

PREDICTED ENERGY ASSESSMENT



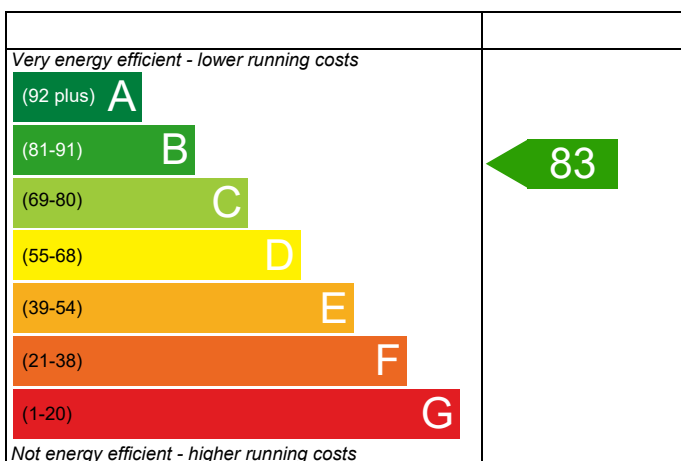
00-F4, Building 12

Dwelling type: Flat, Semi-Detached
 Date of assessment: 12/11/2019
 Produced by: Harry Davey
 Total floor area: 55.38 m²
 DRRN: 7352-9999-9710

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

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

Energy Efficiency Rating

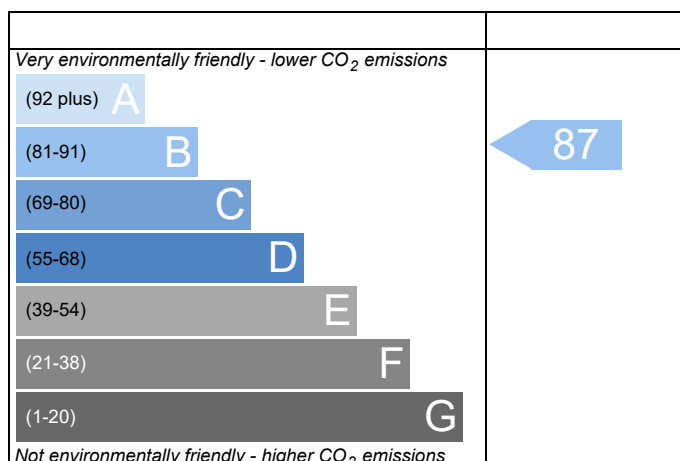


England

EU Directive
2002/91/EC

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

Environmental Impact (CO₂) Rating



England

EU Directive
2002/91/EC

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

This report has 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-F4				Issued on Date	12/11/2019
Assessment Reference	001	Prop Type Ref				
Property	00-F4, Building 12					
SAP Rating	83 B	DER	20.16	TER	20.03	
Environmental	87 B	% DER<TER	-0.63			
CO ₂ Emissions (t/year)	0.95	DFEE	45.39	TFEE	52.23	
General Requirements Compliance	Fail	% DFEE<TFEE	13.08			
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 55 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) 20.03 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 20.16 kgCO₂/m² Fail
Excess emissions =0.13 kgCO₂/m² (0.6%)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 52.2 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE) 45.4 kWh/m²/yr OK

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
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5 Cylinder insulation

Hot water storage	No cylinder
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6 Controls

Space heating controls:	Time and temperature zone control	OK
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Hot water controls:	No cylinder
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Boiler interlock	Yes	OK
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7 Low energy lights

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

8 Mechanical ventilation

Continuous extract system	
Specific fan power:	0.24
Maximum	0.7

9 Summertime temperature

Overheating risk (Thames Valley):	Medium	OK
Based on:		
Overshading:	Average	
Windows facing North East:	5.15 m², No overhang	
Windows facing North West:	5.15 m², No overhang	
Air change rate:	1.80 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
Floor U-value	0.10 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	55.3800 (1b)	x 2.5400 (2b)	= 140.6652 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	55.3800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 140.6652 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					0 * 10 = 0.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(7a)+(7b)+(7c) =				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 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)			10.3000	1.2357	12.7281		(27)
Door to corridor			1.8900	1.4000	2.6460		(26)
Ground Floor			55.3800	0.1000	5.5380		(28a)
External Wall	40.5100	10.3000	30.2100	0.1700	5.1357		(29a)
Sheltered Wall	16.3100	1.8900	14.4200	0.2343	3.3784		(29a)
Total net area of external elements Aum(A, m2)			112.2000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	29.4263		(33)
Party Wall			18.4100	0.0000	0.0000		(32)
Party Ceilings 1			53.3800				(32b)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							7.1215 (36)
Total fabric heat loss						(33) + (36) =	36.5478 (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	23.2098	23.2098	23.2098	23.2098	23.2098	23.2098	23.2098	23.2098	23.2098	23.2098	23.2098	23.2098 (38)
Heat transfer coeff	59.7575	59.7575	59.7575	59.7575	59.7575	59.7575	59.7575	59.7575	59.7575	59.7575	59.7575	59.7575 (39)
Average = Sum(39)m / 12 =												59.7575 (39)
HLP	1.0790	1.0790	1.0790	1.0790	1.0790	1.0790	1.0790	1.0790	1.0790	1.0790	1.0790	1.0790 (40)
HLP (average)												1.0790 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8485 (42)
Average daily hot water use (litres/day)												78.1015 (43)
Daily hot water use	85.9117	82.7876	79.6635	76.5395	73.4154	70.2914	70.2914	73.4154	76.5395	79.6635	82.7876	85.9117 (44)
Energy conte	127.4045	111.4288	114.9845	100.2463	96.1887	83.0036	76.9150	88.2611	89.3152	104.0883	113.6205	123.3845 (45)
Energy content (annual)												Total = Sum(45)m = 1228.8410 (45)
Distribution loss (46)m = 0.15 x (45)m	19.1107	16.7143	17.2477	15.0369	14.4283	12.4505	11.5372	13.2392	13.3973	15.6132	17.0431	18.5077 (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	43.7796	38.1050	40.5957	37.7455	37.4117	34.6642	35.8197	37.4117	37.7455	40.5957	40.8268	43.7796	(61)
Total heat required for water heating calculated for each month	171.1842	149.5338	155.5802	137.9918	133.6004	117.6678	112.7347	125.6728	127.0607	144.6839	154.4472	167.1641	(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	171.1842	149.5338	155.5802	137.9918	133.6004	117.6678	112.7347	125.6728	127.0607	144.6839	154.4472	167.1641	(64)
Heat gains from water heating, kWh/month	53.3069	46.5763	48.3813	42.7683	41.3357	36.2647	34.5292	38.6997	39.1337	44.7583	47.9855	51.9702	(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	92.4242	92.4242	92.4242	92.4242	92.4242	92.4242	92.4242	92.4242	92.4242	92.4242	92.4242	92.4242	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	14.6017	12.9691	10.5472	7.9849	5.9688	5.0391	5.4450	7.0776	9.4995	12.0618	14.0779	15.0076	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	161.1644	162.8368	158.6224	149.6506	138.3252	127.6810	120.5700	118.8976	123.1120	132.0838	143.4092	154.0534	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.2424	32.2424	32.2424	32.2424	32.2424	32.2424	32.2424	32.2424	32.2424	32.2424	32.2424	32.2424	(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)	-73.9394	-73.9394	-73.9394	-73.9394	-73.9394	-73.9394	-73.9394	-73.9394	-73.9394	-73.9394	-73.9394	-73.9394	(71)
Water heating gains (Table 5)	71.6491	69.3100	65.0286	59.4004	55.5587	50.3677	46.4102	52.0158	54.3523	60.1590	66.6465	69.8525	(72)
Total internal gains	301.1425	298.8432	287.9255	270.7631	253.5800	236.8151	226.1524	231.7182	240.6910	258.0318	277.8608	292.6407	(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				5.1500	11.2829	0.6300	0.7000			0.7700			17.7583 (75)
Northwest				5.1500	11.2829	0.6300	0.7000			0.7700			17.7583 (81)
Solar gains	35.5166	72.2951	130.2527	213.9124	287.5402	306.5483	286.7696	228.6161	158.7150	88.3503	44.6891	29.0046	(83)
Total gains	336.6591	371.1382	418.1782	484.6755	541.1202	543.3634	512.9220	460.3343	399.4060	346.3821	322.5499	321.6453	(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	64.3573	64.3573	64.3573	64.3573	64.3573	64.3573	64.3573	64.3573	64.3573	64.3573	64.3573	64.3573		
alpha	5.2905	5.2905	5.2905	5.2905	5.2905	5.2905	5.2905	5.2905	5.2905	5.2905	5.2905	5.2905		
util living area	0.9979	0.9960	0.9889	0.9568	0.8520	0.6673	0.5052	0.5808	0.8541	0.9794	0.9959	0.9984	(86)	
MIT	20.0957	20.1853	20.3650	20.6145	20.8266	20.9231	20.9438	20.9390	20.8569	20.5850	20.2923	20.0688	(87)	
Th 2	20.0180	20.0180	20.0180	20.0180	20.0180	20.0180	20.0180	20.0180	20.0180	20.0180	20.0180	20.0180	(88)	
util rest of house	0.9972	0.9947	0.9850	0.9409	0.8033	0.5797	0.3964	0.4651	0.7858	0.9690	0.9942	0.9978	(89)	
MIT 2	18.8037	18.9345	19.1956	19.5496	19.8250	19.9262	19.9410	19.9388	19.8677	19.5141	19.0912	18.7646	(90)	
Living area fraction	19.1112	19.2322	19.4739	19.8030	20.0634	20.1635	20.1797	20.1768	20.1031	19.7690	19.3770	19.0750	(92)	
Temperature adjustment	19.1112	19.2322	19.4739	19.8030	20.0634	20.1635	20.1797	20.1768	20.1031	19.7690	19.3770	19.0750	(93)	
adjusted MIT	19.1112	19.2322	19.4739	19.8030	20.0634	20.1635	20.1797	20.1768	20.1031	19.7690	19.3770	19.0750	(93)	

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9963	0.9932	0.9821	0.9366	0.8058	0.5934	0.4147	0.4845	0.7927	0.9656	0.9927	0.9970	(94)
Ext temp.	335.4018	368.6044	410.6734	453.9494	436.0410	322.4071	212.6866	223.0140	316.5935	334.4556	320.1980	320.6960	(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	885.0803	856.4560	775.2892	651.5367	499.7771	332.4581	213.9119	225.6937	358.7321	547.9162	733.6437	888.8917	(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	408.9607	327.8363	271.2742	142.2629	47.4197	0.0000	0.0000	0.0000	0.0000	158.8146	297.6809	422.7376	(98)
												2076.9868	(98)
												37.5043	(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													2226.1381	(211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Space heating requirement	408.9607	327.8363	271.2742	142.2629	47.4197	0.0000	0.0000	0.0000	0.0000	158.8146	297.6809	422.7376	(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)	438.3288	351.3787	290.7547	152.4790	50.8249	0.0000	0.0000	0.0000	0.0000	170.2193	319.0578	453.0949	(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	171.1842	149.5338	155.5802	137.9918	133.6004	117.6678	112.7347	125.6728	127.0607	144.6839	154.4472	167.1641	(64)	
Efficiency of water heater (217)m	87.0647	86.8730	86.3370	85.0276	82.6208	80.2000	80.2000	80.2000	80.2000	85.1858	86.5756	87.1885	(216)	
Fuel for water heating, kWh/month	196.6172	172.1292	180.2010	162.2906	161.7032	146.7179	140.5670	156.6992	158.4298	169.8451	178.3959	191.7273	(219)	
Water heating fuel used												2015.3234	(219)	
Annual totals kWh/year														
Space heating fuel - main system													2226.1381	(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)													53.5428	(230a)
central heating pump													30.0000	(230c)
main heating flue fan													45.0000	(230e)
Total electricity for the above, kWh/year													128.5428	(231)
Electricity for lighting (calculated in Appendix L)													257.8711	(232)
Total delivered energy for all uses													4627.8754	(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	2226.1381	0.2160	480.8458 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2015.3234	0.2160	435.3099 (264)
Space and water heating			916.1557 (265)
Pumps and fans	128.5428	0.5190	66.7137 (267)
Energy for lighting	257.8711	0.5190	133.8351 (268)
Total CO2, kg/year			1116.7045 (272)
Dwelling Carbon Dioxide Emission Rate (DER)			20.1600 (273)

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

DER		20.1600	ZC1
Total Floor Area	TFA	55.3800	
Assumed number of occupants	N	1.8485	
CO2 emission factor in Table 12 for electricity displaced from grid	EF	0.5190	
CO2 emissions from appliances, equation (L14)		17.2450	ZC2
CO2 emissions from cooking, equation (L16)		2.9499	ZC3
Total CO2 emissions		40.3548	ZC4
Residual CO2 emissions offset from biofuel CHP		0.0000	ZC5
Additional allowable electricity generation, kWh/m²/year		0.0000	ZC6
Resulting CO2 emissions offset from additional allowable electricity generation		0.0000	ZC7
Net CO2 emissions		40.3548	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	55.3800 (1b)	x 2.5400 (2b)	= 140.6652 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	55.3800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 140.6652 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					2 * 10 = 20.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(7a)+(7b)+(7c) =				20.0000 / (5) = 0.1422 (8)
Pressure test					Yes
Measured/design AP50					5.0000
Infiltration rate					0.3922 (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) =				0.3334 (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	0.4250	0.4167	0.4084	0.3667	0.3584	0.3167	0.3167	0.3084	0.3334	0.3584	0.3750	0.3917 (22b)
Effective ac	0.5903	0.5868	0.5834	0.5672	0.5642	0.5501	0.5501	0.5475	0.5556	0.5642	0.5703	0.5767 (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)			10.3000	1.3258	13.6553		(27)
Ground Floor			55.3800	0.1300	7.1994		(28a)
External Wall	40.5100	10.3000	30.2100	0.1800	5.4378		(29a)
Sheltered Wall	16.3100	1.8900	14.4200	0.1800	2.5956		(29a)
Total net area of external elements Aum(A, m ²)			112.2000				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		30.7781		(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)							4.9173 (36)
Total fabric heat loss						(33) + (36) =	35.6954 (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	27.4025	27.2397	27.0802	26.3306	26.1903	25.5375	25.5375	25.4166	25.7889	26.1903	26.4740	26.7706 (38)
Heat transfer coeff	63.0980	62.9351	62.7756	62.0260	61.8857	61.2329	61.2329	61.1120	61.4843	61.8857	62.1694	62.4661 (39)
Average = Sum(39)m / 12 =												62.0253 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.1394	1.1364	1.1335	1.1200	1.1175	1.1057	1.1057	1.1035	1.1102	1.1175	1.1226	1.1280 (40)
HLP (average)												1.1200 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8485 (42)
Average daily hot water use (litres/day)												78.1015 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	85.9117	82.7876	79.6635	76.5395	73.4154	70.2914	70.2914	73.4154	76.5395	79.6635	82.7876	85.9117 (44)
Energy conte	127.4045	111.4288	114.9845	100.2463	96.1887	83.0036	76.9150	88.2611	89.3152	104.0883	113.6205	123.3845 (45)
Energy content (annual)										Total = Sum(45)m =		1228.8410 (45)
Distribution loss (46)m = 0.15 x (45)m	19.1107	16.7143	17.2477	15.0369	14.4283	12.4505	11.5372	13.2392	13.3973	15.6132	17.0431	18.5077 (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	43.7796	38.1050	40.5957	37.7455	37.4117	34.6642	35.8197	37.4117	37.7455	40.5957	40.8268	43.7796 (61)
Total heat required for water heating calculated for each month	171.1842	149.5338	155.5802	137.9918	133.6004	117.6678	112.7347	125.6728	127.0607	144.6839	154.4472	167.1641 (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	171.1842	149.5338	155.5802	137.9918	133.6004	117.6678	112.7347	125.6728	127.0607	144.6839	154.4472	167.1641 (64)
Heat gains from water heating, kWh/month	53.3069	46.5763	48.3813	42.7683	41.3357	36.2647	34.5292	38.6997	39.1337	44.7583	47.9855	51.9702 (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	92.4242	92.4242	92.4242	92.4242	92.4242	92.4242	92.4242	92.4242	92.4242	92.4242	92.4242	92.4242	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	14.6017	12.9691	10.5472	7.9849	5.9688	5.0391	5.4450	7.0776	9.4995	12.0618	14.0779	15.0076	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	161.1644	162.8368	158.6224	149.6506	138.3252	127.6810	120.5700	118.8976	123.1120	132.0838	143.4092	154.0534	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.2424	32.2424	32.2424	32.2424	32.2424	32.2424	32.2424	32.2424	32.2424	32.2424	32.2424	32.2424	(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)	-73.9394	-73.9394	-73.9394	-73.9394	-73.9394	-73.9394	-73.9394	-73.9394	-73.9394	-73.9394	-73.9394	-73.9394	(71)
Water heating gains (Table 5)	71.6491	69.3100	65.0286	59.4004	55.5587	50.3677	46.4102	52.0158	54.3523	60.1590	66.6465	69.8525	(72)
Total internal gains	301.1425	298.8432	287.9255	270.7631	253.5800	236.8151	226.1524	231.7182	240.6910	258.0318	277.8608	292.6407	(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			5.1500		11.2829		0.6300		0.7000		0.7700		17.7583 (75)	
Northwest			5.1500		11.2829		0.6300		0.7000		0.7700		17.7583 (81)	
Solar gains			35.5166	72.2951	130.2527	213.9124	287.5402	306.5483	286.7696	228.6161	158.7150	88.3503	44.6891	29.0046 (83)
Total gains			336.6591	371.1382	418.1782	484.6755	541.1202	543.3634	512.9220	460.3343	399.4060	346.3821	322.5499	321.6453 (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	60.9502	61.1079	61.2632	62.0036	62.1441	62.8067	62.8067	62.9309	62.5498	62.1441	61.8605	61.5668	
alpha	5.0633	5.0739	5.0842	5.1336	5.1429	5.1871	5.1871	5.1954	5.1700	5.1429	5.1240	5.1045	
util living area	0.9979	0.9961	0.9895	0.9597	0.8619	0.6787	0.5163	0.5914	0.8621	0.9805	0.9960	0.9983 (86)	
MIT	19.7804	19.9059	20.1556	20.5134	20.8138	20.9605	20.9921	20.9848	20.8635	20.4814	20.0747	19.7599 (87)	
Th 2	19.9688	19.9712	19.9735	19.9845	19.9866	19.9962	19.9962	19.9980	19.9925	19.9866	19.9824	19.9781 (88)	
util rest of house	0.9972	0.9948	0.9857	0.9445	0.8139	0.5892	0.4032	0.4722	0.7945	0.9705	0.9943	0.9978 (89)	
MIT 2	18.3438	18.5287	18.8933	19.4107	19.8057	19.9704	19.9933	19.9917	19.8800	19.3751	18.7838	18.3205 (90)	
Living area fraction									fLA = Living area / (4) =				0.2380 (91)
MIT	18.6857	18.8565	19.1937	19.6731	20.0456	20.2061	20.2310	20.2281	20.1140	19.6384	19.0910	18.6631 (92)	
Temperature adjustment												0.0000	
adjusted MIT	18.6857	18.8565	19.1937	19.6731	20.0456	20.2061	20.2310	20.2281	20.1140	19.6384	19.0910	18.6631 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9958	0.9927	0.9817	0.9386	0.8171	0.6089	0.4302	0.5007	0.8040	0.9658	0.9922	0.9967 (94)
Useful gains	335.2598	368.4150	410.5353	454.9204	442.1438	330.8780	220.6798	230.4721	321.1161	334.5436	320.0340	320.5798 (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	907.7093	878.3537	796.8557	668.2141	516.4751	343.2752	222.3378	233.9412	369.7695	559.3475	745.4741	903.4513 (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	425.9025	342.6788	287.4223	153.5715	55.3025	0.0000	0.0000	0.0000	0.0000	167.2541	306.3169	433.6564 (98)
Space heating												2172.1050 (98)
Space heating per m2											(98) / (4) =	39.2218 (99)

8c. Space cooling requirement

Not applicable

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

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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													2325.5942	(211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Space heating requirement	425.9025	342.6788	287.4223	153.5715	55.3025	0.0000	0.0000	0.0000	0.0000	167.2541	306.3169	433.6564	(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)	455.9984	366.8938	307.7327	164.4234	59.2104	0.0000	0.0000	0.0000	0.0000	179.0729	327.9624	464.3002	(211)	
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)	
Water heating														
Water heating requirement	171.1842	149.5338	155.5802	137.9918	133.6004	117.6678	112.7347	125.6728	127.0607	144.6839	154.4472	167.1641	(64)	
Efficiency of water heater	87.2536	87.0728	86.5757	85.3210	83.0153	80.3000	80.3000	80.3000	80.3000	85.4169	86.7429	80.3000	(216)	
(217)m	87.2536	87.0728	86.5757	85.3210	83.0153	80.3000	80.3000	80.3000	80.3000	85.4169	86.7429	87.3434	(217)	
Fuel for water heating, kWh/month	196.1915	171.7342	179.7042	161.7326	160.9347	146.5352	140.3919	156.5041	158.2325	169.3856	178.0518	191.3872	(219)	
Water heating fuel used												2010.7856	(219)	
Annual totals kWh/year														
Space heating fuel - main system												2325.5942	(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)												257.8711	(232)	
Total delivered energy for all uses												4669.2509	(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	2325.5942	0.2160	502.3283 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2010.7856	0.2160	434.3297 (264)
Space and water heating			936.6580 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	257.8711	0.5190	133.8351 (268)
Total CO2, kg/m2/year			1109.4181 (272)
Emissions per m2 for space and water heating			16.9133 (272a)
Fuel factor (mains gas)			1.0000
Emissions per m2 for lighting			2.4167 (272b)
Emissions per m2 for pumps and fans			0.7029 (272c)
Target Carbon Dioxide Emission Rate (TER) = (16.9133 * 1.00) + 2.4167 + 0.7029, rounded to 2 d.p.			20.0300 (273)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	TPB12 00-F4			Issued on Date	12/11/2019
Assessment Reference	001	Prop Type Ref			
Property	00-F4, Building 12				
SAP Rating	83 B	DER	20.16	TER	20.03
Environmental	87 B	% DER<TER	-0.63		
CO ₂ Emissions (t/year)	0.95	DFEE	45.39	TFEE	52.23
General Requirements Compliance	Fail	% DFEE<TFEE	13.08		
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	55.3800 (1b)	x 2.5400 (2b)	= 140.6652 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	55.3800		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 140.6652 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	0	0	0 * 40 =	0.0000 (6a)
Number of open flues	0	0	0	0 * 20 =	0.0000 (6b)
Number of intermittent fans				2 * 10 =	20.0000 (7a)
Number of passive vents				0 * 10 =	0.0000 (7b)
Number of flueless gas fires				0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =				20.0000 / (5) =	0.1422 (8)
Pressure test				Yes	
Measured/design AP50				4.0000	
Infiltration rate				0.3422	(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) =		0.2909 (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	0.3708	0.3636	0.3563	0.3199	0.3127	0.2763	0.2763	0.2690	0.2909	0.3127	0.3272	0.3418 (22b)
Effective ac	0.5688	0.5661	0.5635	0.5512	0.5489	0.5382	0.5382	0.5362	0.5423	0.5489	0.5535	0.5584 (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)			10.3000	1.2357	12.7281		(27)
Door to corridor			1.8900	1.4000	2.6460		(26)
Ground Floor			55.3800	0.1000	5.5380		(28a)
External Wall	40.5100	10.3000	30.2100	0.1700	5.1357		(29a)
Sheltered Wall	16.3100	1.8900	14.4200	0.2343	3.3784		(29a)
Total net area of external elements Aum(A, m ²)			112.2000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	29.4263		(33)
Party Wall			18.4100	0.0000	0.0000		(32)
Party Ceilings 1			53.3800				(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)							7.1215 (36)
Total fabric heat loss						(33) + (36) =	36.5478 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)							
(38)m	26.4016	26.2777	26.1562	25.5855	25.4788	24.9818	24.9818
Heat transfer coeff	62.9494	62.8254	62.7039	62.1333	62.0265	61.5295	61.5295
Average = Sum(39)m / 12 =							62.1328 (39)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.1367	1.1344	1.1322	1.1219	1.1200	1.1110	1.1110	1.1094	1.1145	1.1200	1.1239	1.1280	(40)
Days in month												1.1219	(40)
	31	28	31	30	31	30	31	31	30	31	30	31	(41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.8485	(42)
Average daily hot water use (litres/day)													78.1015	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Daily hot water use	85.9117	82.7876	79.6635	76.5395	73.4154	70.2914	70.2914	73.4154	76.5395	79.6635	82.7876	85.9117	(44)	
Energy content (annual)	127.4045	111.4288	114.9845	100.2463	96.1887	83.0036	76.9150	88.2611	89.3152	104.0883	113.6205	123.3845	(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)	
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)	
Heat gains from water heating, kWh/month	27.0735	23.6786	24.4342	21.3023	20.4401	17.6383	16.3444	18.7555	18.9795	22.1188	24.1444	26.2192	(65)	

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

Metabolic gains (Table 5), Watts														
(66)m	92.4242	92.4242	92.4242	92.4242	92.4242	92.4242	92.4242	92.4242	92.4242	92.4242	92.4242	92.4242	(66)	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	14.6017	12.9691	10.5472	7.9849	5.9688	5.0391	5.4450	7.0776	9.4995	12.0618	14.0779	15.0076	(67)	
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	161.1644	162.8368	158.6224	149.6506	138.3252	127.6810	120.5700	118.8976	123.1120	132.0838	143.4092	154.0534	(68)	
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.2424	32.2424	32.2424	32.2424	32.2424	32.2424	32.2424	32.2424	32.2424	32.2424	32.2424	32.2424	(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)	-73.9394	-73.9394	-73.9394	-73.9394	-73.9394	-73.9394	-73.9394	-73.9394	-73.9394	-73.9394	-73.9394	-73.9394	(71)	
Water heating gains (Table 5)	36.3891	35.2360	32.8417	29.5866	27.4733	24.4976	21.9683	25.2090	26.3604	29.7295	33.5338	35.2409	(72)	
Total internal gains	262.8824	261.7692	252.7386	237.9493	222.4946	207.9450	198.7105	201.9114	209.6991	224.6024	241.7481	255.0291	(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				5.1500	11.2829	0.6300	0.7000	0.7700			17.7583 (75)	
Northwest				5.1500	11.2829	0.6300	0.7000	0.7700			17.7583 (81)	
Solar gains	35.5166	72.2951	130.2527	213.9124	287.5402	306.5483	286.7696	228.6161	158.7150	88.3503	44.6891	29.0046 (83)
Total gains	298.3990	334.0643	382.9913	451.8617	510.0348	514.4933	485.4802	430.5275	368.4141	312.9527	286.4372	284.0337 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)														
tau	61.0941	61.2146	61.3332	61.8965	62.0030	62.5039	62.5039	62.5975	62.3100	62.0030	61.7879	61.5646		
alpha	5.0729	5.0810	5.0889	5.1264	5.1335	5.1669	5.1669	5.1732	5.1540	5.1335	5.1192	5.1043		
util living area	0.9988	0.9976	0.9929	0.9693	0.8838	0.7095	0.5452	0.6288	0.8917	0.9873	0.9977	0.9991	(86)	
MIT	19.7196	19.8466	20.1001	20.4651	20.7850	20.9509	20.9897	20.9797	20.8338	20.4269	20.0127	19.6963	(87)	
Th 2	19.9710	19.9728	19.9746	19.9830	19.9845	19.9918	19.9918	19.9932	19.9890	19.9845	19.9813	19.9780	(88)	
util rest of house	0.9984	0.9967	0.9902	0.9571	0.8401	0.6194	0.4267	0.5047	0.8318	0.9804	0.9967	0.9988	(89)	
MIT 2	18.8005	18.9286	19.1823	19.5463	19.8389	19.9695	19.9892	19.9873	19.8917	19.5152	19.1016	18.7829	(90)	
Living area fraction									fLA = Living area / (4) =			0.2380	(91)	
MIT	19.0192	19.1471	19.4007	19.7650	20.0641	20.2031	20.2273	20.2235	20.1159	19.7321	19.3185	19.0002	(92)	
Temperature adjustment												0.0000		
adjusted MIT	19.0192	19.1471	19.4007	19.7650	20.0641	20.2031	20.2273	20.2235	20.1159	19.7321	19.3185	19.0002	(93)	

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9978	0.9958	0.9882	0.9538	0.8440	0.6396	0.4552	0.5346	0.8408	0.9781	0.9958	0.9983	(94)
Ext temp.	297.7532	332.6608	378.4543	430.9976	430.4715	329.0514	220.9948	230.1439	309.7482	306.1124	285.2295	283.5572	(95)
	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

Heat loss rate W	926.5636	895.0794	808.9256	675.0775	518.7950	344.7535	223.1879	234.9043	371.3065	566.4355	760.5083	924.5459 (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	467.8350	377.9453	320.2706	175.7376	65.7127	0.0000	0.0000	0.0000	0.0000	193.6804	342.2007	476.8955 (98)
Space heating												2420.2779 (98)
Space heating per m2										(98) / (4) =		43.7031 (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	578.3776	455.3185	466.9249	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8931	0.9420	0.9103	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	516.5698	428.9018	425.0208	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	670.8763	635.6303	572.4847	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	111.1007	153.8060	109.7131	0.0000	0.0000	0.0000	0.0000 (104)
Space cooling												374.6198 (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	27.7752	38.4515	27.4283	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling												93.6550 (107)
Space cooling per m2												1.6911 (108)
Energy for space heating												43.7031 (99)
Energy for space cooling												1.6911 (108)
Total												45.3942 (109)
Dwelling Fabric Energy Efficiency (DFEE)												45.4 (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 (m ²)	Storey height (m)	Volume (m ³)
Ground floor	55.3800 (1b)	x 2.5400 (2b)	= 140.6652 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	55.3800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 140.6652 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					2 * 10 = 20.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					Air changes per hour
Pressure test					20.0000 / (5) = 0.1422 (8)
Measured/design AP50					Yes
Infiltration rate					5.0000
Number of sides sheltered					0.3922 (18)
					2 (19)
Shelter factor				(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor				(21) = (18) x (20) =	0.3334 (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	0.4250	0.4167	0.4084	0.3667	0.3584	0.3167	0.3167	0.3084	0.3334	0.3584	0.3750	0.3917 (22b)
Effective ac	0.5903	0.5868	0.5834	0.5672	0.5642	0.5501	0.5501	0.5475	0.5556	0.5642	0.5703	0.5767 (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)			10.3000	1.3258	13.6553		(27)
Ground Floor			55.3800	0.1300	7.1994		(28a)
External Wall	40.5100	10.3000	30.2100	0.1800	5.4378		(29a)
Sheltered Wall	16.3100	1.8900	14.4200	0.1800	2.5956		(29a)
Total net area of external elements Aum(A, m ²)			112.2000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	30.7781		(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)							4.9173 (36)
Total fabric heat loss						(33) + (36) =	35.6954 (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	27.4025	27.2397	27.0802	26.3306	26.1903	25.5375	25.5375	25.4166	25.7889	26.1903	26.4740	26.7706 (38)
Heat transfer coeff	63.0980	62.9351	62.7756	62.0260	61.8857	61.2329	61.2329	61.1120	61.4843	61.8857	62.1694	62.4661 (39)
Average = Sum(39)m / 12 =												62.0253 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.1394	1.1364	1.1335	1.1200	1.1175	1.1057	1.1057	1.1035	1.1102	1.1175	1.1226	1.1280 (40)
HLP (average)												1.1200 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8485 (42)
Average daily hot water use (litres/day)												78.1015 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	85.9117	82.7876	79.6635	76.5395	73.4154	70.2914	70.2914	73.4154	76.5395	79.6635	82.7876	85.9117 (44)
Energy conte	127.4045	111.4288	114.9845	100.2463	96.1887	83.0036	76.9150	88.2611	89.3152	104.0883	113.6205	123.3845 (45)
Energy content (annual)												Total = Sum(45)m = 1228.8410 (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	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	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	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	(59)
Heat gains from water heating, kWh/month	27.0735	23.6786	24.4342	21.3023	20.4401	17.6383	16.3444	18.7555	18.9795	22.1188	24.1444	26.2192 (65)

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

Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	92.4242	92.4242	92.4242	92.4242	92.4242	92.4242	92.4242	92.4242	92.4242	92.4242	92.4242	92.4242 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	14.6017	12.9691	10.5472	7.9849	5.9688	5.0391	5.4450	7.0776	9.4995	12.0618	14.0779	15.0076 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	161.1644	162.8368	158.6224	149.6506	138.3252	127.6810	120.5700	118.8976	123.1120	132.0838	143.4092	154.0534 (68)
Pumps, fans	32.2424	32.2424	32.2424	32.2424	32.2424	32.2424	32.2424	32.2424	32.2424	32.2424	32.2424	32.2424 (69)
Losses e.g. evaporation (negative values) (Table 5)	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)
Water heating gains (Table 5)	-73.9394	-73.9394	-73.9394	-73.9394	-73.9394	-73.9394	-73.9394	-73.9394	-73.9394	-73.9394	-73.9394	-73.9394 (71)
Total internal gains	36.3891	35.2360	32.8417	29.5866	27.4733	24.4976	21.9683	25.2090	26.3604	29.7295	33.5338	35.2409 (72)
	262.8824	261.7692	252.7386	237.9493	222.4946	207.9450	198.7105	201.9114	209.6991	224.6024	241.7481	255.0291 (73)

6. Solar gains

[Jan]												Gains
	Area				Solar flux	g		FF		Access	Gains	
	m2				Table 6a	or Table 6b		or Table 6c		factor	W	
					W/m2					Table 6d		
Northeast	5.1500				11.2829	0.6300		0.7000		0.7700	17.7583 (75)	
Northwest	5.1500				11.2829	0.6300		0.7000		0.7700	17.7583 (81)	
Solar gains	35.5166	72.2951	130.2527	213.9124	287.5402	306.5483	286.7696	228.6161	158.7150	88.3503	29.0046 (83)	
Total gains	298.3990	334.0643	382.9913	451.8617	510.0348	514.4933	485.4802	430.5275	368.4141	312.9527	284.0337 (84)	

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
alpha	60.9502	61.1079	61.2632	62.0036	62.1441	62.8067	62.8067	62.9309	62.5498	62.1441	61.8605	61.5668
util living area	5.0633	5.0739	5.0842	5.1336	5.1429	5.1871	5.1871	5.1954	5.1700	5.1429	5.1240	5.1045
	0.9988	0.9976	0.9929	0.9692	0.8833	0.7074	0.5430	0.6263	0.8908	0.9873	0.9977	0.9991 (86)
MIT	19.7160	19.8440	20.0985	20.4670	20.7867	20.9522	20.9901	20.9804	20.8359	20.4291	20.0142	19.6963 (87)
Th 2	19.9688	19.9712	19.9735	19.9845	19.9866	19.9962	19.9962	19.9980	19.9925	19.9866	19.9824	19.9781 (88)
util rest of house	0.9984	0.9967	0.9902	0.9570	0.8395	0.6175	0.4253	0.5030	0.8308	0.9804	0.9967	0.9988 (89)
MIT 2	18.7951	18.9248	19.1799	19.5495	19.8422	19.9745	19.9937	19.9923	19.8965	19.5190	19.1040	18.7829 (90)
Living area fraction										fLA = Living area / (4) =		0.2380 (91)
MIT	19.0143	19.1435	19.3985	19.7679	20.0670	20.2072	20.2308	20.2274	20.1201	19.7356	19.3206	19.0003 (92)
Temperature adjustment												0.0000
adjusted MIT	19.0143	19.1435	19.3985	19.7679	20.0670	20.2072	20.2308	20.2274	20.1201	19.7356	19.3206	19.0003 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9978	0.9958	0.9882	0.9537	0.8435	0.6377	0.4536	0.5326	0.8399	0.9781	0.9958	0.9983 (94)
Ext temp.	297.7521	332.6603	378.4571	430.9507	430.1974	328.0774	220.2110	229.3093	309.4222	306.0988	285.2298	283.5573 (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	928.4409	896.4184	809.7124	674.0914	517.7958	343.3428	222.3251	233.9023	370.1395	565.3643	759.7490	924.5171 (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	469.2324	378.8454	320.8539	175.0613	65.1732	0.0000	0.0000	0.0000	0.0000	192.8935	341.6539	476.8741 (98)
Space heating per m2												2420.5878 (98)
										(98) / (4) =		43.7087 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b												
Ext. temp.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	575.5890	453.1233	464.4510	0.0000	0.0000	0.0000	0.0000 (100)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.8952	0.9434	0.9123	0.0000	0.0000	0.0000	0.0000 (101)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	515.2826	427.4820	423.7349	0.0000	0.0000	0.0000	0.0000 (102)
Month fracti	0.0000	0.0000	0.0000	0.0000	0.0000	670.8763	635.6303	572.4847	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	112.0275	154.8624	110.6698	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction												377.5597 (104)
Intermittency factor (Table 10b)												fC = cooled area / (4) = 1.0000 (105)

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	28.0069	38.7156	27.6674	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling per m2												94.3899 (107)
Energy for space heating												1.7044 (108)
Energy for space cooling												43.7087 (99)
Total												1.7044 (108)
Target Fabric Energy Efficiency (TFEE)												45.4131 (109)
												52.2 (109)

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)



Property Reference	TPB12 00-F4	Issued on Date	12/11/2019
Assessment Reference	001	Prop Type Ref	
Property	00-F4, Building 12		
SAP Rating	83 B	DER	20.16
Environmental	87 B	TER	20.03
CO ₂ Emissions (t/year)	0.95	% DER<TER	-0.63
General Requirements Compliance	Fail	DFEE	45.39
		TFEE	52.23
		% DFEE<TFEE	13.08
Assessor Details	Mr. Harry Davey, energytest, Tel: 01892 315466, hdavey@energy-test.co.uk		Assessor ID
Client	R434-0001		

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)	20.03	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	20.16	kgCO ₂ /m ²	
Excess emissions	0.13 (0.6%)	kgCO ₂ /m ²	Fail

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	52.23	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	45.39	kWh/m ² /yr	
	-6.8 (-13.0%)	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	0.10 (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

No cylinder

6 Controls

Space heating controls

Time and temperature zone control

Pass

Hot water controls

No cylinder

Boiler interlock

Yes

Pass

7 Low energy lights

Percentage of fixed lights with low-energy fittings

100

%

Minimum

75

%

Pass

8 Mechanical ventilation

Continuous extract system

Specific fan power

0.24

Maximum

0.7

Pass

Criterion 3 – Limiting the effects of heat gains in summer

9 Summertime temperature

Overheating risk (Thames Valley)

Medium

Pass

Based on:

Overshading

Average

Windows facing North East

5.15 m², No overhang

Windows facing North West

5.15 m², No overhang

Air change rate

1.80 ach

Blinds/curtains

Light-coloured curtain or roller blind, closed 100% of daylight hours

Criterion 4 – Building performance consistent with DER and DFEE rate

Party Walls

Type

U-value

Filled Cavity with Edge Sealing

0.00

W/m²K

Pass

Air permeability and pressure testing

3 Air permeability

Air permeability at 50 pascals

4.00 (design value)

Maximum

10.0

Pass

10 Key features

Party wall U-value

0.00

W/m²K

Floor U-value

0.10

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 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 (m²)	DER (kgCO₂/m²)	TER (kgCO₂/m²)
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 kgCO₂/m²			PASS	
Average TER = 17.20 kgCO₂/m²				

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 (m²)	DFEE (kWh/m²/yr)	TFEE (kWh/m²/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/m²/yr			PASS	
Average TFEE = 41.93 kWh/m²/yr				