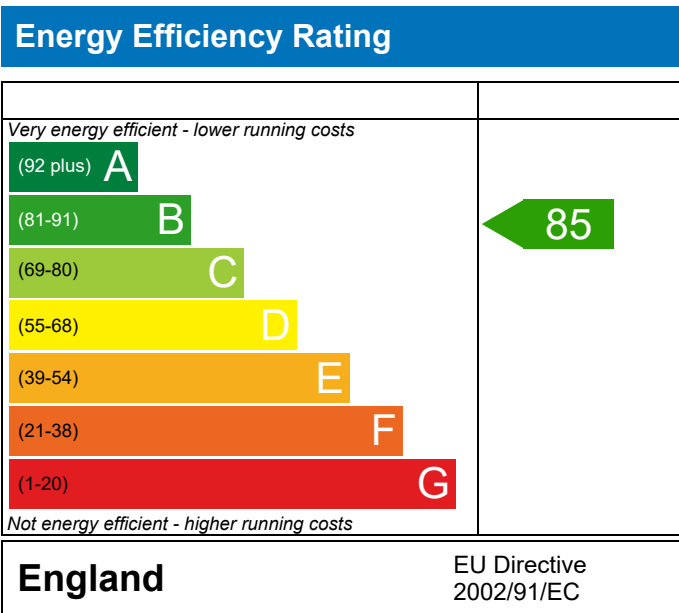


01-F6, Building 12

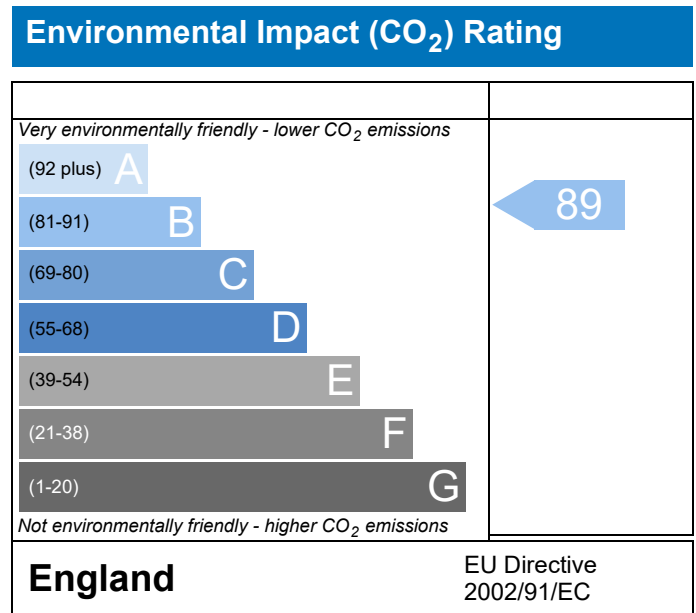
Dwelling type: Flat, End-Terrace
 Date of assessment: 12/11/2019
 Produced by: Harry Davey
 Total floor area: 71.45 m²
 DRRN: 2899-2959-9912

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

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



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



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

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



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	TPB12 01-F6			Issued on Date	12/11/2019
Assessment Reference	001	Prop Type Ref			
Property	01-F6, Building 12				
SAP Rating	85 B	DER	15.04	TER	14.97
Environmental	89 B	% DER<TER	-0.44		
CO ₂ Emissions (t/year)	0.93	DFEE	29.63	TFEE	33.11
General Requirements Compliance	Fail	% DFEE<TFEE	10.52		
Assessor Details	Mr. Harry Davey, energytest, Tel: 01892 315466, hdavey@energy-test.co.uk			Assessor ID	R434-0001
Client					

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



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

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

DWELLING AS DESIGNED

Mid-floor flat, total floor area 71 m²

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

1a TER and DER

Fuel for main heating:Mains gas
Fuel factor:1.00 (mains gas)
Target Carbon Dioxide Emission Rate (TER) 14.97 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 15.04 kgCO₂/m²Fail
Excess emissions =0.07 kgCO₂/m² (0.5%)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)33.1 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)29.6 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.17 (max. 0.30)	0.23 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor (no floor)			
Roof (no roof)			
Openings	1.31 (max. 2.00)	1.40 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

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

4 Heating efficiency

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

Secondary heating system: None

5 Cylinder insulation

Hot water storage No cylinder

6 Controls

Space heating controls: Time and temperature zone control OK

Hot water controls: No cylinder

Boiler interlock

Yes OK

7 Low energy lights

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

8 Mechanical ventilation

Continuous extract system
Specific fan power: 0.24
Maximum 0.7 OK

9 Summertime temperature

Overheating risk (Thames Valley): High Fail

Based on:

Overshading: Average
Windows facing South East: 10.31 m², No overhang
Windows facing South West: 7.73 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

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

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

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	71.4500 (1b)	x 2.5400 (2b)	= 181.4830 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	71.4500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 181.4830 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	0	0	0 * 40 =	0.0000 (6a)
Number of open flues	0	0	0	0 * 20 =	0.0000 (6b)
Number of intermittent fans				0 * 10 =	0.0000 (7a)
Number of passive vents				0 * 10 =	0.0000 (7b)
Number of flueless gas fires				0 * 40 =	0.0000 (7c)
Air changes per hour					
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =				0.0000 / (5) =	0.0000 (8)
Pressure test				Yes	
Measured/design AP50				4.0000	
Infiltration rate				0.2000	(18)
Number of sides sheltered				2	(19)
Shelter factor			(20) = 1 - [0.075 x (19)] =		0.8500 (20)
Infiltration rate adjusted to include shelter factor			(21) = (18) x (20) =		0.1700 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.2168	0.2125	0.2083	0.1870	0.1828	0.1615	0.1615	0.1573	0.1700	0.1828	0.1913	0.1998 (22b)
Mechanical extract ventilation - centralised												0.5000 (23a)
If mechanical ventilation:												
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Window (Uw = 1.30)			18.0400	1.2357	22.2928		(27)
Door to corridor			1.8900	1.4000	2.6460		(26)
External Wall	43.9200	18.0400	25.8800	0.1700	4.3996		(29a)
Sheltered Wall	3.8100	1.8900	1.9200	0.2343	0.4498		(29a)
Total net area of external elements Aum(A, m ²)			47.7300				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	29.7882		(33)
Party Wall			38.9400	0.0000	0.0000		(32)
Party Floor 1			71.4500				(32d)
Party Ceilings 1			71.4500				(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)							8.8536 (36)
Total fabric heat loss						(33) + (36) =	38.6418 (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	29.9447	29.9447	29.9447	29.9447	29.9447	29.9447	29.9447	29.9447	29.9447	29.9447	29.9447	29.9447 (38)
Heat transfer coeff	68.5865	68.5865	68.5865	68.5865	68.5865	68.5865	68.5865	68.5865	68.5865	68.5865	68.5865	68.5865 (39)
Average = Sum(39)m / 12 =												68.5865 (39)
HLP	0.9599	0.9599	0.9599	0.9599	0.9599	0.9599	0.9599	0.9599	0.9599	0.9599	0.9599	0.9599 (40)
HLP (average)												0.9599 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												2.2808 (42)
Average daily hot water use (litres/day)												88.3692 (43)
Daily hot water use	97.2061	93.6713	90.1365	86.6018	83.0670	79.5322	79.5322	83.0670	86.6018	90.1365	93.6713	97.2061 (44)
Energy conte	144.1538	126.0778	130.1010	113.4252	108.8342	93.9156	87.0266	99.8644	101.0570	117.7722	128.5576	139.6052 (45)
Energy content (annual)										Total = Sum(45)m =		1390.3909 (45)
Distribution loss (46)m = 0.15 x (45)m	21.6231	18.9117	19.5152	17.0138	16.3251	14.0873	13.0540	14.9797	15.1586	17.6658	19.2836	20.9408 (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	49.5351	43.1145	45.9326	42.7077	42.3300	39.2214	40.5288	42.3300	42.7077	45.9326	46.1941	49.5351	(61)
Total heat required for water heating calculated for each month	193.6889	169.1923	176.0336	156.1329	151.1642	133.1370	127.5554	142.1944	143.7648	163.7048	174.7517	189.1404	(62)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63)
Output from w/h	193.6889	169.1923	176.0336	156.1329	151.1642	133.1370	127.5554	142.1944	143.7648	163.7048	174.7517	189.1404	(64)
Heat gains from water heating, kWh/month	60.3149	52.6995	54.7417	48.3908	46.7699	41.0323	39.0685	43.7874	44.2784	50.6424	54.2939	58.8025	(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	114.0403	114.0403	114.0403	114.0403	114.0403	114.0403	114.0403	114.0403	114.0403	114.0403	114.0403	114.0403	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	17.8887	15.8886	12.9215	9.7824	7.3125	6.1735	6.6707	8.6708	11.6379	14.7770	17.2470	18.3859	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	200.6573	202.7395	197.4924	186.3221	172.2215	158.9689	150.1154	148.0332	153.2802	164.4506	178.5512	191.8038	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.4040	34.4040	34.4040	34.4040	34.4040	34.4040	34.4040	34.4040	34.4040	34.4040	34.4040	34.4040	(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)	-91.2323	-91.2323	-91.2323	-91.2323	-91.2323	-91.2323	-91.2323	-91.2323	-91.2323	-91.2323	-91.2323	-91.2323	(71)
Water heating gains (Table 5)	81.0684	78.4219	73.5776	67.2095	62.8627	56.9893	52.5115	58.8540	61.4978	68.0678	75.4082	79.0357	(72)
Total internal gains	359.8266	357.2621	344.2036	323.5260	302.6088	282.3438	269.5096	275.7701	286.6280	307.5075	331.4185	349.4375	(73)

6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access	Gains							
	m ²	Table 6a	Specific data	Specific data	factor	W							
		W/m ²	or Table 6b	or Table 6c	Table 6d								
Southeast	10.3100	36.7938	0.6300	0.7000	0.7700	115.9326 (77)							
Southwest	7.7300	36.7938	0.6300	0.7000	0.7700	86.9213 (79)							
Solar gains	202.8539	345.5353	472.7764	585.7929	656.1369	651.3920	628.0114	575.5317	511.9169	381.8901	242.9722	173.6007	(83)
Total gains	562.6805	702.7974	816.9801	909.3189	958.7456	933.7358	897.5210	851.3018	798.5449	689.3976	574.3907	523.0382	(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	72.3438	72.3438	72.3438	72.3438	72.3438	72.3438	72.3438	72.3438	72.3438	72.3438	72.3438	72.3438	
alpha	5.8229	5.8229	5.8229	5.8229	5.8229	5.8229	5.8229	5.8229	5.8229	5.8229	5.8229	5.8229	
util living area	0.9918	0.9726	0.9231	0.8118	0.6432	0.4670	0.3358	0.3699	0.5808	0.8676	0.9785	0.9945	(86)
MIT	20.3536	20.5237	20.7079	20.8596	20.9316	20.9504	20.9529	20.9527	20.9437	20.8357	20.5537	20.3078	(87)
Th 2	20.1169	20.1169	20.1169	20.1169	20.1169	20.1169	20.1169	20.1169	20.1169	20.1169	20.1169	20.1169	(88)
util rest of house	0.9894	0.9650	0.9040	0.7737	0.5892	0.4040	0.2687	0.2993	0.5114	0.8291	0.9712	0.9928	(89)
MIT 2	19.2586	19.5018	19.7563	19.9501	20.0300	20.0467	20.0484	20.0482	20.0420	19.9271	19.5476	19.1923	(90)
Living area fraction	19.4590	19.6889	19.9305	20.1166	20.1950	20.2121	20.2140	20.2138	20.2071	20.0935	19.7318	19.3965	(92)
Temperature adjustment	19.4590	19.6889	19.9305	20.1166	20.1950	20.2121	20.2140	20.2138	20.2071	20.0935	19.7318	0.0000	
adjusted MIT	19.4590	19.6889	19.9305	20.1166	20.1950	20.2121	20.2140	20.2138	20.2071	20.0935	19.7318	19.3965	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	555.3378	675.0410	734.8132	703.5551	569.6355	383.6156	247.7683	261.3879	414.1557	570.8103	555.5707	518.2936	(94)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1039.7042	1014.3186	921.1489	769.3085	582.6456	384.9176	247.8683	261.5759	418.8634	651.1227	866.3677	1042.2771	(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	360.3686	227.9946	138.6337	47.3424	9.6796	0.0000	0.0000	0.0000	0.0000	59.7524	223.7739	389.8437	(98)
Space heating												1457.3889	(98)
Space heating per m ²												20.3973	(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													1562.0459 (211)
Space heating requirement	360.3686	227.9946	138.6337	47.3424	9.6796	0.0000	0.0000	0.0000	0.0000	59.7524	223.7739	389.8437	(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)	386.2471	244.3672	148.5892	50.7422	10.3747	0.0000	0.0000	0.0000	0.0000	64.0433	239.8434	417.8389	(211)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating requirement	193.6889	169.1923	176.0336	156.1329	151.1642	133.1370	127.5554	142.1944	143.7648	163.7048	174.7517	189.1404	(64)
Efficiency of water heater (217)m	86.4922	85.7025	84.3569	82.3429	80.7435	80.2000	80.2000	80.2000	80.2000	82.6726	85.5744	86.7318	(216)
Fuel for water heating, kWh/month	223.9380	197.4182	208.6771	189.6132	187.2154	166.0063	159.0466	177.2997	179.2578	198.0158	204.2102	218.0749	(219)
Water heating fuel used													2308.7733 (219)
Annual totals kWh/year													
Space heating fuel - main system													1562.0459 (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)													69.0797 (230a)
central heating pump													30.0000 (230c)
main heating flue fan													45.0000 (230e)
Total electricity for the above, kWh/year													144.0797 (231)
Electricity for lighting (calculated in Appendix L)													315.9208 (232)
Total delivered energy for all uses													4330.8198 (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	1562.0459	0.2160	337.4019	(261)
Space heating - secondary	0.0000	0.0000	0.0000	(263)
Water heating (other fuel)	2308.7733	0.2160	498.6950	(264)
Space and water heating			836.0970	(265)
Pumps and fans	144.0797	0.5190	74.7774	(267)
Energy for lighting	315.9208	0.5190	163.9629	(268)
Total CO2, kg/year			1074.8372	(272)
Dwelling Carbon Dioxide Emission Rate (DER)			15.0400	(273)

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

DER			15.0400	ZC1
Total Floor Area		TFA	71.4500	
Assumed number of occupants		N	2.2808	
CO2 emission factor in Table 12 for electricity displaced from grid		EF	0.5190	
CO2 emissions from appliances, equation (L14)			16.6418	ZC2
CO2 emissions from cooking, equation (L16)			2.4316	ZC3
Total CO2 emissions			34.1134	ZC4
Residual CO2 emissions offset from biofuel CHP			0.0000	ZC5
Additional allowable electricity generation, kWh/m ² /year			0.0000	ZC6
Resulting CO2 emissions offset from additional allowable electricity generation			0.0000	ZC7
Net CO2 emissions			34.1134	ZC8

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

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

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	71.4500 (1b)	x 2.5400 (2b)	= 181.4830 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	71.4500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 181.4830 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	0	0	0 * 40 =	0.0000 (6a)
Number of open flues	0	0	0	0 * 20 =	0.0000 (6b)
Number of intermittent fans				3 * 10 =	30.0000 (7a)
Number of passive vents				0 * 10 =	0.0000 (7b)
Number of flueless gas fires				0 * 40 =	0.0000 (7c)
Air changes per hour					
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =				30.0000 / (5) =	0.1653 (8)
Pressure test				Yes	
Measured/design AP50					5.0000
Infiltration rate					0.4153 (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) =		0.3530 (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	0.4501	0.4413	0.4324	0.3883	0.3795	0.3354	0.3354	0.3265	0.3530	0.3795	0.3971	0.4148 (22b)
Effective ac	0.6013	0.5974	0.5935	0.5754	0.5720	0.5562	0.5562	0.5533	0.5623	0.5720	0.5789	0.5860 (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)			15.9700	1.3258	21.1723		(27)
External Wall	43.9200	15.9700	27.9500	0.1800	5.0310		(29a)
Sheltered Wall	3.8100	1.8900	1.9200	0.1800	0.3456		(29a)
Total net area of external elements Aum(A, m ²)			47.7300				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	28.4389	(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)							6.1038 (36)
Total fabric heat loss						(33) + (36) =	34.5427 (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	36.0108	35.7753	35.5444	34.4599	34.2570	33.3124	33.3124	33.1375	33.6763	34.2570	34.6675	35.0966 (38)
Heat transfer coeff	70.5536	70.3180	70.0871	69.0026	68.7997	67.8552	67.8552	67.6803	68.2190	68.7997	69.2102	69.6393 (39)
Average = Sum(39)m / 12 =												69.0017 (39)
HLP	0.9875	0.9842	0.9809	0.9657	0.9629	0.9497	0.9497	0.9472	0.9548	0.9629	0.9687	0.9747 (40)
HLP (average)												0.9657 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												2.2808 (42)
Average daily hot water use (litres/day)												88.3692 (43)
Daily hot water use	97.2061	93.6713	90.1365	86.6018	83.0670	79.5322	79.5322	83.0670	86.6018	90.1365	93.6713	97.2061 (44)
Energy conte	144.1538	126.0778	130.1010	113.4252	108.8342	93.9156	87.0266	99.8644	101.0570	117.7722	128.5576	139.6052 (45)
Energy content (annual)												Total = Sum(45)m = 1390.3909 (45)
Distribution loss (46)m = 0.15 x (45)m	21.6231	18.9117	19.5152	17.0138	16.3251	14.0873	13.0540	14.9797	15.1586	17.6658	19.2836	20.9408 (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												
Combi loss	49.5351	43.1145	45.9326	42.7077	42.3300	39.2214	40.5288	42.3300	42.7077	45.9326	46.1941	49.5351 (61)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

Total heat required for water heating calculated for each month	193.6889	169.1923	176.0336	156.1329	151.1642	133.1370	127.5554	142.1944	143.7648	163.7048	174.7517	189.1404 (62)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63)
Output from w/h	193.6889	169.1923	176.0336	156.1329	151.1642	133.1370	127.5554	142.1944	143.7648	163.7048	174.7517	189.1404 (64)
Heat gains from water heating, kWh/month	60.3149	52.6995	54.7417	48.3908	46.7699	41.0323	39.0685	43.7874	44.2784	50.6424	54.2939	58.8025 (65)
												1920.4605 (64)

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	114.0403	114.0403	114.0403	114.0403	114.0403	114.0403	114.0403	114.0403	114.0403	114.0403	114.0403	114.0403 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	17.8879	15.8879	12.9209	9.7820	7.3121	6.1732	6.6704	8.6704	11.6374	14.7763	17.2462	18.3851 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	200.6573	202.7395	197.4924	186.3221	172.2215	158.9689	150.1154	148.0332	153.2802	164.4506	178.5512	191.8038 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.4040	34.4040	34.4040	34.4040	34.4040	34.4040	34.4040	34.4040	34.4040	34.4040	34.4040	34.4040 (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)	-91.2323	-91.2323	-91.2323	-91.2323	-91.2323	-91.2323	-91.2323	-91.2323	-91.2323	-91.2323	-91.2323	-91.2323 (71)
Water heating gains (Table 5)	81.0684	78.4219	73.5776	67.2095	62.8627	56.9893	52.5115	58.8540	61.4978	68.0678	75.4082	79.0357 (72)
Total internal gains	359.8258	357.2614	344.2030	323.5256	302.6084	282.3435	269.5093	275.7697	286.6275	307.5068	331.4177	349.4366 (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							
Southeast	9.1300	36.7938	0.6300	0.7000	0.7700	102.6639 (77)						
Southwest	6.8400	36.7938	0.6300	0.7000	0.7700	76.9136 (79)						
Solar gains	179.5774	305.8868	418.5277	518.5761	580.8484	576.6480	555.9502	509.4923	453.1770	338.0701	215.0924	153.6809 (83)
Total gains	539.4032	663.1482	762.7307	842.1017	883.4569	858.9915	825.4596	785.2620	739.8044	645.5769	546.5101	503.1175 (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	70.3268	70.5624	70.7948	71.9075	72.1195	73.1235	73.1235	73.3124	72.7335	72.1195	71.6918	71.2500	
alpha	5.6885	5.7042	5.7197	5.7938	5.8080	5.8749	5.8749	5.8875	5.8489	5.8080	5.7795	5.7500	
util living area	0.9936	0.9798	0.9435	0.8491	0.6897	0.5010	0.3611	0.3954	0.6190	0.8932	0.9832	0.9955 (86)	
MIT	20.1300	20.3462	20.5977	20.8370	20.9585	20.9946	20.9993	20.9989	20.9826	20.8110	20.4227	20.0915 (87)	
Th 2	20.0938	20.0966	20.0993	20.1120	20.1144	20.1255	20.1255	20.1275	20.1212	20.1144	20.1095	20.1045 (88)	
util rest of house	0.9916	0.9740	0.9281	0.8144	0.6347	0.4346	0.2897	0.3210	0.5472	0.8590	0.9773	0.9941 (89)	
MIT 2	18.9443	19.2574	19.6121	19.9369	20.0782	20.1222	20.1252	20.1271	20.1093	19.9149	19.3803	18.8965 (90)	
Living area fraction	19.1613	19.4568	19.7925	20.1017	20.2393	20.2819	20.2853	20.2867	20.2692	20.0790	19.5711	19.1153 (92)	
Temperature adjustment												0.0000	
adjusted MIT	19.1613	19.4568	19.7925	20.1017	20.2393	20.2819	20.2853	20.2867	20.2692	20.0790	19.5711	19.1153 (93)	

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	533.3605	642.3847	703.1524	685.3984	567.8742	383.6200	249.9071	262.7731	414.0150	553.5172	531.5469	499.0711 (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	1048.5199	1023.6028	931.6333	772.9450	587.5039	385.5483	250.0636	263.0528	420.8551	652.1503	863.1276	1038.6923 (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	383.2786	256.1785	169.9898	63.0335	14.6045	0.0000	0.0000	0.0000	0.0000	73.3830	238.7381	401.4782 (98)
Space heating												1600.6843 (98)
Space heating per m2												22.4029 (99)

8c. Space cooling requirement

Not applicable

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)
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FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

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												1713.7948 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	383.2786	256.1785	169.9898	63.0335	14.6045	0.0000	0.0000	0.0000	0.0000	73.3830	238.7381	401.4782 (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)	410.3625	274.2811	182.0019	67.4877	15.6365	0.0000	0.0000	0.0000	0.0000	78.5685	255.6083	429.8482 (211)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating requirement	193.6889	169.1923	176.0336	156.1329	151.1642	133.1370	127.5554	142.1944	143.7648	163.7048	174.7517	189.1404 (64)
Efficiency of water heater	86.7376	86.0929	84.9634	82.9659	81.0983	80.3000	80.3000	80.3000	80.3000	83.1763	85.8371	80.3000 (216)
Fuel for water heating, kWh/month	223.3045	196.5229	207.1876	188.1892	186.3964	165.7995	158.8486	177.0789	179.0346	196.8166	203.5852	217.6536 (219)
Water heating fuel used												2300.4176 (219)
Annual totals kWh/year												
Space heating fuel - main system												1713.7948 (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)												315.9062 (232)
Total delivered energy for all uses												4405.1186 (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	1713.7948	0.2160	370.1797 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2300.4176	0.2160	496.8902 (264)
Space and water heating			867.0699 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	315.9062	0.5190	163.9553 (268)
Total CO2, kg/m2/year			1069.9502 (272)
Emissions per m2 for space and water heating			12.1353 (272a)
Fuel factor (mains gas)			1.0000
Emissions per m2 for lighting			2.2947 (272b)
Emissions per m2 for pumps and fans			0.5448 (272c)
Target Carbon Dioxide Emission Rate (TER) = (12.1353 * 1.00) + 2.2947 + 0.5448, rounded to 2 d.p.			14.9700 (273)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	TPB12 01-F6	Issued on Date	12/11/2019
Assessment Reference	001	Prop Type Ref	
Property	01-F6, Building 12		

SAP Rating	85 B	DER	15.04	TER	14.97
Environmental	89 B	% DER<TER	-0.44		
CO ₂ Emissions (t/year)	0.93	DFEE	29.63	TFEE	33.11
General Requirements Compliance	Fail	% DFEE<TFEE	10.52		

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

CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

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

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	71.4500 (1b)	x 2.5400 (2b)	= 181.4830 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	71.4500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 181.4830 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	0	0	0 + 40 =	0.0000 (6a)
Number of open flues	0	0	0	0 + 20 =	0.0000 (6b)
Number of intermittent fans				3 + 10 =	30.0000 (7a)
Number of passive vents				0 + 10 =	0.0000 (7b)
Number of flueless gas fires				0 + 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =				30.0000 / (5) =	0.1653 (8)
Pressure test				Yes	
Measured/design AP50				4.0000	
Infiltration rate				0.3653	(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) =	0.3105 (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 infiltr rate	0.3959	0.3881	0.3804	0.3416	0.3338	0.2950	0.2950	0.2872	0.3105	0.3338	0.3493	0.3648 (22b)
Effective ac	0.5784	0.5753	0.5723	0.5583	0.5557	0.5435	0.5435	0.5412	0.5482	0.5557	0.5610	0.5666 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K					
Window (U _w = 1.30)			18.0400	1.2357	22.2928		(27)					
Door to corridor			1.8900	1.4000	2.6460		(26)					
External Wall	43.9200	18.0400	25.8800	0.1700	4.3996		(29a)					
Sheltered Wall	3.8100	1.8900	1.9200	0.2343	0.4498		(29a)					
Total net area of external elements A _{um} (A, m ²)	47.7300						(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	29.7882		(33)					
Party Wall	38.9400			0.0000	0.0000		(32)					
Party Floor 1	71.4500						(32d)					
Party Ceilings 1	71.4500						(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)							8.8536 (36)					
Total fabric heat loss							(33) + (36) = 38.6418 (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
	34.6381	34.4559	34.2772	33.4381	33.2812	32.5503	32.5503	32.4150	32.8318	33.2812	33.5987	33.9308 (38)
Heat transfer coeff	73.2799	73.0977	72.9190	72.0799	71.9230	71.1921	71.1921	71.0568	71.4736	71.9230	72.2405	72.5726 (39)
Average = Sum(39)m / 12 =												72.0792 (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	1.0256	1.0231	1.0206	1.0088	1.0066	0.9964	0.9964	0.9945	1.0003	1.0066	1.0111	1.0157 (40)
HLP (average)												1.0088 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												2.2808 (42)
Average daily hot water use (litres/day)												88.3692 (43)
Daily hot water use	97.2061	93.6713	90.1365	86.6018	83.0670	79.5322	79.5322	83.0670	86.6018	90.1365	93.6713	97.2061 (44)
Energy content (annual)	144.1538	126.0778	130.1010	113.4252	108.8342	93.9156	87.0266	99.8644	101.0570	117.7722	128.5576	139.6052 (45)
Energy content (annual)												Total = Sum(45)m = 1390.3909 (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	30.6327	26.7915	27.6465	24.1029	23.1273	19.9571	18.4932	21.2212	21.4746	25.0266	27.3185	29.6661 (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	114.0403	114.0403	114.0403	114.0403	114.0403	114.0403	114.0403	114.0403	114.0403	114.0403	114.0403	114.0403 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	17.8887	15.8886	12.9215	9.7824	7.3125	6.1735	6.6707	8.6708	11.6379	14.7770	17.2470	18.3859 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	200.6573	202.7395	197.4924	186.3221	172.2215	158.9689	150.1154	148.0332	153.2802	164.4506	178.5512	191.8038 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.4040	34.4040	34.4040	34.4040	34.4040	34.4040	34.4040	34.4040	34.4040	34.4040	34.4040	34.4040 (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)	-91.2323	-91.2323	-91.2323	-91.2323	-91.2323	-91.2323	-91.2323	-91.2323	-91.2323	-91.2323	-91.2323	-91.2323 (71)
Water heating gains (Table 5)	41.1730	39.8684	37.1592	33.4762	31.0850	27.7182	24.8564	28.5231	29.8259	33.6379	37.9424	39.8738 (72)
Total internal gains	316.9311	315.7086	304.7853	286.7928	267.8311	250.0726	238.8545	242.4391	251.9561	270.0776	290.9526	307.2756 (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						
Southeast	10.3100	36.7938	0.6300	0.7000	0.7700	115.9326 (77)						
Southwest	7.7300	36.7938	0.6300	0.7000	0.7700	86.9213 (79)						
Solar gains	202.8539	345.5353	472.7764	585.7929	656.1369	651.3920	628.0114	575.5317	511.9169	381.8901	242.9722	173.6007 (83)
Total gains	519.7850	661.2439	777.5617	872.5857	923.9679	901.4647	866.8660	817.9708	763.8730	651.9677	533.9249	480.8763 (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	67.7103	67.8791	68.0454	68.8375	68.9878	69.6960	69.6960	69.8287	69.4215	68.9878	68.6845	68.3703
alpha	5.5140	5.5253	5.5364	5.5892	5.5992	5.6464	5.6464	5.6552	5.6281	5.5992	5.5790	5.5580
util living area	0.9949	0.9814	0.9443	0.8480	0.6868	0.5001	0.3606	0.3983	0.6250	0.9002	0.9860	0.9966 (86)
MIT	20.0496	20.2897	20.5650	20.8217	20.9537	20.9935	20.9991	20.9985	20.9787	20.7826	20.3558	20.0029 (87)
Th 2	20.0620	20.0642	20.0662	20.0760	20.0778	20.0863	20.0863	20.0879	20.0831	20.0778	20.0741	20.0703 (88)
util rest of house	0.9932	0.9759	0.9288	0.8124	0.6301	0.4311	0.2861	0.3200	0.5502	0.8667	0.9809	0.9954 (89)
MIT 2	19.2030	19.4410	19.7068	19.9455	20.0504	20.0837	20.0861	20.0875	20.0731	19.9204	19.5164	19.1634 (90)
Living area fraction										fLA = Living area / (4) =		0.1831 (91)
MIT	19.3579	19.5964	19.8639	20.1059	20.2157	20.2502	20.2533	20.2543	20.2389	20.0783	19.6701	19.3171 (92)
Temperature adjustment												0.0000
adjusted MIT	19.3579	19.5964	19.8639	20.1059	20.2157	20.2502	20.2533	20.2543	20.2389	20.0783	19.6701	19.3171 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9916	0.9725	0.9249	0.8136	0.6389	0.4436	0.2998	0.3344	0.5633	0.8667	0.9780	0.9942 (94)
Useful gains	515.4220	643.0692	719.1872	709.9731	590.3530	399.9013	259.8811	273.5000	430.3129	565.0765	522.2010	478.1059 (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	1103.4452	1074.2699	974.4826	807.7229	612.4760	402.2514	260.0845	273.8746	438.7702	681.7051	908.0708	1097.0854 (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	437.4892	289.7669	189.9398	70.3799	16.4595	0.0000	0.0000	0.0000	0.0000	86.7716	277.8263	460.5207 (98)
Space heating												1829.1540 (98)
Space heating per m2											(98) / (4) =	25.6005 (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	669.2062	526.8219	540.0318	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9789	0.9916	0.9881	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	655.0563	522.4196	533.5825	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1138.3680	1096.2070	1040.4262	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	347.9844	426.8978	377.0918	0.0000	0.0000	0.0000	0.0000 (104)
Space cooling												1151.9739 (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	86.9961	106.7244	94.2729	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling												287.9935 (107)
Space cooling per m2												4.0307 (108)
Energy for space heating												25.6005 (99)
Energy for space cooling												4.0307 (108)
Total												29.6312 (109)
Dwelling Fabric Energy Efficiency (DFEE)												29.6 (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	71.4500 (1b)	x 2.5400 (2b)	= 181.4830 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	71.4500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 181.4830 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	0	0	0 * 40 =	0.0000 (6a)
Number of open flues	0	0	0	0 * 20 =	0.0000 (6b)
Number of intermittent fans				3 * 10 =	30.0000 (7a)
Number of passive vents				0 * 10 =	0.0000 (7b)
Number of flueless gas fires				0 * 40 =	0.0000 (7c)
Air changes per hour					
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =				30.0000 / (5) =	0.1653 (8)
Pressure test				Yes	
Measured/design AP50					5.0000
Infiltration rate					0.4153 (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) =		0.3530 (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	0.4501	0.4413	0.4324	0.3883	0.3795	0.3354	0.3354	0.3265	0.3530	0.3795	0.3971	0.4148 (22b)
Effective ac	0.6013	0.5974	0.5935	0.5754	0.5720	0.5562	0.5562	0.5533	0.5623	0.5720	0.5789	0.5860 (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)			15.9700	1.3258	21.1723		(27)					
External Wall	43.9200	15.9700	27.9500	0.1800	5.0310		(29a)					
Sheltered Wall	3.8100	1.8900	1.9200	0.1800	0.3456		(29a)					
Total net area of external elements Aum(A, m ²)			47.7300				(31)					
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	28.4389	(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)							6.1038 (36)					
Total fabric heat loss						(33) + (36) =	34.5427 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	36.0108	35.7753	35.5444	34.4599	34.2570	33.3124	33.3124	33.1375	33.6763	34.2570	34.6675	35.0966 (38)
Heat transfer coeff	70.5536	70.3180	70.0871	69.0026	68.7997	67.8552	67.8552	67.6803	68.2190	68.7997	69.2102	69.6393 (39)
Average = Sum(39)m / 12 =												69.0017 (39)
HLP	0.9875	0.9842	0.9809	0.9657	0.9629	0.9497	0.9497	0.9472	0.9548	0.9629	0.9687	0.9747 (40)
HLP (average)												0.9657 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												2.2808 (42)
Average daily hot water use (litres/day)												88.3692 (43)
Daily hot water use	97.2061	93.6713	90.1365	86.6018	83.0670	79.5322	79.5322	83.0670	86.6018	90.1365	93.6713	97.2061 (44)
Energy conte	144.1538	126.0778	130.1010	113.4252	108.8342	93.9156	87.0266	99.8644	101.0570	117.7722	128.5576	139.6052 (45)
Energy content (annual)												Total = Sum(45)m = 1390.3909 (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)
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)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

Heat gains from water heating, kWh/month
 30.6327 26.7915 27.6465 24.1029 23.1273 19.9571 18.4932 21.2212 21.4746 25.0266 27.3185 29.6661 (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	114.0403	114.0403	114.0403	114.0403	114.0403	114.0403	114.0403	114.0403	114.0403	114.0403	114.0403	114.0403 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	17.8879	15.8879	12.9209	9.7820	7.3121	6.1732	6.6704	8.6704	11.6374	14.7763	17.2462	18.3851 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	200.6573	202.7395	197.4924	186.3221	172.2215	158.9689	150.1154	148.0332	153.2802	164.4506	178.5512	191.8038 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.4040	34.4040	34.4040	34.4040	34.4040	34.4040	34.4040	34.4040	34.4040	34.4040	34.4040	34.4040 (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)	-91.2323	-91.2323	-91.2323	-91.2323	-91.2323	-91.2323	-91.2323	-91.2323	-91.2323	-91.2323	-91.2323	-91.2323 (71)
Water heating gains (Table 5)	41.1730	39.8684	37.1592	33.4762	31.0850	27.7182	24.8564	28.5231	29.8259	33.6379	37.9424	39.8738 (72)
Total internal gains	316.9303	315.7079	304.7847	286.7923	267.8307	250.0724	238.8542	242.4387	251.9556	270.0769	290.9518	307.2748 (73)

6. Solar gains

[Jan]	Area m ²	Solar flux Table 6a W/m ²	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W						
Southeast	9.1300	36.7938	0.6300	0.7000	0.7700	102.6639 (77)						
Southwest	6.8400	36.7938	0.6300	0.7000	0.7700	76.9136 (79)						
Solar gains	179.5774	305.8868	418.5277	518.5761	580.8484	576.6480	555.9502	509.4923	453.1770	338.0701	215.0924	153.6809 (83)
Total gains	496.5077	621.5947	723.3123	805.3684	848.6792	826.7204	794.8045	751.9310	705.1325	608.1470	506.0442	460.9556 (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	70.3268	70.5624	70.7948	71.9075	72.1195	73.1235	73.1235	73.3124	72.7335	72.1195	71.6918	71.2500
alpha	5.6885	5.7042	5.7197	5.7938	5.8080	5.8749	5.8749	5.8875	5.8489	5.8080	5.7795	5.7500
util living area	0.9957	0.9850	0.9541	0.8677	0.7118	0.5195	0.3749	0.4127	0.6453	0.9128	0.9883	0.9971 (86)
MIT	20.0737	20.2954	20.5577	20.8149	20.9514	20.9935	20.9992	20.9986	20.9786	20.7817	20.3721	20.0356 (87)
Th 2	20.0938	20.0966	20.0993	20.1120	20.1144	20.1255	20.1255	20.1275	20.1212	20.1144	20.1095	20.1045 (88)
util rest of house	0.9944	0.9805	0.9410	0.8351	0.6567	0.4511	0.3008	0.3352	0.5720	0.8826	0.9840	0.9962 (89)
MIT 2	19.2532	19.4742	19.7297	19.9745	20.0850	20.1228	20.1253	20.1272	20.1110	19.9540	19.5625	19.2242 (90)
Living area fraction	fLA = Living area / (4) =											0.1831 (91)
MIT	19.4034	19.6246	19.8813	20.1284	20.2436	20.2822	20.2853	20.2867	20.2698	20.1055	19.7107	19.3727 (92)
Temperature adjustment												0.0000
adjusted MIT	19.4034	19.6246	19.8813	20.1284	20.2436	20.2822	20.2853	20.2867	20.2698	20.1055	19.7107	19.3727 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9930	0.9775	0.9373	0.8358	0.6651	0.4635	0.3144	0.3494	0.5848	0.8822	0.9815	0.9952 (94)
Useful gains	493.0446	607.6125	677.9404	673.1295	564.4840	383.2236	249.8717	262.6995	412.3550	536.5269	496.7020	458.7432 (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	1065.5992	1035.4027	937.8554	774.7873	587.7997	385.5652	250.0639	263.0526	420.9010	653.9775	872.7892	1056.6163 (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	425.9807	287.4750	193.3767	73.1936	17.3469	0.0000	0.0000	0.0000	0.0000	87.3832	270.7828	444.8175 (98)
Space heating												1800.3565 (98)
Space heating per m ²												(98) / (4) = 25.1974 (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	637.8387	502.1284	514.3700	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9784	0.9917	0.9882	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	624.0587	497.9736	508.3253	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1051.0042	1011.9788	963.2363	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	307.4008	382.4199	338.4538	0.0000	0.0000	0.0000	0.0000 (104)
Space cooling												1028.2745 (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)

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	76.8502	95.6050	84.6135	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling													257.0686 (107)
Space cooling per m2													3.5979 (108)
Energy for space heating													25.1974 (99)
Energy for space cooling													3.5979 (108)
Total													28.7953 (109)
Target Fabric Energy Efficiency (TFEE)													33.1 (109)

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)



Property Reference	TPB12 01-F6	Issued on Date	12/11/2019
Assessment Reference	001	Prop Type Ref	
Property	01-F6, Building 12		

SAP Rating	85 B	DER	15.04	TER	14.97
Environmental	89 B	% DER<TER	-0.44		
CO₂ Emissions (t/year)	0.93	DFEE	29.63	TFEE	33.11
General Requirements Compliance	Fail	% DFEE<TFEE	10.52		

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

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Criterion 1 – Achieving the TER and TFEE rate

1a TER and DER

Fuel for main heating	Mains gas		
Fuel factor	1.00 (mains gas)		
Target Carbon Dioxide Emission Rate (TER)	14.97	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	15.04	kgCO ₂ /m ²	
Excess emissions	0.07 (0.5%)	kgCO ₂ /m ²	Fail

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	33.11	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	29.63	kWh/m ² /yr	
	-3.5 (-10.6%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.17 (max. 0.30)	0.23 (max. 0.70)	Pass
Party wall	0.00 (max. 0.20)	-	Pass
Openings	1.31 (max. 2.00)	1.40 (max. 3.30)	Pass

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

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

Limiting System Efficiencies

4 Heating efficiency

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

5 Cylinder insulation

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)



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)

High

Fail

Based on:

Overshading

Average

Windows facing South East

10.31 m², No overhang

Windows facing South West

7.73 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

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 ²)	DER (kgCO ₂ /m ²)	TER (kgCO ₂ /m ²)
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 ₂ /m ²			PASS	
Average TER = 17.20 kgCO ₂ /m ²				

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 ²)	DFEE (kWh/m ² /yr)	TFEE (kWh/m ² /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 ² /yr			PASS	
Average TFEE = 41.93 kWh/m ² /yr				