

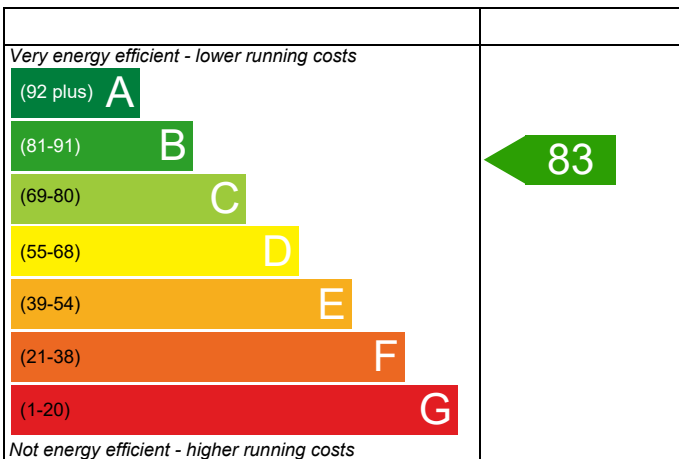
00-F1, Building 12

Dwelling type: Flat, Semi-Detached  
 Date of assessment: 12/11/2019  
 Produced by: Harry Davey  
 Total floor area: 54.15 m<sup>2</sup>  
 DRRN: 9929-6922-1983

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 (CO<sub>2</sub>) emissions.

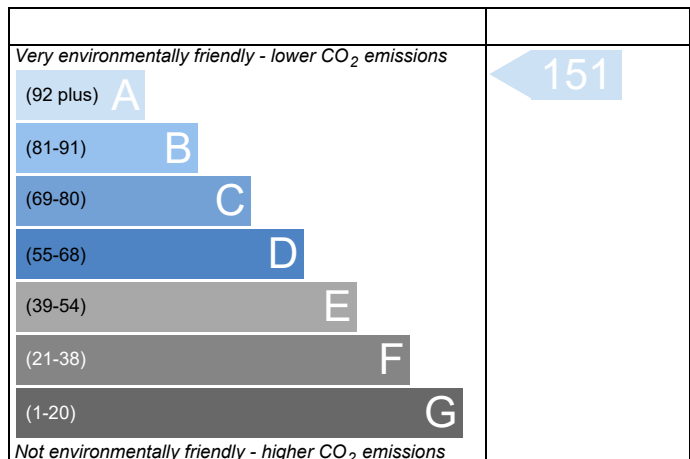
## Energy Efficiency Rating



**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 (CO<sub>2</sub>) 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 (CO<sub>2</sub>) 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	TPB12 00-F1			Issued on Date	12/11/2019
Assessment Reference	001	Prop Type Ref			
Property	00-F1, Building 12				
SAP Rating	83 B	DER	-67.48	TER	19.85
Environmental	151 A	% DER<TER	440.01		
CO <sub>2</sub> Emissions (t/year)	-4.16	DFEE	43.76	TFEE	50.16
General Requirements Compliance	Fail	% DFEE<TFEE	12.75		
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

Ground-floor flat, total floor area 54 m<sup>2</sup>

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) 19.85 kgCO<sub>2</sub>/m<sup>2</sup>  
Dwelling Carbon Dioxide Emission Rate (DER)-67.48 kgCO<sub>2</sub>/m<sup>2</sup>OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)50.2 kWh/m<sup>2</sup>/yr  
Dwelling Fabric Energy Efficiency (DFEE)43.8 kWh/m<sup>2</sup>/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	0.10 (max. 0.25)	0.10 (max. 0.70)	OK
Roof (no roof)			
Openings	1.32 (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 South West: 5.15 m<sup>2</sup>, No overhang

Windows facing North West: 3.42 m<sup>2</sup>, 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/m<sup>2</sup>K

Floor U-value 0.10 W/m<sup>2</sup>K

Photovoltaic array 12.00 kW

# 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 (m2)	Storey height (m)	Volume (m3)
Ground floor	54.1500 (1b)	x 2.5400 (2b)	= 137.5410 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.1500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 137.5410 (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				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:												
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 m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Window (Uw = 1.30)			8.5700	1.2357	10.5903		(27)
Door to corridor			1.8900	1.4000	2.6460		(26)
Ground Floor			54.1500	0.1000	5.4150		(28a)
External Wall	40.4600	8.5700	31.8900	0.1700	5.4213		(29a)
Sheltered Wall	15.2100	1.8900	13.3200	0.2343	3.1207		(29a)
Total net area of external elements Aum(A, m2)			109.8200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	27.1933		(33)
Party Wall			19.5100	0.0000	0.0000		(32)
Party Ceilings 1			54.1400				(32b)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							10.1196 (36)
Total fabric heat loss						(33) + (36) =	37.3129 (37)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	22.6943	22.6943	22.6943	22.6943	22.6943	22.6943	22.6943	22.6943	22.6943	22.6943	22.6943	22.6943 (38)
Heat transfer coeff	60.0072	60.0072	60.0072	60.0072	60.0072	60.0072	60.0072	60.0072	60.0072	60.0072	60.0072	60.0072 (39)
Average = Sum(39)m / 12 =												60.0072 (39)
HLP	1.1082	1.1082	1.1082	1.1082	1.1082	1.1082	1.1082	1.1082	1.1082	1.1082	1.1082	1.1082 (40)
HLP (average)												1.1082 (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												1.8124 (42)
Average daily hot water use (litres/day)												77.2448 (43)
Daily hot water use	84.9693	81.8795	78.7897	75.6999	72.6101	69.5203	69.5203	72.6101	75.6999	78.7897	81.8795	84.9693 (44)
Energy conte	126.0070	110.2065	113.7233	99.1467	95.1336	82.0931	76.0713	87.2929	88.3355	102.9465	112.3742	122.0311 (45)
Energy content (annual)												Total = Sum(45)m = 1215.3616 (45)
Distribution loss (46)m = 0.15 x (45)m	18.9011	16.5310	17.0585	14.8720	14.2700	12.3140	11.4107	13.0939	13.2503	15.4420	16.8561	18.3047 (46)

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)



### CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Combi loss	43.2994	37.6870	40.1504	37.3315	37.0013	34.2840	35.4268	37.0013	37.3315	40.1504	40.3789	43.2994	(61)
Total heat required for water heating calculated for each month	169.3064	147.8935	153.8736	136.4782	132.1349	116.3771	111.4981	124.2943	125.6670	143.0969	152.7531	165.3305	(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	169.3064	147.8935	153.8736	136.4782	132.1349	116.3771	111.4981	124.2943	125.6670	143.0969	152.7531	165.3305	(64)
Heat gains from water heating, kWh/month	52.7222	46.0654	47.8506	42.2991	40.8823	35.8669	34.1504	38.2752	38.7044	44.2673	47.4591	51.4002	(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	90.6206	90.6206	90.6206	90.6206	90.6206	90.6206	90.6206	90.6206	90.6206	90.6206	90.6206	90.6206	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	14.7266	13.0800	10.6374	8.0532	6.0199	5.0822	5.4915	7.1381	9.5807	12.1649	14.1983	15.1359	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	157.9924	159.6319	155.5005	146.7052	135.6028	125.1680	118.1970	116.5575	120.6889	129.4842	140.5866	151.0214	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.0621	32.0621	32.0621	32.0621	32.0621	32.0621	32.0621	32.0621	32.0621	32.0621	32.0621	32.0621	(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)	-72.4965	-72.4965	-72.4965	-72.4965	-72.4965	-72.4965	-72.4965	-72.4965	-72.4965	-72.4965	-72.4965	-72.4965	(71)
Water heating gains (Table 5)	70.8631	68.5497	64.3153	58.7488	54.9493	49.8152	45.9011	51.4452	53.7561	59.4991	65.9155	69.0863	(72)
Total internal gains	296.7684	294.4478	283.6394	266.6934	249.7581	233.2516	222.7758	228.3270	237.2120	254.3344	273.8866	288.4297	(73)

#### 6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access	Gains							
	m2	Table 6a	Specific data	Specific data	factor	W							
		W/m2	or Table 6b	or Table 6c	Table 6d								
Southwest	5.1500	36.7938	0.6300	0.7000	0.7700	57.9101 (79)							
Northwest	3.4200	11.2829	0.6300	0.7000	0.7700	11.7929 (81)							
Solar gains	69.7030	122.6470	178.2156	238.2574	282.7863	287.7432	274.5013	240.2103	198.8399	138.3565	84.2014	59.1896	(83)
Total gains	366.4713	417.0949	461.8550	504.9509	532.5444	520.9948	497.2771	468.5373	436.0518	392.6908	358.0880	347.6193	(84)

#### 7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Thl (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	62.6661	62.6661	62.6661	62.6661	62.6661	62.6661	62.6661	62.6661	62.6661	62.6661	62.6661	62.6661	
alpha	5.1777	5.1777	5.1777	5.1777	5.1777	5.1777	5.1777	5.1777	5.1777	5.1777	5.1777	5.1777	
util living area	0.9965	0.9926	0.9820	0.9480	0.8571	0.6900	0.5214	0.5729	0.8157	0.9643	0.9928	0.9974	(86)
MIT	20.1127	20.2239	20.4015	20.6233	20.8144	20.9154	20.9413	20.9376	20.8711	20.6259	20.3202	20.0806	(87)
Th 2	19.9942	19.9942	19.9942	19.9942	19.9942	19.9942	19.9942	19.9942	19.9942	19.9942	19.9942	19.9942	(88)
util rest of house	0.9954	0.9902	0.9758	0.9295	0.8085	0.6002	0.4072	0.4558	0.7397	0.9477	0.9900	0.9965	(89)
MIT 2	18.8097	18.9714	19.2280	19.5404	19.7885	19.8962	19.9151	19.9133	19.8576	19.5496	19.1125	18.7629	(90)
Living area fraction	19.1268	19.2762	19.5136	19.8039	20.0382	20.1443	20.1649	20.1626	20.1043	19.8116	19.4065	19.0836	(92)
Temperature adjustment	19.1268	19.2762	19.5136	19.8039	20.0382	20.1443	20.1649	20.1626	20.1043	19.8116	19.4065	19.0836	(93)

#### 8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9940	0.9879	0.9720	0.9252	0.8109	0.6144	0.4271	0.4761	0.7491	0.9439	0.9877	0.9954	(94)
Ext temp.	364.2796	412.0360	448.9125	467.2052	431.8450	320.1198	212.3637	223.0843	326.6416	370.6618	353.6899	346.0109	(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	889.7159	862.6770	780.9116	654.3150	500.3495	332.6975	213.9178	225.7840	360.2984	552.7610	738.4758	893.1222	(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	390.9246	302.8307	247.0073	134.7191	50.9674	0.0000	0.0000	0.0000	0.0000	135.4819	277.0459	407.0508	(98)
												1946.0276	(98)
												35.9377	(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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
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													2085.7745 (211)
Space heating requirement	390.9246	302.8307	247.0073	134.7191	50.9674	0.0000	0.0000	0.0000	0.0000	135.4819	277.0459	407.0508	(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)	418.9974	324.5774	264.7452	144.3935	54.6274	0.0000	0.0000	0.0000	0.0000	145.2110	296.9409	436.2817	(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	169.3064	147.8935	153.8736	136.4782	132.1349	116.3771	111.4981	124.2943	125.6670	143.0969	152.7531	165.3305	(64)
Efficiency of water heater (217)m	86.9893	86.7167	86.1363	84.9182	82.7772	80.2000	80.2000	80.2000	80.2000	84.8135	86.4315	87.1305	(216)
Fuel for water heating, kWh/month	194.6290	170.5480	178.6398	160.7172	159.6273	145.1086	139.0251	154.9804	156.6920	168.7194	176.7331	189.7503	(219)
Water heating fuel used													1995.1700 (219)
Annual totals kWh/year													
Space heating fuel - main system													2085.7745 (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)													52.3536 (230a)
central heating pump													30.0000 (230c)
main heating flue fan													45.0000 (230e)
Total electricity for the above, kWh/year													127.3536 (231)
Electricity for lighting (calculated in Appendix L)													260.0764 (232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV Unit 0 (0.80 * 12.00 * 951 * 1.00) =													-9125.9136 (233)
Total delivered energy for all uses													-4657.5391 (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	2085.7745	0.2160	450.5273	(261)
Space heating - secondary	0.0000	0.0000	0.0000	(263)
Water heating (other fuel)	1995.1700	0.2160	430.9567	(264)
Space and water heating			881.4840	(265)
Pumps and fans	127.3536	0.5190	66.0965	(267)
Energy for lighting	260.0764	0.5190	134.9796	(268)
Energy saving/generation technologies				
PV Unit	-9125.9136	0.5190	-4736.3492	(269)
Total CO2, kg/year			-3653.7890	(272)
Dwelling Carbon Dioxide Emission Rate (DER)			-67.4800	(273)

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

DER			-67.4800	ZC1
Total Floor Area		TFA	54.1500	
Assumed number of occupants		N	1.8124	
CO2 emission factor in Table 12 for electricity displaced from grid		EF	0.5190	
CO2 emissions from appliances, equation (L14)			17.2896	ZC2
CO2 emissions from cooking, equation (L16)			3.0009	ZC3
Total CO2 emissions			-47.1896	ZC4
Residual CO2 emissions offset from biofuel CHP			0.0000	ZC5
Additional allowable electricity generation, kWh/m <sup>2</sup> /year			0.0000	ZC6
Resulting CO2 emissions offset from additional allowable electricity generation			0.0000	ZC7
Net CO2 emissions			-47.1896	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 (m2)	Storey height (m)	Volume (m3)
Ground floor	54.1500 (1b)	2.5400 (2b)	137.5410 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.1500		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 137.5410 (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				2 * 10 =	20.0000 (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) =				20.0000 / (5) =	0.1454 (8)
Pressure test					Yes
Measured/design AP50					5.0000
Infiltration rate					0.3954 (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) =	0.3361 (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	0.4285	0.4201	0.4117	0.3697	0.3613	0.3193	0.3193	0.3109	0.3361	0.3613	0.3781	0.3949 (22b)
	0.5918	0.5883	0.5848	0.5683	0.5653	0.5510	0.5510	0.5483	0.5565	0.5653	0.5715	0.5780 (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)			8.5700	1.3258	11.3617		(27)
Ground Floor			54.1500	0.1300	7.0395		(28a)
External Wall	40.4600	8.5700	31.8900	0.1800	5.7402		(29a)
Sheltered Wall	15.2100	1.8900	13.3200	0.1800	2.3976		(29a)
Total net area of external elements Aum(A, m2)			109.8200				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 28.4290		(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							7.8810 (36)
Total fabric heat loss							(33) + (36) = 36.3100 (37)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	26.8617	26.6999	26.5413	25.7962	25.6568	25.0079	25.0079	24.8878	25.2579	25.6568	25.9388	26.2336 (38)
Heat transfer coeff	63.1718	63.0099	62.8513	62.1063	61.9669	61.3180	61.3180	61.1978	61.5679	61.9669	62.2489	62.5437 (39)
Average = Sum(39)m / 12 =												62.1056 (39)
HLP	1.1666	1.1636	1.1607	1.1469	1.1444	1.1324	1.1324	1.1302	1.1370	1.1444	1.1496	1.1550 (40)
HLP (average)												1.1469 (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												1.8124 (42)
Average daily hot water use (litres/day)												77.2448 (43)
Daily hot water use	84.9693	81.8795	78.7897	75.6999	72.6101	69.5203	69.5203	72.6101	75.6999	78.7897	81.8795	84.9693 (44)
Energy conte	126.0070	110.2065	113.7233	99.1467	95.1336	82.0931	76.0713	87.2929	88.3355	102.9465	112.3742	122.0311 (45)
Energy content (annual)												Total = Sum(45)m = 1215.3616 (45)
Distribution loss (46)m = 0.15 x (45)m	18.9011	16.5310	17.0585	14.8720	14.2700	12.3140	11.4107	13.0939	13.2503	15.4420	16.8561	18.3047 (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	43.2994	37.6870	40.1504	37.3315	37.0013	34.2840	35.4268	37.0013	37.3315	40.1504	40.3789	43.2994 (61)
Total heat required for water heating calculated for each month	169.3064	147.8935	153.8736	136.4782	132.1349	116.3771	111.4981	124.2943	125.6670	143.0969	152.7531	165.3305 (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	169.3064	147.8935	153.8736	136.4782	132.1349	116.3771	111.4981	124.2943	125.6670	143.0969	152.7531	165.3305 (64)
Heat gains from water heating, kWh/month	52.7222	46.0654	47.8506	42.2991	40.8823	35.8669	34.1504	38.2752	38.7044	44.2673	47.4591	51.4002 (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	90.6206	90.6206	90.6206	90.6206	90.6206	90.6206	90.6206	90.6206	90.6206	90.6206	90.6206	90.6206 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	14.7266	13.0800	10.6374	8.0532	6.0199	5.0822	5.4915	7.1381	9.5807	12.1649	14.1983	15.1359 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	157.9924	159.6319	155.5005	146.7052	135.6028	125.1680	118.1970	116.5575	120.6889	129.4842	140.5866	151.0214 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.0621	32.0621	32.0621	32.0621	32.0621	32.0621	32.0621	32.0621	32.0621	32.0621	32.0621	32.0621 (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)	-72.4965	-72.4965	-72.4965	-72.4965	-72.4965	-72.4965	-72.4965	-72.4965	-72.4965	-72.4965	-72.4965	-72.4965 (71)
Water heating gains (Table 5)	70.8631	68.5497	64.3153	58.7488	54.9493	49.8152	45.9011	51.4452	53.7561	59.4991	65.9155	69.0863 (72)
Total internal gains	296.7684	294.4478	283.6394	266.6934	249.7581	233.2516	222.7758	228.3270	237.2120	254.3344	273.8866	288.4297 (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				
Southwest	5.1500	36.7938	0.6300	0.6300	0.7000	0.7700	57.9101 (79)					
Northwest	3.4200	11.2829	0.6300	0.6300	0.7000	0.7700	11.7929 (81)					
Solar gains	69.7030	122.6470	178.2156	238.2574	282.7863	287.7432	274.5013	240.2103	198.8399	138.3565	84.2014	59.1896 (83)
Total gains	366.4713	417.0949	461.8550	504.9509	532.5444	520.9948	497.2771	468.5373	436.0518	392.6908	358.0880	347.6193 (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	59.5268	59.6797	59.8303	60.5481	60.6843	61.3265	61.3265	61.4469	61.0775	60.6843	60.4094	60.1246	
alpha	4.9685	4.9786	4.9887	5.0365	5.0456	5.0884	5.0884	5.0965	5.0718	5.0456	5.0273	5.0083	
util living area	0.9966	0.9929	0.9831	0.9513	0.8657	0.6998	0.5312	0.5821	0.8242	0.9662	0.9930	0.9974 (86)	
MIT	19.8073	19.9614	20.2084	20.5295	20.7999	20.9515	20.9902	20.9847	20.8863	20.5399	20.1160	19.7801 (87)	
Th 2	19.9468	19.9492	19.9516	19.9627	19.9648	19.9745	19.9745	19.9763	19.9707	19.9648	19.9606	19.9562 (88)	
util rest of house	0.9954	0.9905	0.9772	0.9334	0.8179	0.6085	0.4133	0.4619	0.7484	0.9502	0.9902	0.9965 (89)	
MIT 2	18.3674	18.5933	18.9523	19.4144	19.7700	19.9425	19.9709	19.9701	19.8813	19.4380	18.8276	18.3343 (90)	
Living area fraction												fLA = Living area / (4) = 0.2434 (91)	
MIT	18.7179	18.9263	19.2580	19.6858	20.0207	20.1881	20.2190	20.2170	20.1259	19.7062	19.1412	18.6862 (92)	
Temperature adjustment													0.0000
adjusted MIT	18.7179	18.9263	19.2580	19.6858	20.0207	20.1881	20.2190	20.2170	20.1259	19.7062	19.1412	18.6862 (93)	

#### 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9935	0.9873	0.9719	0.9275	0.8208	0.6287	0.4421	0.4913	0.7613	0.9450	0.9871	0.9949 (94)	
Useful gains	364.0839	411.7958	448.8863	468.3602	437.1207	327.5661	219.8701	230.1718	331.9794	371.1089	353.4732	345.8465 (95)	
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.4000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)	
Heat loss rate W	910.8028	883.7960	801.8601	669.8661	515.6069	342.6508	221.9100	233.5947	371.0041	564.2828	749.5515	906.0204 (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	406.7589	317.1841	262.6124	145.0842	58.3937	0.0000	0.0000	0.0000	0.0000	143.7214	285.1764	416.7694 (98)	
Space heating													2035.7005 (98)
Space heating per m2													(98) / (4) = 37.5937 (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													2179.5508 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	406.7589	317.1841	262.6124	145.0842	58.3937	0.0000	0.0000	0.0000	0.0000	143.7214	285.1764	416.7694	(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)	435.5020	339.5976	281.1696	155.3364	62.5200	0.0000	0.0000	0.0000	0.0000	153.8773	305.3280	446.2199	(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	169.3064	147.8935	153.8736	136.4782	132.1349	116.3771	111.4981	124.2943	125.6670	143.0969	152.7531	165.3305	(64)
Efficiency of water heater (217)m	87.1774	86.9233	86.3857	85.2053	83.1471	80.3000	80.3000	80.3000	80.3000	85.0622	86.6006	87.2819	(217)
Fuel for water heating, kWh/month	194.2092	170.1425	178.1240	160.1757	158.9170	144.9279	138.8519	154.7874	156.4968	168.2262	176.3880	189.4212	(219)
Water heating fuel used													1990.6678 (219)
Annual totals kWh/year													
Space heating fuel - main system													2179.5508 (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)													260.0764 (232)
Total delivered energy for all uses													4505.2950 (238)

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 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	2179.5508	0.2160	470.7830 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1990.6678	0.2160	429.9842 (264)
Space and water heating			900.7672 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	260.0764	0.5190	134.9796 (268)
Total CO2, kg/m2/year			1074.6719 (272)
Emissions per m2 for space and water heating			16.6347 (272a)
Fuel factor (mains gas)			1.0000
Emissions per m2 for lighting			2.4927 (272b)
Emissions per m2 for pumps and fans			0.7188 (272c)
Target Carbon Dioxide Emission Rate (TER) = (16.6347 * 1.00) + 2.4927 + 0.7188, rounded to 2 d.p.			19.8500 (273)

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)



Property Reference	TPB12 00-F1	Issued on Date	12/11/2019
Assessment Reference	001	Prop Type Ref	
Property	00-F1, Building 12		

SAP Rating	83 B	DER	-67.48	TER	19.85
Environmental	151 A	% DER<TER	440.01		
CO <sub>2</sub> Emissions (t/year)	-4.16	DFEE	43.76	TFEE	50.16
General Requirements Compliance	Fail	% DFEE<TFEE	12.75		

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 <sup>2</sup> )	Storey height (m)	Volume (m <sup>3</sup> )
Ground floor	54.1500 (1b)	x 2.5400 (2b)	= 137.5410 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.1500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 137.5410 (5)

#### 2. Ventilation rate

	main heating	secondary heating	other	total	m <sup>3</sup> 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) =	0.1454 (8)
Pressure test				Yes	
Measured/design AP50				4.0000	
Infiltration rate				0.3454	(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) =	0.2936 (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	0.3743	0.3670	0.3597	0.3230	0.3156	0.2789	0.2789	0.2716	0.2936	0.3156	0.3303	0.3450 (22b)
Effective ac	0.5701	0.5673	0.5647	0.5522	0.5498	0.5389	0.5389	0.5369	0.5431	0.5498	0.5545	0.5595 (25)

#### 3. Heat losses and heat loss parameter

Element	Gross m <sup>2</sup>	Openings m <sup>2</sup>	NetArea m <sup>2</sup>	U-value W/m <sup>2</sup> K	A x U W/K	K-value kJ/m <sup>2</sup> K	A x K kJ/K					
Window (Uw = 1.30)			8.5700	1.2357	10.5903		(27)					
Door to corridor			1.8900	1.4000	2.6460		(26)					
Ground Floor			54.1500	0.1000	5.4150		(28a)					
External Wall	40.4600	8.5700	31.8900	0.1700	5.4213		(29a)					
Sheltered Wall	15.2100	1.8900	13.3200	0.2343	3.1207		(29a)					
Total net area of external elements Aum(A, m <sup>2</sup> )			109.8200				(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	27.1933		(33)					
Party Wall			19.5100	0.0000	0.0000		(32)					
Party Ceilings 1			54.1400				(32b)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m <sup>2</sup> K							250.0000 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							10.1196 (36)					
Total fabric heat loss							(33) + (36) = 37.3129 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	25.8744	25.7509	25.6299	25.0613	24.9550	24.4598	24.4598	24.3681	24.6505	24.9550	25.1702	25.3951 (38)
Heat transfer coeff	63.1873	63.0638	62.9428	62.3742	62.2679	61.7727	61.7727	61.6810	61.9634	62.2679	62.4831	62.7080 (39)
Average = Sum(39)m / 12 =												62.3737 (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	1.1669	1.1646	1.1624	1.1519	1.1499	1.1408	1.1408	1.1391	1.1443	1.1499	1.1539	1.1580 (40)
HLP (average)												1.1519 (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												1.8124 (42)
Average daily hot water use (litres/day)												77.2448 (43)
Daily hot water use	84.9693	81.8795	78.7897	75.6999	72.6101	69.5203	69.5203	72.6101	75.6999	78.7897	81.8795	84.9693 (44)
Energy content (annual)	126.0070	110.2065	113.7233	99.1467	95.1336	82.0931	76.0713	87.2929	88.3355	102.9465	112.3742	122.0311 (45)
Energy content (annual)												Total = Sum(45)m = 1215.3616 (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	26.7765	23.4189	24.1662	21.0687	20.2159	17.4448	16.1652	18.5497	18.7713	21.8761	23.8795	25.9316 (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	90.6206	90.6206	90.6206	90.6206	90.6206	90.6206	90.6206	90.6206	90.6206	90.6206	90.6206	90.6206 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	14.7266	13.0800	10.6374	8.0532	6.0199	5.0822	5.4915	7.1381	9.5807	12.1649	14.1983	15.1359 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	157.9924	159.6319	155.5005	146.7052	135.6028	125.1680	118.1970	116.5575	120.6889	129.4842	140.5866	151.0214 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.0621	32.0621	32.0621	32.0621	32.0621	32.0621	32.0621	32.0621	32.0621	32.0621	32.0621	32.0621 (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)	-72.4965	-72.4965	-72.4965	-72.4965	-72.4965	-72.4965	-72.4965	-72.4965	-72.4965	-72.4965	-72.4965	-72.4965 (71)
Water heating gains (Table 5)	35.9899	34.8495	32.4814	29.2620	27.1719	24.2289	21.7274	24.9325	26.0712	29.4034	33.1660	34.8543 (72)
Total internal gains	258.8951	257.7476	248.8055	234.2066	218.9807	204.6653	195.6020	198.8142	206.5271	221.2387	238.1371	251.1978 (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						
Southwest	5.1500	36.7938	0.6300	0.7000	0.7700	57.9101 (79)						
Northwest	3.4200	11.2829	0.6300	0.7000	0.7700	11.7929 (81)						
Solar gains	69.7030	122.6470	178.2156	238.2574	282.7863	287.7432	274.5013	240.2103	198.8399	138.3565	84.2014	59.1896 (83)
Total gains	328.5981	380.3947	427.0211	472.4641	501.7670	492.4085	470.1033	439.0246	405.3669	359.5952	322.3385	310.3874 (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	59.5122	59.6287	59.7434	60.2880	60.3910	60.8751	60.8751	60.9656	60.6877	60.3910	60.1830	59.9671
alpha	4.9675	4.9752	4.9829	5.0192	5.0261	5.0583	5.0583	5.0644	5.0458	5.0261	5.0122	4.9978
util living area	0.9979	0.9953	0.9878	0.9621	0.8877	0.7320	0.5623	0.6193	0.8560	0.9762	0.9956	0.9984 (86)
MIT	19.7424	19.8986	20.1506	20.4796	20.7681	20.9394	20.9871	20.9794	20.8601	20.4857	20.0509	19.7122 (87)
Th 2	19.9466	19.9484	19.9502	19.9587	19.9603	19.9677	19.9677	19.9690	19.9648	19.9603	19.9571	19.9537 (88)
util rest of house	0.9972	0.9936	0.9834	0.9475	0.8442	0.6406	0.4385	0.4937	0.7859	0.9642	0.9938	0.9979 (89)
MIT 2	18.8037	18.9607	19.2119	19.5389	19.8029	19.9397	19.9644	19.9632	19.8870	19.5508	19.1200	18.7793 (90)
Living area fraction										fLA = Living area / (4) =		0.2434 (91)
MIT	19.0322	19.1889	19.4403	19.7678	20.0378	20.1830	20.2133	20.2105	20.1239	19.7783	19.3466	19.0063 (92)
Temperature adjustment												0.0000
adjusted MIT	19.0322	19.1889	19.4403	19.7678	20.0378	20.1830	20.2133	20.2105	20.1239	19.7783	19.3466	19.0063 (93)

#### 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9963	0.9920	0.9805	0.9441	0.8479	0.6612	0.4690	0.5246	0.7984	0.9615	0.9924	0.9972 (94)
Useful gains	327.3903	377.3670	418.7110	446.0752	425.4720	325.5903	220.4655	230.3170	323.6266	345.7557	319.8763	309.5214 (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)

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)



### CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

Heat loss rate W	930.8868	901.1156	814.5009	677.8735	519.1781	344.8767	223.2039	235.0371	373.2590	571.5146	765.2023	928.4769 (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	449.0014	351.9591	294.4677	166.8948	69.7174	0.0000	0.0000	0.0000	0.0000	167.9646	320.6347	460.5029 (98)
Space heating												2281.1425 (98)
Space heating per m2											(98) / (4) =	42.1264 (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	580.6633	457.1179	468.7755	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8750	0.9320	0.9107	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	508.0638	426.0361	426.9249	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	644.0107	616.6504	581.4445	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	97.8818	141.8170	114.9626	0.0000	0.0000	0.0000	0.0000 (104)
Space cooling												354.6614 (104)
Cooled fraction									FC = cooled area / (4) =			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)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	24.4704	35.4543	28.7407	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling												88.6654 (107)
Space cooling per m2												1.6374 (108)
Energy for space heating												42.1264 (99)
Energy for space cooling												1.6374 (108)
Total												43.7638 (109)
Dwelling Fabric Energy Efficiency (DFEE)												43.8 (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	54.1500 (1b)	x 2.5400 (2b)	= 137.5410 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.1500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 137.5410 (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				2 * 10 =	20.0000 (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) =				20.0000 / (5) =	0.1454 (8)
Pressure test				Yes	
Measured/design AP50					5.0000
Infiltration rate					0.3954 (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) =		0.3361 (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	0.4285	0.4201	0.4117	0.3697	0.3613	0.3193	0.3193	0.3109	0.3361	0.3613	0.3781	0.3949 (22b)
	0.5918	0.5883	0.5848	0.5683	0.5653	0.5510	0.5510	0.5483	0.5565	0.5653	0.5715	0.5780 (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)			8.5700	1.3258	11.3617		(27)					
Ground Floor			54.1500	0.1300	7.0395		(28a)					
External Wall	40.4600	8.5700	31.8900	0.1800	5.7402		(29a)					
Sheltered Wall	15.2100	1.8900	13.3200	0.1800	2.3976		(29a)					
Total net area of external elements Aum(A, m2)			109.8200				(31)					
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	28.4290	(33)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							7.8810 (36)					
Total fabric heat loss							(33) + (36) = 36.3100 (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	26.8617	26.6999	26.5413	25.7962	25.6568	25.0079	25.0079	24.8878	25.2579	25.6568	25.9388	26.2336 (38)
Average = Sum(39)m / 12 =	63.1718	63.0099	62.8513	62.1063	61.9669	61.3180	61.3180	61.1978	61.5679	61.9669	62.2489	62.5437 (39)
												62.1056 (39)
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1666	1.1636	1.1607	1.1469	1.1444	1.1324	1.1324	1.1302	1.1370	1.1444	1.1496	1.1550 (40)
Days in month												1.1469 (40)
	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												1.8124 (42)
Average daily hot water use (litres/day)												77.2448 (43)
Daily hot water use	84.9693	81.8795	78.7897	75.6999	72.6101	69.5203	69.5203	72.6101	75.6999	78.7897	81.8795	84.9693 (44)
Energy conte	126.0070	110.2065	113.7233	99.1467	95.1336	82.0931	76.0713	87.2929	88.3355	102.9465	112.3742	122.0311 (45)
Energy content (annual)												Total = Sum(45)m = 1215.3616 (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	26.7765	23.4189	24.1662	21.0687	20.2159	17.4448	16.1652	18.5497	18.7713	21.8761	23.8795	25.9316	(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	90.6206	90.6206	90.6206	90.6206	90.6206	90.6206	90.6206	90.6206	90.6206	90.6206	90.6206	90.6206	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	14.7266	13.0800	10.6374	8.0532	6.0199	5.0822	5.4915	7.1381	9.5807	12.1649	14.1983	15.1359	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	157.9924	159.6319	155.5005	146.7052	135.6028	125.1680	118.1970	116.5575	120.6889	129.4842	140.5866	151.0214	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.0621	32.0621	32.0621	32.0621	32.0621	32.0621	32.0621	32.0621	32.0621	32.0621	32.0621	32.0621	(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)	-72.4965	-72.4965	-72.4965	-72.4965	-72.4965	-72.4965	-72.4965	-72.4965	-72.4965	-72.4965	-72.4965	-72.4965	(71)
Water heating gains (Table 5)	35.9899	34.8495	32.4814	29.2620	27.1719	24.2289	21.7274	24.9325	26.0712	29.4034	33.1660	34.8543	(72)
Total internal gains	258.8951	257.7476	248.8055	234.2066	218.9807	204.6653	195.6020	198.8142	206.5271	221.2387	238.1371	251.1978	(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							
Southwest	5.1500	36.7938	0.6300	0.7000	0.7700	57.9101 (79)							
Northwest	3.4200	11.2829	0.6300	0.7000	0.7700	11.7929 (81)							
Solar gains	69.7030	122.6470	178.2156	238.2574	282.7863	287.7432	274.5013	240.2103	198.8399	138.3565	84.2014	59.1896	(83)
Total gains	328.5981	380.3947	427.0211	472.4641	501.7670	492.4085	470.1033	439.0246	405.3669	359.5952	322.3385	310.3874	(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	59.5268	59.6797	59.8303	60.5481	60.6843	61.3265	61.3265	61.4469	61.0775	60.6843	60.4094	60.1246	
alpha	4.9685	4.9786	4.9887	5.0365	5.0456	5.0884	5.0884	5.0965	5.0718	5.0456	5.0273	5.0083	
util living area	0.9979	0.9953	0.9878	0.9618	0.8866	0.7289	0.5589	0.6156	0.8542	0.9760	0.9956	0.9984	(86)
MIT	19.7428	19.8999	20.1526	20.4845	20.7718	20.9417	20.9877	20.9804	20.8635	20.4905	20.0558	19.7163	(87)
Th 2	19.9468	19.9492	19.9516	19.9627	19.9648	19.9745	19.9745	19.9763	19.9707	19.9648	19.9606	19.9562	(88)
util rest of house	0.9972	0.9936	0.9833	0.9471	0.8430	0.6379	0.4363	0.4912	0.7840	0.9640	0.9938	0.9979	(89)
MIT 2	18.8043	18.9626	19.2150	19.5469	19.8100	19.9476	19.9714	19.9707	19.8949	19.5591	19.1276	18.7853	(90)
Living area fraction										fLA = Living area / (4) =			0.2434 (91)
MIT	19.0327	19.1907	19.4432	19.7751	20.0441	20.1895	20.2187	20.2165	20.1306	19.7858	19.3536	19.0119	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.0327	19.1907	19.4432	19.7751	20.0441	20.1895	20.2187	20.2165	20.1306	19.7858	19.3536	19.0119	(93)

#### 8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9963	0.9920	0.9805	0.9438	0.8469	0.6584	0.4665	0.5218	0.7966	0.9613	0.9924	0.9972	(94)
Useful gains	327.3904	377.3664	418.7015	445.9251	424.9265	324.2155	219.2986	229.0813	322.9082	345.6806	319.8747	309.5226	(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	930.6909	900.4580	813.4956	675.4138	517.0584	342.7387	221.8941	233.5596	371.2926	569.2156	762.7700	926.3906	(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	448.8556	351.5175	293.7268	165.2318	68.5462	0.0000	0.0000	0.0000	0.0000	166.3100	318.8846	458.9498	(98)
Space heating												2272.0223	(98)
Space heating per m2												41.9579	(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	576.3889	453.7529	465.1032	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8784	0.9344	0.9138	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	506.3023	423.9885	424.9908	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	644.0107	616.6504	581.4445	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	99.1501	143.3404	116.4016	0.0000	0.0000	0.0000	0.0000	(104)
Space cooling												358.8921	(104)
Cooled fraction												1.0000	(105)
Intermittency factor (Table 10b)													

# 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	24.7875	35.8351	29.1004	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling per m2												89.7230 (107)
Energy for space heating												1.6569 (108)
Energy for space cooling												41.9579 (99)
Total												1.6569 (108)
Target Fabric Energy Efficiency (TFEE)												43.6149 (109)
												50.2 (109)

# BASIC COMPLIANCE REPORT

## Calculation Type: New Build (As Designed)



<b>Property Reference</b>	TPB12 00-F1	<b>Issued on Date</b>	12/11/2019
<b>Assessment Reference</b>	001	<b>Prop Type Ref</b>	
<b>Property</b>	00-F1, Building 12		

<b>SAP Rating</b>	83 B	<b>DER</b>	-67.48	<b>TER</b>	19.85
<b>Environmental</b>	151 A	<b>% DER&lt;TER</b>	440.01		
<b>CO<sub>2</sub> Emissions (t/year)</b>	-4.16	<b>DFEE</b>	43.76	<b>TFEE</b>	50.16
<b>General Requirements Compliance</b>	Fail	<b>% DFEE&lt;TFEE</b>	12.75		

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

### 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)	19.85	kgCO <sub>2</sub> /m <sup>2</sup>	
Dwelling Carbon Dioxide Emission Rate (DER)	-67.48	kgCO <sub>2</sub> /m <sup>2</sup>	Pass
	-87.33 (-439.9%)	kgCO <sub>2</sub> /m <sup>2</sup>	

##### 1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	50.16	kWh/m <sup>2</sup> /yr	
Dwelling Fabric Energy Efficiency (DFEE)	43.76	kWh/m <sup>2</sup> /yr	
	-6.4 (-12.7%)	kWh/m <sup>2</sup> /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	0.10 (max. 0.25)	0.10 (max. 0.70)	Pass
Openings	1.32 (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 South West

Windows facing North West

Air change rate

Blinds/curtains

## Criterion 4 – Building performance consistent with DER and DFEE rate

### Party Walls

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

Floor U-value  W/m<sup>2</sup>K

Photovoltaic array  kW

*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 12	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 12		Block Name:		
Property-Assessment Reference	Multiplier	Floor Area (m <sup>2</sup> )	DER (kgCO <sub>2</sub> /m <sup>2</sup> )	TER (kgCO <sub>2</sub> /m <sup>2</sup> )
TPB12 00-F1-001	1	54.15	-67.48	19.85
TPB12 00-F2-001	1	59.47	18.07	17.93
TPB12 00-F3-001	1	104.68	15.98	16.14
TPB12 00-F4-001	1	55.38	20.16	20.03
TPB12 01-F5-001	1	54.15	18.51	18.12
TPB12 01-F6-001	1	71.45	15.04	14.97
TPB12 01-F7-001	1	75.65	15.08	15.17
TPB12 01-F8-001	1	71.07	17.53	17.42
TPB12 02-F9-001	1	54.15	17.98	17.72
TPB12 02-F10-001	1	71.45	15.04	15.05
TPB12 02-F11-001	1	75.65	15.17	15.22
TPB12 02-F12-001	1	71.07	17.19	17.11
TPB12 03-F13-001	1	54.04	19.51	19.58
TPB12 03-F14-001	1	76.28	16.41	16.86
TPB12 03-F15-001	1	76.28	16.88	17.32
TPB12 03-F16-001	1	54.04	20.46	20.50
Totals:	16	1078.96	191.53	279.00
Average DER = 12.78 kgCO <sub>2</sub> /m <sup>2</sup>			<b>PASS</b>	
Average TER = 17.20 kgCO <sub>2</sub> /m <sup>2</sup>				

# BLOCK COMPLIANCE

## Calculation Type: New Build (As Designed)



### Block Compliance Report - DFEE

Block Reference: TP Bd 12		Block Name:		
Property-Assessment Reference	Multiplier	Floor Area (m <sup>2</sup> )	DFEE (kWh/m <sup>2</sup> /yr)	TSEE (kWh/m <sup>2</sup> /yr)
TPB12 00-F1-001	1	54.15	43.76	50.16
TPB12 00-F2-001	1	59.47	36.83	42.09
TPB12 00-F3-001	1	104.68	38.96	45.58
TPB12 00-F4-001	1	55.38	45.39	52.23
TPB12 01-F5-001	1	54.15	38.62	42.47
TPB12 01-F6-001	1	71.45	29.63	33.11
TPB12 01-F7-001	1	75.65	29.59	33.52
TPB12 01-F8-001	1	71.07	39.23	44.41
TPB12 02-F9-001	1	54.15	35.11	39.10
TPB12 02-F10-001	1	71.45	27.78	31.51
TPB12 02-F11-001	1	75.65	29.68	33.40
TPB12 02-F12-001	1	71.07	37.04	41.86
TPB12 03-F13-001	1	54.04	41.82	48.85
TPB12 03-F14-001	1	76.28	35.32	42.13
TPB12 03-F15-001	1	76.28	37.33	44.45
TPB12 03-F16-001	1	54.04	45.88	53.53
Totals:	16	1078.96	591.96	678.37
Average DFEE = 36.55 kWh/m <sup>2</sup> /yr			<b>PASS</b>	
Average TSEE = 41.93 kWh/m <sup>2</sup> /yr				