0.6810	0.5305	0.3965	0.3012	0.3502	0.5541	0.7984	0.9227	0.9585 (86)
Tweekday	16.3167	16.8990	17.7123	18.5266	19.0304	19.2756	19.3491	19.3369	19.1388	18.3536	17.1580	16.2045
Tweekend	19.3932	19.6591	20.0379	20.4316	20.6935	20.8318	20.8835	20.8696	20.7373	20.3264	19.7693	19.3410
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	18.5201	18.9258	19.5152	20.1124	20.5269	20.7417	20.8202	20.7988	20.5898	19.9604	19.0782	18.4396 (87)
Th 2	19.5408	19.5424	19.5440	19.5514	19.5528	19.5593	19.5593	19.5605	19.5568	19.5528	19.5500	19.5471 (88)
util rest of house	0.9413	0.8879	0.7905	0.6371	0.4709	0.3202	0.2097	0.2514	0.4710	0.7560	0.9073	0.9511 (89)
Tweekday	16.3167	16.8990	17.7123	18.5266	19.0304	19.2756	19.3491	19.3369	19.1388	18.3536	17.1580	16.2045
Tweekend	16.3167	16.8990	17.7123	18.5266	19.0304	19.2756	19.3491	19.3369	19.1388	18.3536	17.1580	16.2045
MIT 2	16.3167	16.8990	17.7123	18.5266	19.0304	19.2756	19.3491	19.3369	19.1388	18.3536	17.1580	16.2045 (90)
Living area fraction									fLA = Living area / (4) =			0.6235 (91)
MIT	17.6906	18.1628	18.8364	19.5154	19.9635	20.1898	20.2664	20.2484	20.0435	19.3555	18.3553	17.5982 (92)
Temperature adjustment												0.0000
adjusted MIT	17.6906	18.1628	18.8364	19.5154	19.9635	20.1898	20.2664	20.2484	20.0435	19.3555	18.3553	17.5982 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9267	0.8695	0.7749	0.6359	0.4886	0.3547	0.2557	0.3002	0.5009	0.7493	0.8911	0.9380 (94)
Ext temp.	863.5295	1150.6028	1410.0327	1526.2639	1379.3888	1015.2627	696.4655	717.2236	979.6431	1051.4084	887.6318	791.6701 (95)
	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)

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Calculation of Dwelling Emissions for Regulations Compliance 09 Jan 2014

Heat loss rate W	2708.9555	2679.5467	2489.1632	2128.8269	1655.2761	1113.6923	730.4822	765.9890	1186.6273	1753.8209	2259.8124	2696.5804 (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	1372.9970	1027.4503	802.8731	433.8453	205.2602	0.0000	0.0000	0.0000	0.0000	522.5949	987.9700	1417.2533 (98)
Space heating												6770.2441 (98)
Space heating per m2										(98) / (4) =		56.8928 (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 %)												242.8803 (206)
Efficiency of secondary/supplementary heating system, %												100.0000 (208)
Space heating requirement												2787.4819 (211)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	1372.9970	1027.4503	802.8731	433.8453	205.2602	0.0000	0.0000	0.0000	0.0000	522.5949	987.9700	1417.2533 (98)
Space heating efficiency (main heating system 1)	242.8803	242.8803	242.8803	242.8803	242.8803	0.0000	0.0000	0.0000	0.0000	242.8803	242.8803	242.8803 (210)
Space heating fuel (main heating system)	565.2978	423.0275	330.5633	178.6252	84.5108	0.0000	0.0000	0.0000	0.0000	215.1656	406.7724	583.5193 (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	218.8838	192.9344	202.6459	181.6896	178.0723	159.1464	152.8738	167.7077	167.3982	188.4001	199.1750	213.6280 (64)
Efficiency of water heater	267.2350	267.2350	267.2350	267.2350	267.2350	267.2350	267.2350	267.2350	267.2350	267.2350	267.2350	267.2350 (216)
(217)m	267.2350	267.2350	267.2350	267.2350	267.2350	267.2350	267.2350	267.2350	267.2350	267.2350	267.2350	267.2350 (217)
Fuel for water heating, kWh/month	81.9069	72.1965	75.8306	67.9887	66.6351	59.5530	57.2058	62.7566	62.6408	70.4998	74.5318	79.9401 (219)
Water heating fuel used												831.6857 (219)
Annual totals kWh/year												
Space heating fuel - main system												2787.4819 (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)												446.9894 (232)
Energy saving/generation technologies (Appendices M, N and Q)												
PV Unit 0 (0.80 * 1.95 * 1080 * 0.80) =												
Total delivered energy for all uses										-1347.2467		-1347.2467 (233)
												2718.9102 (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	2787.4819	0.5190	1446.7031 (261)
Space heating - secondary	0.0000	0.5190	0.0000 (263)
Water heating (other fuel)	831.6857	0.5190	431.6449 (264)
Space and water heating			1878.3480 (265)
Pumps and fans	0.0000	0.0000	0.0000 (267)
Energy for lighting	446.9894	0.5190	231.9875 (268)
Energy saving/generation technologies			
PV Unit	-1347.2467	0.5190	-699.2211 (269)
Total CO2, kg/year			1411.1144 (272)
Dwelling Carbon Dioxide Emission Rate (DER)			11.8600 (273)

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

DER			11.8600 ZC1
Total Floor Area		TFA	119.0000
Assumed number of occupants		N	2.8594
CO2 emission factor in Table 12 for electricity displaced from grid		EF	0.5190
CO2 emissions from appliances, equation (L14)			14.1375 ZC2
CO2 emissions from cooking, equation (L16)			1.5767 ZC3
Total CO2 emissions			27.5742 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			27.5742 ZC8

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CALCULATION OF TARGET EMISSIONS 09 Jan 2014

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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	71.0000 (1b)	x 3.2000 (2b)	= 227.2000 (1b) - (3b)
First floor	48.0000 (1c)	x 2.6000 (2c)	= 124.8000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	119.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	352.0000 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					4 * 10 = 40.0000 (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) =				40.0000 / (5) =	0.1136 (8)
Pressure test					Yes
Measured/design AP50					5.0000
Infiltration rate					0.3636 (18)
Number of sides sheltered					1 (19)
Shelter factor			(20) = 1 - [0.075 x (19)] =		0.9250 (20)
Infiltration rate adjusted to include shelter factor			(21) = (18) x (20) =		0.3364 (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	0.4289	0.4205	0.4120	0.3700	0.3616	0.3195	0.3195	0.3111	0.3364	0.3616	0.3784	0.3952 (22b)
Effective ac	0.5920	0.5884	0.5849	0.5685	0.5654	0.5511	0.5511	0.5484	0.5566	0.5654	0.5716	0.5761 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
TER Opening Type (Uw = 1.40)			29.7500	1.3258	39.4413		(27)
Heat Loss Floor 1			74.0000	0.1300	9.6200		(28a)
External Wall 1	164.0000	29.7500	134.2500	0.1800	24.1650		(29a)
External Wall 2	36.0000		36.0000	0.1800	6.4800		(29a)
External Roof 1 Main	71.0000		71.0000	0.1300	9.2300		(30)
Total net area of external elements Aum(A, m ²)			345.0000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	88.9363		(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)							21.7382 (36)
Total fabric heat loss						(33) + (36) =	110.6745 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)							
(38)m	68.7623	68.3475	67.9409	66.0312	65.6738	64.0105	64.0105
Heat transfer coeff	179.4368	179.0220	178.6154	176.7056	176.3483	174.6850	174.6850
Average = Sum(39)m / 12 =							
HLP	1.5079	1.5044	1.5010	1.4849	1.4819	1.4679	1.4679
HLP (average)							
Days in month	31	28	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.8594 (42)
Average daily hot water use (litres/day)												102.1100 (43)
Daily hot water use	112.3210	108.2366	104.1522	100.0678	95.9834	91.8990	91.8990	95.9834	100.0678	104.1522	108.2366	112.3210 (44)
Energy conte	166.5687	145.6821	150.3308	131.0621	125.7572	108.5189	100.5587	115.3926	116.7707	136.0850	148.5475	161.3129 (45)
Energy content (annual)												Total = Sum(45)m = 1606.5872 (45)
Distribution loss (46)m = 0.15 x (45)m												
	24.9853	21.8523	22.5496	19.6593	18.8636	16.2778	15.0838	17.3089	17.5156	20.4128	22.2821	24.1969 (46)
Water storage loss:												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6525 (48)
Temperature factor from Table 2b												0.5400 (49)

Regs Region: England

Elmhurst Energy Systems

SAP2012 Calculator (Design

System) version 4.14r19

FALCON
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FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



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CALCULATION OF TARGET EMISSIONS 09 Jan 2014

Not applicable

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													93.5000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													7829.9024 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	1403.0935	1116.8419	944.3242	545.6423	249.7799	0.0000	0.0000	0.0000	0.0000	599.0141	1035.1526	1427.1102	(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)	1500.6348	1194.4834	1009.9725	583.5746	267.1443	0.0000	0.0000	0.0000	0.0000	640.6567	1107.1151	1526.3210	(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	217.4948	191.6798	201.2569	180.3454	176.6833	157.8022	151.4848	166.3187	166.0540	187.0111	197.8308	212.2390	(64)
Efficiency of water heater (217)m	88.9002	88.7567	88.4172	87.5827	85.7372	79.8000	79.8000	79.8000	79.8000	87.7022	88.5940	88.9558	(216)
Fuel for water heating, kWh/month	244.6505	215.9610	227.6219	205.9143	206.0754	197.7471	189.8305	208.4194	208.0878	213.2343	223.3004	238.5893	(219)
Water heating fuel used												2579.4318	(219)
Annual totals kWh/year													
Space heating fuel - main system												7829.9024	(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)												446.9894	(232)
Total delivered energy for all uses												10931.3236	(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	7829.9024	0.2160	1691.2589 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2579.4318	0.2160	557.1573 (264)
Space and water heating			2248.4162 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	446.9894	0.5190	231.9875 (268)
Total CO2, kg/m2/year			2519.3287 (272)
Emissions per m2 for space and water heating			18.8943 (272a)
Fuel factor (electricity)			1.5500
Emissions per m2 for lighting			1.9495 (272b)
Emissions per m2 for pumps and fans			0.3271 (272c)
Target Carbon Dioxide Emission Rate (TER) = (18.8943 * 1.55) + 1.9495 + 0.3271, rounded to 2 d.p.			31.5600 (273)