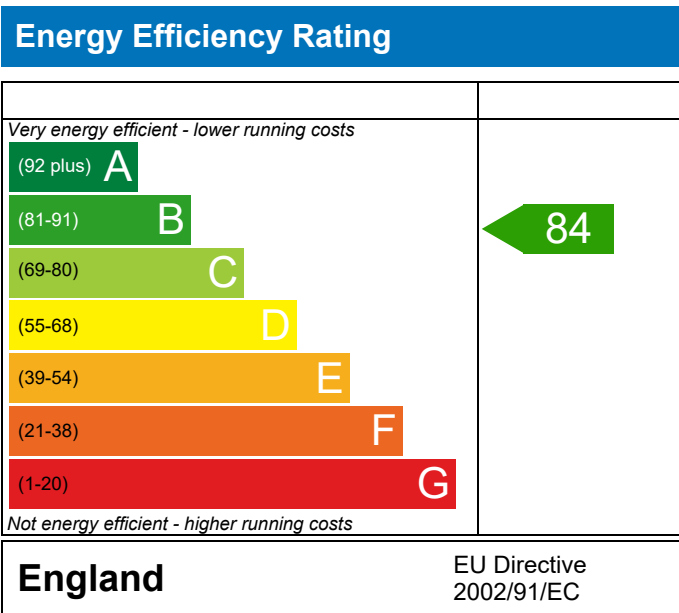


01-F8, Building 13

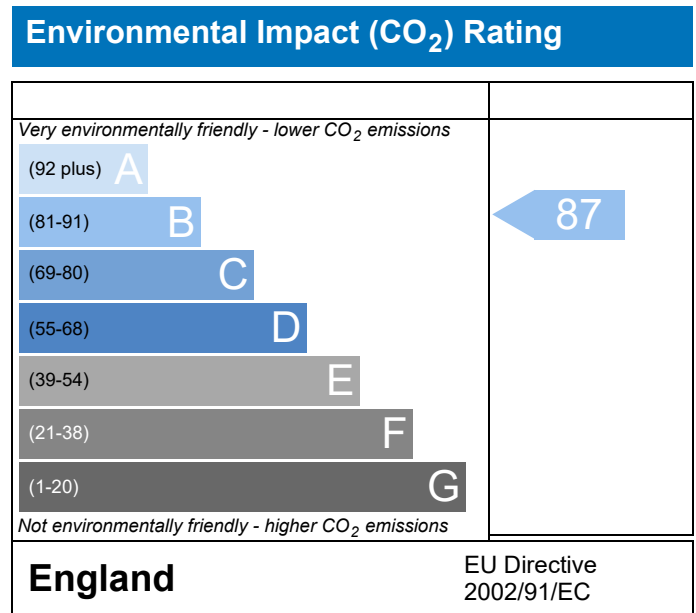
Dwelling type: Flat, Semi-Detached
 Date of assessment: 12/11/2019
 Produced by: Harry Davey
 Total floor area: 71.07 m²
 DRRN: 8699-2973-9912

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.



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.



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 been produced by an accredited Elmhurst member whose work is subject to quality assurance audits. The data used to produce the report has been verified by the Elmhurst members' portal.



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	TPB13 01-F8		Issued on Date	12/11/2019	
Assessment Reference	001	Prop Type Ref			
Property	01-F8, Building 13				
SAP Rating	84 B	DER	17.53	TER	17.42
Environmental	87 B	% DER<TER	-0.64		
CO ₂ Emissions (t/year)	1.05	DFEE	39.23	TFEE	44.41
General Requirements Compliance	Fail	% DFEE<TFEE	11.66		
Assessor Details	Mr. Harry Davey, energytest, Tel: 01892 315466, hdavey@energy-test.co.uk			Assessor ID	R434-0001
Client					

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



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 71 m²

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating:Mains gas
Fuel factor:1.00 (mains gas)
Target Carbon Dioxide Emission Rate (TER) 17.42 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 17.53 kgCO₂/m²Fail
Excess emissions =0.11 kgCO₂/m² (0.6%)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)44.4 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)39.2 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.19 (max. 0.30)	0.23 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.26 (max. 0.25)	0.26 (max. 0.70)	Fail
Roof (no roof)			
Openings	1.31 (max. 2.00)	1.40 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

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

4 Heating efficiency

Main heating system: Boiler system with radiators or underfloor - Mains gas
Data from database
Worcester Greenstar 37 CDi
Combi boiler
Efficiency: 89.4% SEDBUK2009
Minimum: 88.0% OK

Secondary heating system:

None

5 Cylinder insulation

Hot water storage No cylinder

6 Controls

Space heating controls: Time and temperature zone control OK

Hot water controls:

No cylinder

Boiler interlock

Yes OK

7 Low energy lights

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

8 Mechanical ventilation

Continuous extract system
Specific fan power: 0.24
Maximum 0.7 OK

9 Summertime temperature

Overheating risk (Thames Valley): High Fail

Based on:

Overshading: Average
Windows facing North East: 7.73 m², No overhang
Windows facing North West: 5.15 m², No overhang
Air change rate: 0.10 ach
Blinds/curtains: Light-coloured curtain or roller blind, closed 100% of daylight hours

10 Key features

Party wall U-value 0.00 W/m²K

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



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	71.0700 (1b)	x 2.5400 (2b)	= 180.5178 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	71.0700		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 180.5178 (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				0 * 10 =	0.0000 (7a)	
Number of passive vents				0 * 10 =	0.0000 (7b)	
Number of flueless gas fires				0 * 40 =	0.0000 (7c)	
Air changes per hour						
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					0.0000 / (5) =	0.0000 (8)
Pressure test					Yes	
Measured/design AP50					4.0000	
Infiltration rate					0.2000	(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) =	0.1700 (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	0.2168	0.2125	0.2083	0.1870	0.1828	0.1615	0.1615	0.1573	0.1700	0.1828	0.1913	0.1998 (22b)
Mechanical extract ventilation - centralised	0.5000 (23a)											
If mechanical ventilation:	0.5000 (23a)											
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K	
Window (Uw = 1.30)			12.8800	1.2357	15.9163		(27)	
Door to corridor			1.8900	1.4000	2.6460		(26)	
Heat Loss Floor 1			0.8100	0.2578	0.2089		(28b)	
External Wall	47.9000	12.8800	35.0200	0.1700	5.9534		(29a)	
Sheltered Wall	15.2100	1.8900	13.3200	0.2343	3.1207		(29a)	
Total net area of external elements Aum(A, m ²)			63.9200				(31)	
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	27.8453		(33)	
Party Wall			26.9000	0.0000	0.0000		(32)	
Party Floor 1			70.2600				(32d)	
Party Ceilings 1			71.0700				(32b)	
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K								250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)								9.4517 (36)
Total fabric heat loss								(33) + (36) = 37.2970 (37)

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

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	29.7854	29.7854	29.7854	29.7854	29.7854	29.7854	29.7854	29.7854	29.7854	29.7854	29.7854	29.7854 (38)
Average = Sum(39)m / 12 =	67.0824	67.0824	67.0824	67.0824	67.0824	67.0824	67.0824	67.0824	67.0824	67.0824	67.0824	67.0824 (39)
HLP (average)	0.9439	0.9439	0.9439	0.9439	0.9439	0.9439	0.9439	0.9439	0.9439	0.9439	0.9439	0.9439 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy	2.2718 (42)											
Average daily hot water use (litres/day)	88.1557 (43)											
Daily hot water use	96.9713	93.4450	89.9188	86.3926	82.8664	79.3401	79.3401	82.8664	86.3926	89.9188	93.4450	96.9713 (44)
Energy conte	143.8056	125.7733	129.7868	113.1513	108.5713	93.6888	86.8164	99.6231	100.8130	117.4878	128.2471	139.2680 (45)
Energy content (annual)	Total = Sum(45)m = 1387.0325 (45)											
Distribution loss (46)m = 0.15 x (45)m												

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Water storage loss:	21.5708	18.8660	19.4680	16.9727	16.2857	14.0533	13.0225	14.9435	15.1219	17.6232	19.2371	20.8902 (46)
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	49.4155	43.0103	45.8216	42.6046	42.2278	39.1266	40.4309	42.2278	42.6046	45.8216	46.0825	49.4155 (61)
Total heat required for water heating calculated for each month	193.2211	168.7836	175.6084	155.7558	150.7991	132.8154	127.2473	141.8509	143.4175	163.3094	174.3296	188.6835 (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	193.2211	168.7836	175.6084	155.7558	150.7991	132.8154	127.2473	141.8509	143.4175	163.3094	174.3296	188.6835 (64)
Heat gains from water heating, kWh/month	60.1692	52.5722	54.6095	48.2739	46.6569	40.9332	38.9742	43.6816	44.1714	50.5201	54.1628	58.6605 (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	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	18.1714	16.1397	13.1257	9.9370	7.4280	6.2710	6.7761	8.8078	11.8218	15.0105	17.5195	18.6765 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	199.7814	201.8545	196.6303	185.5087	171.4697	158.2749	149.4601	147.3870	152.6111	163.7327	177.7718	190.9665 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591 (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)	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728 (71)
Water heating gains (Table 5)	80.8726	78.2324	73.3999	67.0471	62.7109	56.8516	52.3847	58.7119	61.3492	67.9034	75.2261	78.8448 (72)
Total internal gains	358.9027	356.3039	343.2332	322.5701	301.6859	281.4749	268.6981	274.9839	285.8595	306.7239	330.5946	348.5650 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b g	Specific data or Table 6c FF	Access factor Table 6d	Gains W						
Northeast	7.7300	11.2829	0.6300	0.7000	0.7700	26.6547 (75)						
Northwest	5.1500	11.2829	0.6300	0.7000	0.7700	17.7583 (81)						
Solar gains	44.4130	90.4039	162.8791	267.4943	359.5648	383.3342	358.6013	285.8811	198.4708	110.4808	55.8830	36.2699 (83)
Total gains	403.3157	446.7078	506.1123	590.0644	661.2507	664.8091	627.2993	560.8650	484.3302	417.2047	386.4777	384.8349 (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	73.5724	73.5724	73.5724	73.5724	73.5724	73.5724	73.5724	73.5724	73.5724	73.5724	73.5724	73.5724
alpha	5.9048	5.9048	5.9048	5.9048	5.9048	5.9048	5.9048	5.9048	5.9048	5.9048	5.9048	5.9048
util living area	0.9985	0.9968	0.9898	0.9533	0.8292	0.6276	0.4676	0.5428	0.8351	0.9801	0.9968	0.9988 (86)
MIT	20.2150	20.3003	20.4681	20.6973	20.8761	20.9415	20.9521	20.9497	20.8938	20.6566	20.3904	20.1893 (87)
Th 2	20.1304	20.1304	20.1304	20.1304	20.1304	20.1304	20.1304	20.1304	20.1304	20.1304	20.1304	20.1304 (88)
util rest of house	0.9980	0.9957	0.9862	0.9371	0.7808	0.5500	0.3768	0.4441	0.7684	0.9705	0.9955	0.9985 (89)
MIT 2	19.0683	19.1928	19.4366	19.7607	19.9886	20.0549	20.0622	20.0611	20.0141	19.7093	19.3248	19.0307 (90)
Living area fraction	fLA = Living area / (4) =											0.1855 (91)
MIT	19.2810	19.3982	19.6279	19.9344	20.1532	20.2193	20.2272	20.2259	20.1772	19.8850	19.5224	19.2455 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.2810	19.3982	19.6279	19.9344	20.1532	20.2193	20.2272	20.2259	20.1772	19.8850	19.5224	19.2455 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9973	0.9945	0.9835	0.9328	0.7822	0.5582	0.3870	0.4551	0.7725	0.9669	0.9942	0.9979 (94)
Useful gains	402.2133	444.2545	497.7549	550.3892	517.2094	371.1146	242.7669	255.2676	374.1438	403.4136	384.2480	384.0319 (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	1004.9599	972.5755	880.6534	740.2134	567.0623	376.9558	243.3229	256.6507	407.6765	622.8616	833.3273	1009.2909 (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	448.4435	355.0317	284.8765	136.6734	37.0906	0.0000	0.0000	0.0000	0.0000	163.2694	323.3371	465.1927 (98)
Space heating												2213.9149 (98)
Space heating per m2												(98) / (4) = 31.1512 (99)

8c. Space cooling requirement

Not applicable

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 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 %)													93.3000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													2372.8992 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	448.4435	355.0317	284.8765	136.6734	37.0906	0.0000	0.0000	0.0000	0.0000	163.2694	323.3371	465.1927	(98)
Space heating efficiency (main heating system 1)	93.3000	93.3000	93.3000	93.3000	93.3000	0.0000	0.0000	0.0000	0.0000	93.3000	93.3000	93.3000	(210)
Space heating fuel (main heating system)	480.6468	380.5270	305.3338	146.4882	39.7542	0.0000	0.0000	0.0000	0.0000	174.9940	346.5564	498.5988	(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	193.2211	168.7836	175.6084	155.7558	150.7991	132.8154	127.2473	141.8509	143.4175	163.3094	174.3296	188.6835	(64)
Efficiency of water heater (217)m	87.0007	86.7786	86.1620	84.6237	82.0108	80.2000	80.2000	80.2000	80.2000	84.9502	86.4848	80.2000	(216)
Fuel for water heating, kWh/month	222.0913	194.4991	203.8120	184.0569	183.8772	165.6053	158.6625	176.8715	178.8248	192.2413	201.5726	216.5452	(219)
Water heating fuel used												2278.6596	(219)
Annual totals kWh/year													
Space heating fuel - main system													2372.8992 (211)
Space heating fuel - secondary													0.0000 (215)
Electricity for pumps and fans:													
(MEV)Centralised, Database: in-use factor = 1.3000, SFP = 0.3120)													
mechanical ventilation fans (SFP = 0.3120)													68.7123 (230a)
central heating pump													30.0000 (230c)
main heating flue fan													45.0000 (230e)
Total electricity for the above, kWh/year													143.7123 (231)
Electricity for lighting (calculated in Appendix L)													320.9132 (232)
Total delivered energy for all uses													5116.1842 (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	2372.8992	0.2160	512.5462 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2278.6596	0.2160	492.1905 (264)
Space and water heating			1004.7367 (265)
Pumps and fans	143.7123	0.5190	74.5867 (267)
Energy for lighting	320.9132	0.5190	166.5539 (268)
Total CO2, kg/year			1245.8773 (272)
Dwelling Carbon Dioxide Emission Rate (DER)			17.5300 (273)

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

DER			17.5300 ZC1
Total Floor Area		TFA	71.0700
Assumed number of occupants		N	2.2718
CO2 emission factor in Table 12 for electricity displaced from grid		EF	0.5190
CO2 emissions from appliances, equation (L14)			16.6577 ZC2
CO2 emissions from cooking, equation (L16)			2.4416 ZC3
Total CO2 emissions			36.6293 ZC4
Residual CO2 emissions offset from biofuel CHP			0.0000 ZC5
Additional allowable electricity generation, kWh/m ² /year			0.0000 ZC6
Resulting CO2 emissions offset from additional allowable electricity generation			0.0000 ZC7
Net CO2 emissions			36.6293 ZC8

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

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

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	71.0700 (1b)	2.5400 (2b)	180.5178 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	71.0700		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 180.5178 (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				3 * 10 =	30.0000 (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) =				30.0000 / (5) =	0.1662 (8)
Pressure test				Yes	
Measured/design AP50				5.0000	
Infiltration rate					0.4162 (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) =		0.3538 (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	0.4510	0.4422	0.4334	0.3891	0.3803	0.3361	0.3361	0.3272	0.3538	0.3803	0.3980	0.4157 (22b)
Effective ac	0.6017	0.5978	0.5939	0.5757	0.5723	0.5565	0.5565	0.5535	0.5626	0.5723	0.5792	0.5864 (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)			12.8800	1.3258	17.0758		(27)
Heat Loss Floor 1			0.8100	0.1300	0.1053		(28b)
External Wall	47.9000	12.8800	35.0200	0.1800	6.3036		(29a)
Sheltered Wall	15.2100	1.8900	13.3200	0.1800	2.3976		(29a)
Total net area of external elements Aum(A, m ²)			63.9200				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		27.7723		(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)							7.5539 (36)
Total fabric heat loss						(33) + (36) =	35.3262 (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	35.8450	35.6097	35.3791	34.2958	34.0931	33.1495	33.1495	32.9748	33.5130	34.0931	34.5031	34.9318 (38)
Heat transfer coeff	71.1712	70.9359	70.7052	69.6219	69.4192	68.4757	68.4757	68.3010	68.8391	69.4192	69.8293	70.2579 (39)
Average = Sum(39)m / 12 =												69.6209 (39)
HLP	1.0014	0.9981	0.9949	0.9796	0.9768	0.9635	0.9635	0.9610	0.9686	0.9768	0.9825	0.9886 (40)
HLP (average)												0.9796 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												2.2718 (42)
Average daily hot water use (litres/day)												88.1557 (43)
Daily hot water use	96.9713	93.4450	89.9188	86.3926	82.8664	79.3401	79.3401	82.8664	86.3926	89.9188	93.4450	96.9713 (44)
Energy conte	143.8056	125.7733	129.7868	113.1513	108.5713	93.6888	86.8164	99.6231	100.8130	117.4878	128.2471	139.2680 (45)
Energy content (annual)												Total = Sum(45)m = 1387.0325 (45)
Distribution loss (46)m = 0.15 x (45)m	21.5708	18.8660	19.4680	16.9727	16.2857	14.0533	13.0225	14.9435	15.1219	17.6232	19.2371	20.8902 (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)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

Combi loss	49.4155	43.0103	45.8216	42.6046	42.2278	39.1266	40.4309	42.2278	42.6046	45.8216	46.0825	49.4155 (61)
Total heat required for water heating calculated for each month	193.2211	168.7836	175.6084	155.7558	150.7991	132.8154	127.2473	141.8509	143.4175	163.3094	174.3296	188.6835 (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	193.2211	168.7836	175.6084	155.7558	150.7991	132.8154	127.2473	141.8509	143.4175	163.3094	174.3296	188.6835 (64)
Heat gains from water heating, kWh/month	60.1692	52.5722	54.6095	48.2739	46.6569	40.9332	38.9742	43.6816	44.1714	50.5201	54.1628	58.6605 (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	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	18.1714	16.1397	13.1257	9.9370	7.4280	6.2710	6.7761	8.8078	11.8218	15.0105	17.5195	18.6765 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	199.7814	201.8545	196.6303	185.5087	171.4697	158.2749	149.4601	147.3870	152.6111	163.7327	177.7718	190.9665 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591 (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)	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728 (71)
Water heating gains (Table 5)	80.8726	78.2324	73.3999	67.0471	62.7109	56.8516	52.3847	58.7119	61.3492	67.9034	75.2261	78.8448 (72)
Total internal gains	358.9027	356.3039	343.2332	322.5701	301.6859	281.4749	268.6981	274.9839	285.8595	306.7239	330.5946	348.5650 (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						
Northeast	7.7300	11.2829	0.6300	0.7000	0.7700	26.6547 (75)						
Northwest	5.1500	11.2829	0.6300	0.7000	0.7700	17.7583 (81)						
Solar gains	44.4130	90.4039	162.8791	267.4943	359.5648	383.3342	358.6013	285.9811	198.4708	110.4808	55.8830	36.2699 (83)
Total gains	403.3157	446.7078	506.1123	590.0644	661.2507	664.8091	627.2993	560.8650	484.3302	417.2047	386.4777	384.8349 (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	69.3457	69.5758	69.8027	70.8888	71.0958	72.0754	72.0754	72.2598	71.6949	71.0958	70.6783	70.2471	
alpha	5.6230	5.6384	5.6535	5.7259	5.7397	5.8050	5.8050	5.8173	5.7797	5.7397	5.7119	5.6831	
util living area	0.9985	0.9969	0.9906	0.9571	0.8412	0.6380	0.4767	0.5515	0.8441	0.9814	0.9969	0.9988 (86)	
MIT	19.9326	20.0531	20.2876	20.6213	20.8781	20.9807	20.9969	20.9934	20.9096	20.5736	20.2021	19.9163 (87)	
Th 2	20.0821	20.0849	20.0876	20.1003	20.1027	20.1139	20.1139	20.1159	20.1096	20.1027	20.0979	20.0929 (88)	
util rest of house	0.9980	0.9959	0.9872	0.9418	0.7934	0.5585	0.3827	0.4500	0.7779	0.9722	0.9956	0.9985 (89)	
MIT 2	18.6484	18.8263	19.1692	19.6527	19.9855	20.1014	20.1127	20.1132	20.0356	19.5950	19.0541	18.6325 (90)	
Living area fraction												fLA = Living area / (4) = 0.1855 (91)	
MIT	18.8866	19.0538	19.3766	19.8324	20.1510	20.2644	20.2767	20.2764	20.1977	19.7765	19.2670	18.8706 (92)	
Temperature adjustment													0.0000
adjusted MIT	18.8866	19.0538	19.3766	19.8324	20.1510	20.2644	20.2767	20.2764	20.1977	19.7765	19.2670	18.8706 (93)	

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	0.9970	0.9942	0.9836	0.9362	0.7963	0.5725	0.4001	0.4689	0.7853	0.9677	0.9939	0.9977 (94)	
Useful gains	402.1024	444.1180	497.8163	552.3963	526.5284	380.6108	251.0106	262.9764	380.3421	403.7438	384.1237	383.9411 (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	1038.1422	1004.0147	910.4458	761.1323	586.6638	387.8754	251.7647	264.7612	419.7597	637.0243	849.6131	1030.7235 (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	473.2137	376.2506	306.9963	150.2900	44.7407	0.0000	0.0000	0.0000	0.0000	173.5607	335.1523	481.2061 (98)	
Space heating													2341.4104 (98)
Space heating per m2													(98) / (4) = 32.9451 (99)

8c. Space cooling requirement

Not applicable

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

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													93.4000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													2506.8634 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	473.2137	376.2506	306.9963	150.2900	44.7407	0.0000	0.0000	0.0000	0.0000	173.5607	335.1523	481.2061	(98)
Space heating efficiency (main heating system 1)	93.4000	93.4000	93.4000	93.4000	93.4000	0.0000	0.0000	0.0000	0.0000	93.4000	93.4000	93.4000	(210)
Space heating fuel (main heating system)	506.6527	402.8379	328.6898	160.9100	47.9022	0.0000	0.0000	0.0000	0.0000	185.8251	358.8355	515.2100	(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	193.2211	168.7836	175.6084	155.7558	150.7991	132.8154	127.2473	141.8509	143.4175	163.3094	174.3296	188.6835	(64)
Efficiency of water heater (217)m	87.2194	87.0109	86.4437	84.9614	82.4066	80.3000	80.3000	80.3000	80.3000	85.2046	86.6699	87.3070	(217)
Fuel for water heating, kWh/month	221.5347	193.9799	203.1478	183.3253	182.9940	165.3991	158.4649	176.6512	178.6021	191.6673	201.1419	216.1151	(219)
Water heating fuel used												2273.0234	(219)
Annual totals kWh/year													
Space heating fuel - main system													2506.8634 (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)													320.9132 (232)
Total delivered energy for all uses													5175.7999 (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	2506.8634	0.2160	541.4825 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2273.0234	0.2160	490.9731 (264)
Space and water heating			1032.4555 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	320.9132	0.5190	166.5539 (268)
Total CO2, kg/m2/year			1237.9345 (272)
Emissions per m2 for space and water heating			14.5273 (272a)
Fuel factor (mains gas)			1.0000
Emissions per m2 for lighting			2.3435 (272b)
Emissions per m2 for pumps and fans			0.5477 (272c)
Target Carbon Dioxide Emission Rate (TER) = (14.5273 * 1.00) + 2.3435 + 0.5477, rounded to 2 d.p.			17.4200 (273)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	TPB13 01-F8	Issued on Date	12/11/2019
Assessment Reference	001	Prop Type Ref	
Property	01-F8, Building 13		

SAP Rating	84 B	DER	17.53	TER	17.42
Environmental	87 B	% DER<TER	-0.64		
CO ₂ Emissions (t/year)	1.05	DFEE	39.23	TREE	44.41
General Requirements Compliance	Fail	% DFEE<TFEE	11.66		

Assessor Details	Mr. Harry Davey, energytest, Tel: 01892 315466, hdavey@energy-test.co.uk	Assessor ID	R434-0001
Client			

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	71.0700 (1b)	2.5400 (2b)	180.5178 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	71.0700		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 180.5178 (5)
Dwelling volume			

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				3 + 10 =	30.0000 (7a)
Number of passive vents				0 + 10 =	0.0000 (7b)
Number of flueless gas fires				0 + 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =				30.0000 / (5) =	0.1662 (8)
Pressure test				Yes	
Measured/design AP50				4.0000	
Infiltration rate				0.3662	(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) =	0.3113 (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	0.3969	0.3891	0.3813	0.3424	0.3346	0.2957	0.2957	0.2879	0.3113	0.3346	0.3502	0.3657 (22b)
Effective ac	0.5787	0.5757	0.5727	0.5586	0.5560	0.5437	0.5437	0.5414	0.5484	0.5560	0.5613	0.5669 (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					
Window (U _w = 1.30)			12.8800	1.2357	15.9163		(27)					
Door to corridor			1.8900	1.4000	2.6460		(26)					
Heat Loss Floor 1			0.8100	0.2578	0.2089		(28b)					
External Wall	47.9000	12.8800	35.0200	0.1700	5.9534		(29a)					
Sheltered Wall	15.2100	1.8900	13.3200	0.2343	3.1207		(29a)					
Total net area of external elements A _{um} (m ²)					63.9200		(31)					
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	27.8453	(33)					
Party Wall			26.9000	0.0000	0.0000		(32)					
Party Floor 1			70.2600				(32d)					
Party Ceilings 1			71.0700				(32b)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							250.0000 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							9.4517 (36)					
Total fabric heat loss						(33) + (36) =	37.2970 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	34.4765	34.2943	34.1158	33.2771	33.1202	32.3898	32.3898	32.2545	32.6711	33.1202	33.4377	33.7695 (38)
Average = Sum(39)m / 12 =	71.7735	71.5913	71.4128	70.5741	70.4172	69.6868	69.6868	69.5515	69.9681	70.4172	70.7347	71.0665 (39)
												70.5734 (39)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.0099	1.0073	1.0048	0.9930	0.9908	0.9805	0.9805	0.9786	0.9845	0.9908	0.9953	1.0000 (40)
HLP (average)												0.9930 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												2.2718 (42)
Average daily hot water use (litres/day)												88.1557 (43)
Daily hot water use	96.9713	93.4450	89.9188	86.3926	82.8664	79.3401	79.3401	82.8664	86.3926	89.9188	93.4450	96.9713 (44)
Energy content (annual)	143.8056	125.7733	129.7868	113.1513	108.5713	93.6888	86.8164	99.6231	100.8130	117.4878	128.2471	139.2680 (45)
Energy content (annual)												Total = Sum(45)m = 1387.0325 (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												
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 (57)
Heat gains from water heating, kWh/month	30.5587	26.7268	27.5797	24.0446	23.0714	19.9089	18.4485	21.1699	21.4228	24.9662	27.2525	29.5945 (65)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Metabolic gains (Table 5), Watts												
(66)m	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	18.1714	16.1397	13.1257	9.9370	7.4280	6.2710	6.7761	8.8078	11.8218	15.0105	17.5195	18.6765 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	199.7814	201.8545	196.6303	185.5087	171.4697	158.2749	149.4601	147.3870	152.6111	163.7327	177.7718	190.9665 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591 (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)	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728 (71)
Water heating gains (Table 5)	41.0735	39.7721	37.0695	33.3953	31.0100	27.6512	24.7964	28.4542	29.7538	33.5567	37.8507	39.7775 (72)
Total internal gains	316.1036	314.8435	303.9028	285.9183	266.9849	249.2745	238.1098	241.7262	251.2640	269.3772	290.2193	306.4977 (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						
Northeast	7.7300	11.2829	0.6300	0.7000	0.7700	26.6547 (75)						
Northwest	5.1500	11.2829	0.6300	0.7000	0.7700	17.7583 (81)						
Solar gains	44.4130	90.4039	162.8791	267.4943	359.5648	383.3342	358.6013	285.8811	198.4708	110.4808	55.8830	36.2699 (83)
Total gains	360.5166	405.2475	466.7819	553.4126	626.5498	632.6087	596.7111	527.6073	449.7348	379.8580	346.1023	342.7676 (84)

7. Mean internal temperature (heating season)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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	68.7638	68.9387	69.1111	69.9324	70.0882	70.8228	70.8228	70.9606	70.5381	70.0882	69.7737	69.4479
alpha	5.5843	5.5959	5.6074	5.6622	5.6725	5.7215	5.7215	5.7307	5.7025	5.6725	5.6516	5.6299
util living area	0.9991	0.9981	0.9937	0.9680	0.8683	0.6739	0.5083	0.5923	0.8792	0.9882	0.9982	0.9994 (86)
MIT	19.8631	19.9850	20.2241	20.5671	20.8491	20.9732	20.9954	20.9899	20.8810	20.5142	20.1328	19.8433 (87)
Th 2	20.0751	20.0772	20.0793	20.0892	20.0910	20.0996	20.0996	20.1012	20.0963	20.0910	20.0873	20.0834 (88)
util rest of house	0.9989	0.9975	0.9913	0.9559	0.8241	0.5918	0.4072	0.4838	0.8197	0.9821	0.9975	0.9992 (89)
MIT 2	19.0280	19.1515	19.3911	19.7346	19.9896	20.0875	20.0984	20.0982	20.0269	19.6891	19.3075	19.0151 (90)
Living area fraction												0.1855 (91)
MIT	19.1829	19.3061	19.5456	19.8890	20.1490	20.2517	20.2648	20.2636	20.1853	19.8422	19.4606	19.1687 (92)
Temperature adjustment												0.0000
adjusted MIT	19.1829	19.3061	19.5456	19.8890	20.1490	20.2517	20.2648	20.2636	20.1853	19.8422	19.4606	19.1687 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9985	0.9967	0.9895	0.9526	0.8273	0.6063	0.4261	0.5040	0.8266	0.9798	0.9968	0.9988 (94)
Useful gains	359.9617	403.9241	461.8978	527.1886	518.3329	383.5460	254.2445	265.9274	371.7297	372.1886	344.9888	342.3720 (95)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

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												
Month fracti	1068.1975	1031.3502	931.6232	775.5365	594.9538	393.8496	255.3855	268.7172	425.7778	650.8070	874.3228	1063.7742 (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	526.9275	421.6303	349.4757	178.8105	57.0060	0.0000	0.0000	0.0000	0.0000	207.2921	381.1205	536.7232 (98)
Space heating per m2												(98) / (4) = 37.4136 (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												
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	655.0558	515.6822	528.5915	0.0000	0.0000	0.0000	0.0000 (100)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.9298	0.9662	0.9426	0.0000	0.0000	0.0000	0.0000 (101)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	609.0762	498.2534	498.2603	0.0000	0.0000	0.0000	0.0000 (102)
Month fracti	0.0000	0.0000	0.0000	0.0000	0.0000	823.9521	780.2947	700.9401	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	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	0.0000	0.0000	0.0000	0.0000	0.0000	154.7106	209.8388	150.7938	0.0000	0.0000	0.0000	0.0000 (104)
Space cooling												515.3432 (104)
Cooled fraction												FC = cooled area / (4) = 1.0000 (105)
Intermittency factor (Table 10b)												
Intermittency factor	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)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	38.6777	52.4597	37.6984	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling												128.8358 (107)
Space cooling per m2												1.8128 (108)
Energy for space heating												37.4136 (99)
Energy for space cooling												1.8128 (108)
Total												39.2264 (109)
Dwelling Fabric Energy Efficiency (DFEE)												39.2 (109)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



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 (m2)	Storey height (m)	Volume (m3)
Ground floor	71.0700 (1b)	2.5400 (2b)	180.5178 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	71.0700		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	180.5178 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour
Number of chimneys	0	0	0	0 * 40 =	0.0000 (6a)
Number of open flues	0	0	0	0 * 20 =	0.0000 (6b)
Number of intermittent fans				3 * 10 =	30.0000 (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) =				30.0000 / (5) =	0.1662 (8)
Pressure test				Yes	
Measured/design AP50					5.0000
Infiltration rate					0.4162 (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) =		0.3538 (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	0.4510	0.4422	0.4334	0.3891	0.3803	0.3361	0.3361	0.3272	0.3538	0.3803	0.3980	0.4157 (22b)
Effective ac	0.6017	0.5978	0.5939	0.5757	0.5723	0.5565	0.5565	0.5535	0.5626	0.5723	0.5792	0.5864 (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
TER Opaque door			1.8900	1.0000	1.8900		(26)
TER Opening Type (Uw = 1.40)			12.8800	1.3258	17.0758		(27)
Heat Loss Floor 1			0.8100	0.1300	0.1053		(28b)
External Wall	47.9000	12.8800	35.0200	0.1800	6.3036		(29a)
Sheltered Wall	15.2100	1.8900	13.3200	0.1800	2.3976		(29a)
Total net area of external elements Aum(A, m2)			63.9200				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		27.7723		(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							7.5539 (36)
Total fabric heat loss							(33) + (36) = 35.3262 (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	35.8450	35.6097	35.3791	34.2958	34.0931	33.1495	33.1495	32.9748	33.5130	34.0931	34.5031	34.9318 (38)
Heat transfer coeff	71.1712	70.9359	70.7052	69.6219	69.4192	68.4757	68.4757	68.3010	68.8391	69.4192	69.8293	70.2579 (39)
Average = Sum(39)m / 12 =												69.6209 (39)
HLP	1.0014	0.9981	0.9949	0.9796	0.9768	0.9635	0.9635	0.9610	0.9686	0.9768	0.9825	0.9886 (40)
HLP (average)												0.9796 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												2.2718 (42)
Average daily hot water use (litres/day)												88.1557 (43)
Daily hot water use	96.9713	93.4450	89.9188	86.3926	82.8664	79.3401	79.3401	82.8664	86.3926	89.9188	93.4450	96.9713 (44)
Energy conte	143.8056	125.7733	129.7868	113.1513	108.5713	93.6888	86.8164	99.6231	100.8130	117.4878	128.2471	139.2680 (45)
Energy content (annual)												Total = Sum(45)m = 1387.0325 (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)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

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	0.0000	(59)
Heat gains from water heating, kWh/month	30.5587	26.7268	27.5797	24.0446	23.0714	19.9089	18.4485	21.1699	21.4228	24.9662	27.2525	29.5945	29.5945	(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	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	18.1714	16.1397	13.1257	9.9370	7.4280	6.2710	6.7761	8.8078	11.8218	15.0105	17.5195	18.6765	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	199.7814	201.8545	196.6303	185.5087	171.4697	158.2749	149.4601	147.3870	152.6111	163.7327	177.7718	190.9665	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	(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)	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	(71)
Water heating gains (Table 5)	41.0735	39.7721	37.0695	33.3953	31.0100	27.6512	24.7964	28.4542	29.7538	33.5567	37.8507	39.7775	(72)
Total internal gains	316.1036	314.8435	303.9028	285.9183	266.9849	249.2745	238.1098	241.7262	251.2640	269.3772	290.2193	306.4977	(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							
Northeast	7.7300	11.2829	0.6300	0.7000	0.7700	26.6547 (75)							
Northwest	5.1500	11.2829	0.6300	0.7000	0.7700	17.7583 (81)							
Solar gains	44.4130	90.4039	162.8791	267.4943	359.5648	383.3342	358.6013	285.8811	198.4708	110.4808	55.8830	36.2699	(83)
Total gains	360.5166	405.2475	466.7819	553.4126	626.5498	632.6087	596.7111	527.6073	449.7348	379.8580	346.1023	342.7676	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation factor for gains for living area, nil,m (see Table 9a)													21.0000 (85)
tau	69.3457	69.5758	69.8027	70.8888	71.0958	72.0754	72.0754	72.2598	71.6949	71.0958	70.6783	70.2471	
alpha	5.6230	5.6384	5.6535	5.7259	5.7397	5.8050	5.8050	5.8173	5.7797	5.7397	5.7119	5.6831	
util living area	0.9991	0.9981	0.9936	0.9671	0.8641	0.6652	0.5001	0.5833	0.8747	0.9880	0.9982	0.9994	(86)
MIT	19.8749	19.9976	20.2365	20.5810	20.8578	20.9762	20.9961	20.9912	20.8885	20.5270	20.1479	19.8594	(87)
Th 2	20.0821	20.0849	20.0876	20.1003	20.1027	20.1139	20.1139	20.1159	20.1096	20.1027	20.0979	20.0929	(88)
util rest of house	0.9989	0.9975	0.9912	0.9547	0.8195	0.5844	0.4020	0.4775	0.8147	0.9817	0.9975	0.9992	(89)
MIT 2	19.0457	19.1704	19.4104	19.7575	20.0075	20.1031	20.1129	20.1134	20.0449	19.7114	19.3313	19.0389	(90)
Living area fraction										fLA = Living area / (4) =			0.1855 (91)
MIT	19.1994	19.3238	19.5636	19.9102	20.1652	20.2650	20.2767	20.2762	20.2014	19.8627	19.4828	19.1911	(92)
Temperature adjustment													0.0000
adjusted MIT	19.1994	19.3238	19.5636	19.9102	20.1652	20.2650	20.2767	20.2762	20.2014	19.8627	19.4828	19.1911	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	359.9643	403.9239	461.8574	526.5917	515.6539	378.8160	250.7872	262.3353	369.6106	372.0556	344.9886	342.3754	(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	1060.4110	1023.1626	923.6630	766.5508	587.6442	387.9176	251.7614	264.7453	420.0123	643.0081	864.6797	1053.2411	(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	521.1323	416.1284	343.5833	172.7706	53.5608	0.0000	0.0000	0.0000	0.0000	201.5887	374.1776	528.8841	(98)
Space heating												2611.8258	(98)
Space heating per m2												36.7500	(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	643.6716	506.7202	519.0874	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9359	0.9698	0.9481	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	602.3919	491.4150	492.1429	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	823.9521	780.2947	700.9401	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	159.5234	214.9265	155.3451	0.0000	0.0000	0.0000	0.0000	(104)
Space cooling													529.7950
Cooled fraction													1.0000
Intermittency factor (Table 10b)													fc = cooled area / (4) =

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

Space cooling kWh	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)
Space cooling	0.0000	0.0000	0.0000	0.0000	0.0000	39.8808	53.7316	38.8363	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling per m2													132.4488 (107)
Energy for space heating													1.8636 (108)
Energy for space cooling													36.7500 (99)
Total													1.8636 (108)
Target Fabric Energy Efficiency (TFEE)													38.6137 (109)
													44.4 (109)

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)



Property Reference	TPB13 01-F8		Issued on Date	12/11/2019	
Assessment Reference	001	Prop Type Ref			
Property	01-F8, Building 13				
SAP Rating	84 B	DER	17.53	TER	17.42
Environmental	87 B	% DER<TER	-0.64		
CO₂ Emissions (t/year)	1.05	DFEE	39.23	TFEE	44.41
General Requirements Compliance	Fail	% DFEE<TFEE	11.66		
Assessor Details	Mr. Harry Davey, energytest, Tel: 01892 315466, hdavey@energy-test.co.uk			Assessor ID	R434-0001
Client					

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Criterion 1 – Achieving the TER and TFEE rate

1a TER and DER

Fuel for main heating	Mains gas		
Fuel factor	1.00 (mains gas)		
Target Carbon Dioxide Emission Rate (TER)	17.42	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	17.53	kgCO ₂ /m ²	
Excess emissions	0.11 (0.6%)	kgCO ₂ /m ²	Fail

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	44.41	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	39.23	kWh/m ² /yr	
	-5.2 (-11.7%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.19 (max. 0.30)	0.23 (max. 0.70)	Pass
Party wall	0.00 (max. 0.20)	-	Pass
Floor	0.26 (max. 0.25)	0.26 (max. 0.70)	Fail
Openings	1.31 (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	4.00 (design value)	
Maximum	10.0	Pass

Limiting System Efficiencies

4 Heating efficiency

Main heating system	Boiler system with radiators or underfloor - Mains gas Data from database Worcester Greenstar 37 CDi Combi boiler Efficiency: 89.4% SEDBUK2009 Minimum: 88.0%	Pass
Secondary heating system	None	

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)



5 Cylinder insulation

Hot water storage

6 Controls

Space heating controls

Hot water controls

Boiler interlock

7 Low energy lights

Percentage of fixed lights with low-energy fittings %

Minimum %

8 Mechanical ventilation

Continuous extract system

Specific fan power

Maximum

Criterion 3 – Limiting the effects of heat gains in summer

9 Summertime temperature

Overheating risk (Thames Valley)

Based on:

Overshading

Windows facing North East

Windows facing North West

Air change rate

Blinds/curtains

Criterion 4 – Building performance consistent with DER and DFEE rate

Party Walls

Type	U-value	W/m ² K	
Filled Cavity with Edge Sealing	<input type="text" value="0.00"/>	W/m ² K	<input type="text" value="Pass"/>

Air permeability and pressure testing

3 Air permeability

Air permeability at 50 pascals

Maximum

10 Key features

Party wall U-value W/m²K

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

BLOCK COMPLIANCE

Calculation Type: New Build (As Designed)



Block Reference	TP Bd 13	Issued on Date	12/11/2019
Block Name			
Assessor Details	Mr. Harry Davey, energytest, Tel: 01892 315466, hdavey@energy-test.co.uk	Assessor ID	R434-0001
Client			

Block Compliance Report - DER

Block Reference: TP Bd 13		Block Name:		
Property-Assessment Reference	Multiplier	Floor Area (m ²)	DER (kgCO ₂ /m ²)	TER (kgCO ₂ /m ²)
TPB13 00-F1-001	1	54.15	-67.48	19.85
TPB13 00-F2-001	1	59.47	18.07	17.93
TPB13 00-F3-001	1	104.68	15.98	16.14
TPB13 00-F4-001	1	55.38	20.16	20.03
TPB13 01-F5-001	1	54.15	18.09	17.82
TPB13 01-F6-001	1	71.45	14.92	14.93
TPB13 01-F7-001	1	75.65	15.08	15.17
TPB13 01-F8-001	1	71.07	17.53	17.42
TPB13 02-F9-001	1	54.15	17.98	17.72
TPB13 02-F10-001	1	71.45	15.04	15.05
TPB13 02-F11-001	1	75.65	15.17	15.22
TPB13 02-F12-001	1	71.07	17.19	17.11
TPB13 03-F13-001	1	54.04	19.51	19.58
TPB13 03-F14-001	1	76.28	16.41	16.86
TPB13 03-F15-001	1	76.28	16.88	17.32
TPB13 03-F16-001	1	54.04	20.46	20.50
Totals:	16	1078.96	190.99	278.65
Average DER = 12.75 kgCO ₂ /m ²			PASS	
Average TER = 17.18 kgCO ₂ /m ²				

BLOCK COMPLIANCE

Calculation Type: New Build (As Designed)



Block Compliance Report - DFEE

Block Reference: TP Bd 13		Block Name:		
Property-Assessment Reference	Multiplier	Floor Area (m ²)	DFEE (kWh/m ² /yr)	TFEE (kWh/m ² /yr)
TPB13 00-F1-001	1	54.15	43.76	50.16
TPB13 00-F2-001	1	59.47	36.83	42.09
TPB13 00-F3-001	1	104.68	38.96	45.58
TPB13 00-F4-001	1	55.38	45.39	52.23
TPB13 01-F5-001	1	54.15	36.20	40.45
TPB13 01-F6-001	1	71.45	27.81	31.60
TPB13 01-F7-001	1	75.65	29.59	33.52
TPB13 01-F8-001	1	71.07	39.23	44.41
TPB13 02-F9-001	1	54.15	35.11	39.10
TPB13 02-F10-001	1	71.45	27.78	31.51
TPB13 02-F11-001	1	75.65	29.68	33.40
TPB13 02-F12-001	1	71.07	37.04	41.86
TPB13 03-F13-001	1	54.04	41.82	48.85
TPB13 03-F14-001	1	76.28	35.32	42.13
TPB13 03-F15-001	1	76.28	37.33	44.45
TPB13 03-F16-001	1	54.04	45.88	53.53
Totals:	16	1078.96	587.71	674.84
Average DFEE = 36.30 kWh/m ² /yr			PASS	
Average TFEE = 41.73 kWh/m ² /yr				