

PREDICTED ENERGY ASSESSMENT

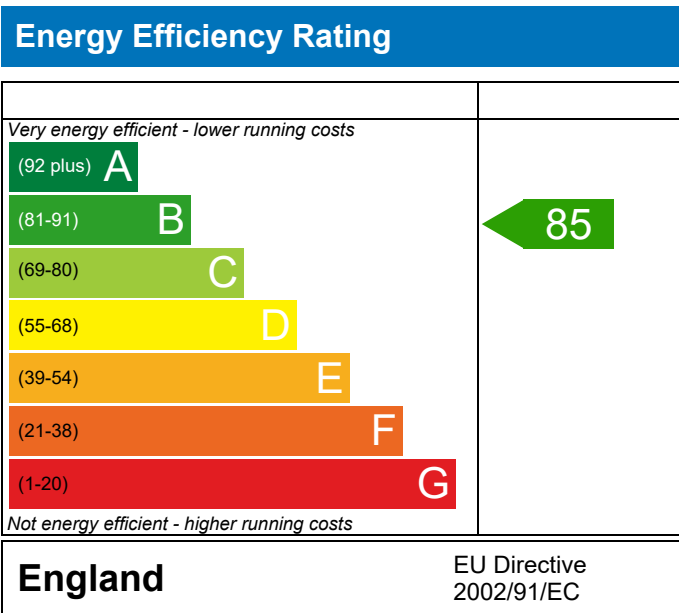
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02-F11, Building 12

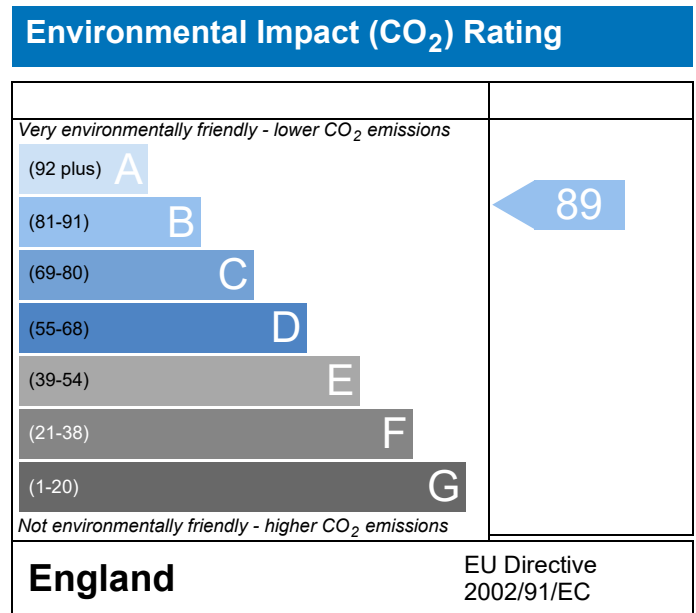
Dwelling type: Flat, End-Terrace
 Date of assessment: 12/11/2019
 Produced by: Harry Davey
 Total floor area: 75.65 m²
 DRRN: 9929-4902-1953

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)

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Property Reference	TPB12 02-F11			Issued on Date	12/11/2019
Assessment Reference	001	Prop Type Ref			
Property	02-F11, Building 12				
SAP Rating	85 B	DER	15.17	TER	15.22
Environmental	89 B	% DER<TER	0.34		
CO ₂ Emissions (t/year)	0.97	DFEE	29.68	TFEE	33.40
General Requirements Compliance	Fail	% DFEE<TFEE	11.15		
Assessor Details	Mr. Harry Davey, energytest, Tel: 01892 315466, hdavey@energy-test.co.uk			Assessor ID	R434-0001
Client					

FULL SAP CALCULATION PRINTOUT

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

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DWELLING AS DESIGNED

Mid-floor flat, total floor area 76 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) 15.22 kgCO₂/m²
 Dwelling Carbon Dioxide Emission Rate (DER) 15.17 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)33.4 kWh/m²/yr
 Dwelling Fabric Energy Efficiency (DFEE)29.7 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.18 (max. 0.30)	0.23 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	(no floor)		
Roof	0.10 (max. 0.20)	0.10 (max. 0.35)	OK
Openings	1.32 (max. 2.00)	1.40 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

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

4 Heating efficiency

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

Secondary heating system:

None

5 Cylinder insulation

Hot water storage No cylinder

6 Controls

Space heating controls: Time and temperature zone control OK

Hot water controls:

No cylinder

Boiler interlock

Yes

OK

7 Low energy lights

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

8 Mechanical ventilation

Continuous extract system
 Specific fan power: 0.18
 Maximum 0.7 OK

9 Summertime temperature

Overheating risk (Thames Valley): High Fail

Based on:

Overshading: Average
 Windows facing North East: 1.71 m², No overhang
 Windows facing South East: 8.57 m², No overhang
 Air change rate: 0.10 ach
 Blinds/curtains: Light-coloured curtain or roller blind, closed 100% of daylight hours

10 Key features

Party wall U-value 0.00 W/m²K
 Roof U-value 0.10 W/m²K

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

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CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

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

1. Overall dwelling dimensions

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	75.6500 (1b)	x 2.5400 (2b)	= 192.1510 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	75.6500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 192.1510 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour
Number of chimneys	0	0	0	0 * 40 =	0.0000 (6a)
Number of open flues	0	0	0	0 * 20 =	0.0000 (6b)
Number of intermittent fans				0 * 10 =	0.0000 (7a)
Number of passive vents				0 * 10 =	0.0000 (7b)
Number of flueless gas fires				0 * 40 =	0.0000 (7c)
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)			10.2800	1.2357	12.7034		(27)
Door to corridor			1.8900	1.4000	2.6460		(26)
External Wall	43.8700	10.2800	33.5900	0.1700	5.7103		(29a)
Sheltered Wall	11.1300	1.8900	9.2400	0.2343	2.1648		(29a)
0.72	3.3200		3.3200	0.1000	0.3320		(30)
Total net area of external elements Aum(A, m2)			58.3200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	23.5565		(33)
Party Wall			26.8700	0.0000	0.0000		(32)
Party Floor 1			75.6500				(32d)
Party Ceilings 1			72.3300				(32b)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							7.9020 (36)
Total fabric heat loss						(33) + (36) =	31.4585 (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	31.7049	31.7049	31.7049	31.7049	31.7049	31.7049	31.7049	31.7049	31.7049	31.7049	31.7049	31.7049 (38)
Heat transfer coeff	63.1634	63.1634	63.1634	63.1634	63.1634	63.1634	63.1634	63.1634	63.1634	63.1634	63.1634	63.1634 (39)
Average = Sum(39)m / 12 =												63.1634 (39)
HLP	0.8349	0.8349	0.8349	0.8349	0.8349	0.8349	0.8349	0.8349	0.8349	0.8349	0.8349	0.8349 (40)
HLP (average)												0.8349 (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												2.3751 (42)
Average daily hot water use (litres/day)												90.6098 (43)
Daily hot water use	99.6707	96.0464	92.4220	88.7976	85.1732	81.5488	81.5488	85.1732	88.7976	92.4220	96.0464	99.6707 (44)
Energy conte	147.8088	129.2745	133.3998	116.3011	111.5937	96.2969	89.2332	102.3964	103.6194	120.7584	131.8172	143.1450 (45)
Energy content (annual)												Total = Sum(45)m = 1425.6445 (45)
Distribution loss (46)m = 0.15 x (45)m												

FULL SAP CALCULATION PRINTOUT

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CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Water storage loss:	22.1713	19.3912	20.0100	17.4452	16.7391	14.4445	13.3850	15.3595	15.5429	18.1138	19.7726	21.4717 (46)
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	50.7911	44.2076	47.0972	43.7906	43.4033	40.2158	41.5564	43.4033	43.7906	47.0972	47.3653	50.7911 (61)
Total heat required for water heating calculated for each month	198.6000	173.4822	180.4970	160.0917	154.9970	136.5127	130.7896	145.7997	147.4100	167.8556	179.1825	193.9361 (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	198.6000	173.4822	180.4970	160.0917	154.9970	136.5127	130.7896	145.7997	147.4100	167.8556	179.1825	193.9361 (64)
Heat gains from water heating, kWh/month	61.8442	54.0357	56.1297	49.6178	47.9557	42.0727	40.0591	44.8976	45.4011	51.9265	55.6706	60.2935 (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	118.7574	118.7574	118.7574	118.7574	118.7574	118.7574	118.7574	118.7574	118.7574	118.7574	118.7574	118.7574 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	20.2268	17.9653	14.6103	11.0610	8.2682	6.9804	7.5425	9.8041	13.1590	16.7084	19.5011	20.7890 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	210.1099	212.2902	206.7960	195.0994	180.3345	166.4577	157.1870	155.0068	160.5010	172.1976	186.9625	200.8393 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.8757	34.8757	34.8757	34.8757	34.8757	34.8757	34.8757	34.8757	34.8757	34.8757	34.8757	34.8757 (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)	-95.0059	-95.0059	-95.0059	-95.0059	-95.0059	-95.0059	-95.0059	-95.0059	-95.0059	-95.0059	-95.0059	-95.0059 (71)
Water heating gains (Table 5)	83.1239	80.4103	75.4432	68.9136	64.4566	58.4343	53.8429	60.3463	63.0571	69.7936	77.3202	81.0396 (72)
Total internal gains	375.0879	372.2930	358.4767	336.7011	314.6866	293.4995	280.1997	286.7843	298.3443	320.3268	345.4110	364.2951 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data g or Table 6b	Specific data FF or Table 6c	Access factor Table 6d	Gains W						
Northeast	1.7100	11.2829	0.6300	0.7000	0.7700	5.8964 (75)						
Southeast	8.5700	36.7938	0.6300	0.7000	0.7700	96.3669 (77)						
Solar gains	102.2633	176.1508	246.2195	313.7977	359.4386	360.3403	345.9496	311.3642	269.5387	196.0868	122.8445	87.2853 (83)
Total gains	477.3512	548.4438	604.6962	650.4988	674.1252	653.8398	626.1493	598.1485	567.8829	516.4136	468.2555	451.5804 (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	83.1727	83.1727	83.1727	83.1727	83.1727	83.1727	83.1727	83.1727	83.1727	83.1727	83.1727	83.1727
alpha	6.5448	6.5448	6.5448	6.5448	6.5448	6.5448	6.5448	6.5448	6.5448	6.5448	6.5448	6.5448
util living area	0.9969	0.9918	0.9765	0.9263	0.8009	0.6078	0.4426	0.4835	0.7309	0.9471	0.9923	0.9979 (86)
MIT	20.3865	20.4912	20.6370	20.7987	20.9115	20.9517	20.9577	20.9571	20.9379	20.7927	20.5501	20.3553 (87)
Th 2	20.2232	20.2232	20.2232	20.2232	20.2232	20.2232	20.2232	20.2232	20.2232	20.2232	20.2232	20.2232 (88)
util rest of house	0.9960	0.9893	0.9693	0.9048	0.7534	0.5386	0.3652	0.4031	0.6624	0.9269	0.9895	0.9972 (89)
MIT 2	19.3950	19.5470	19.7562	19.9790	20.1182	20.1579	20.1619	20.1617	20.1469	19.9753	19.6334	19.3495 (90)
Living area fraction	fLA = Living area / (4) = 0.2013 (91)											
MIT	19.5946	19.7371	19.9335	20.1441	20.2779	20.3177	20.3221	20.3218	20.3062	20.1399	19.8179	19.5520 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.5946	19.7371	19.9335	20.1441	20.2779	20.3177	20.3221	20.3218	20.3062	20.1399	19.8179	19.5520 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	474.9457	541.4971	584.1770	586.9655	510.3008	357.7874	234.8615	247.2618	380.5730	477.3082	462.4469	449.9523 (95)
Ext temp.	4.3000	4.9000	6.5000	8.0000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	966.0602	937.1603	848.5078	710.2133	541.8080	361.1480	235.1029	247.7153	392.0038	602.5714	803.3078	969.6847 (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	365.3892	265.8857	196.6622	88.7384	23.4413	0.0000	0.0000	0.0000	0.0000	93.1958	245.4199	386.6809 (98)
Space heating	1665.4134 (98)											
Space heating per m2	(98) / (4) = 22.0147 (99)											

8c. Space cooling requirement

Not applicable

FULL SAP CALCULATION PRINTOUT

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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													1785.0090 (211)
Space heating requirement	365.3892	265.8857	196.6622	88.7384	23.4413	0.0000	0.0000	0.0000	0.0000	93.1958	245.4199	386.6809	(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)	391.6283	284.9793	210.7847	95.1108	25.1247	0.0000	0.0000	0.0000	0.0000	99.8883	263.0438	414.4490	(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	198.6000	173.4822	180.4970	160.0917	154.9970	136.5127	130.7896	145.7997	147.4100	167.8556	179.1825	193.9361	(64)
Efficiency of water heater (217)m	86.4656	86.0225	85.1671	83.5319	81.3960	80.2000	80.2000	80.2000	80.2000	83.5356	85.7432	80.2000	(216)
Fuel for water heating, kWh/month	229.6867	201.6706	211.9328	191.6533	190.4234	170.2154	163.0793	181.7952	183.8029	200.9390	208.9758	223.8028	(219)
Water heating fuel used													2357.9772 (219)
Annual totals kWh/year													
Space heating fuel - main system													1785.0090 (211)
Space heating fuel - secondary													0.0000 (215)
Electricity for pumps and fans: (MEVCentralised, Database: in-use factor = 1.3000, SFP = 0.2340) mechanical ventilation fans (SFP = 0.2340) central heating pump main heating flue fan													54.8553 (230a) 30.0000 (230c) 45.0000 (230e)
Total electricity for the above, kWh/year													129.8553 (231)
Electricity for lighting (calculated in Appendix L)													357.2115 (232)
Total delivered energy for all uses													4630.0529 (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	1785.0090	0.2160	385.5619	(261)
Space heating - secondary	0.0000	0.0000	0.0000	(263)
Water heating (other fuel)	2357.9772	0.2160	509.3231	(264)
Space and water heating			894.8850	(265)
Pumps and fans	129.8553	0.5190	67.3949	(267)
Energy for lighting	357.2115	0.5190	185.3927	(268)
Total CO2, kg/year			1147.6726	(272)
Dwelling Carbon Dioxide Emission Rate (DER)			15.1700	(273)

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

DER			15.1700	ZC1
Total Floor Area		TFA	75.6500	
Assumed number of occupants		N	2.3751	
CO2 emission factor in Table 12 for electricity displaced from grid		EF	0.5190	
CO2 emissions from appliances, equation (L14)			16.4583	ZC2
CO2 emissions from cooking, equation (L16)			2.3266	ZC3
Total CO2 emissions			33.9548	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			33.9548	ZC8

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

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CALCULATION OF TARGET EMISSIONS 09 Jan 2014

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

1. Overall dwelling dimensions

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	75.6500 (1b)	x 2.5400 (2b)	= 192.1510 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	75.6500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 192.1510 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour
Number of chimneys	0	0	0	0 * 40 =	0.0000 (6a)
Number of open flues	0	0	0	0 * 20 =	0.0000 (6b)
Number of intermittent fans				3 * 10 =	30.0000 (7a)
Number of passive vents				0 * 10 =	0.0000 (7b)
Number of flueless gas fires				0 * 40 =	0.0000 (7c)
Air changes per hour					
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =				30.0000 / (5) =	0.1561 (8)
Pressure test				Yes	
Measured/design AP50				5.0000	
Infiltration rate					0.4061 (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) =		0.3452 (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	0.4401	0.4315	0.4229	0.3797	0.3711	0.3279	0.3279	0.3193	0.3452	0.3711	0.3884	0.4056 (22b)
Effective ac	0.5969	0.5931	0.5894	0.5721	0.5689	0.5538	0.5538	0.5510	0.5596	0.5689	0.5754	0.5823 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
TER Opaque door			1.8900	1.0000	1.8900		(26)
TER Opening Type (Uw = 1.40)			10.2800	1.3258	13.6288		(27)
External Wall	43.8700	10.2800	33.5900	0.1800	6.0462		(29a)
Sheltered Wall	11.1300	1.8900	9.2400	0.1800	1.6632		(29a)
0.72			3.3200	0.1300	0.4316		(30)
Total net area of external elements Aum(A, m2)			58.3200				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	23.6598	(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							5.6994 (36)
Total fabric heat loss							(33) + (36) = 29.3592 (37)

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

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	37.8469	37.6084	37.3746	36.2766	36.0711	35.1148	35.1148	34.9377	35.4831	36.0711	36.4867	36.9212 (38)
Average = Sum(39)m / 12 =	67.2061	66.9676	66.7338	65.6358	65.4303	64.4740	64.4740	64.2969	64.8423	65.4303	65.8459	66.2804 (39)
												65.6348 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.8884	0.8852	0.8821	0.8676	0.8649	0.8523	0.8523	0.8499	0.8571	0.8649	0.8704	0.8761 (40)
HLP (average)												0.8676 (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												2.3751 (42)
Average daily hot water use (litres/day)												90.6098 (43)
Daily hot water use	99.6707	96.0464	92.4220	88.7976	85.1732	81.5488	81.5488	85.1732	88.7976	92.4220	96.0464	99.6707 (44)
Energy conte	147.8088	129.2745	133.3998	116.3011	111.5937	96.2969	89.2332	102.3964	103.6194	120.7584	131.8172	143.1450 (45)
Energy content (annual)												Total = Sum(45)m = 1425.6445 (45)
Distribution loss (46)m = 0.15 x (45)m	22.1713	19.3912	20.0100	17.4452	16.7391	14.4445	13.3850	15.3595	15.5429	18.1138	19.7726	21.4717 (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

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CALCULATION OF TARGET EMISSIONS 09 Jan 2014

Combi loss	50.7911	44.2076	47.0972	43.7906	43.4033	40.2158	41.5564	43.4033	43.7906	47.0972	47.3653	50.7911 (61)
Total heat required for water heating calculated for each month	198.6000	173.4822	180.4970	160.0917	154.9970	136.5127	130.7896	145.7997	147.4100	167.8556	179.1825	193.9361 (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	198.6000	173.4822	180.4970	160.0917	154.9970	136.5127	130.7896	145.7997	147.4100	167.8556	179.1825	193.9361 (64)
Heat gains from water heating, kWh/month	61.8442	54.0357	56.1297	49.6178	47.9557	42.0727	40.0591	44.8976	45.4011	51.9265	55.6706	60.2935 (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	118.7574	118.7574	118.7574	118.7574	118.7574	118.7574	118.7574	118.7574	118.7574	118.7574	118.7574	118.7574 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	20.2268	17.9653	14.6103	11.0610	8.2682	6.9804	7.5425	9.8041	13.1590	16.7084	19.5011	20.7890 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	210.1099	212.2902	206.7960	195.0994	180.3345	166.4577	157.1870	155.0068	160.5010	172.1976	186.9625	200.8393 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.8757	34.8757	34.8757	34.8757	34.8757	34.8757	34.8757	34.8757	34.8757	34.8757	34.8757	34.8757 (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)	-95.0059	-95.0059	-95.0059	-95.0059	-95.0059	-95.0059	-95.0059	-95.0059	-95.0059	-95.0059	-95.0059	-95.0059 (71)
Water heating gains (Table 5)	83.1239	80.4103	75.4432	68.9136	64.4566	58.4343	53.8429	60.3463	63.0571	69.7936	77.3202	81.0396 (72)
Total internal gains	375.0879	372.2930	358.4767	336.7011	314.6866	293.4995	280.1997	286.7843	298.3443	320.3268	345.4110	364.2951 (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	1.7100	11.2829	0.6300	0.7000	0.7700	5.8964 (75)						
Southeast	8.5700	36.7938	0.6300	0.7000	0.7700	96.3669 (77)						
Solar gains	102.2633	176.1508	246.2195	313.7977	359.4386	360.3403	345.9496	311.3642	269.5387	196.0868	122.8445	87.2853 (83)
Total gains	477.3512	548.4438	604.6962	650.4988	674.1252	653.8398	626.1493	598.1485	567.8829	516.4136	468.2555	451.5804 (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	78.1696	78.4480	78.7228	80.0398	80.2911	81.4821	81.4821	81.7065	81.0192	80.2911	79.7843	79.2613	
alpha	6.2113	6.2299	6.2482	6.3360	6.3527	6.4321	6.4321	6.4471	6.4013	6.3527	6.3190	6.2841	
util living area	0.9972	0.9927	0.9794	0.9335	0.8160	0.6186	0.4515	0.4918	0.7440	0.9519	0.9929	0.9980 (86)	
MIT	20.1574	20.3038	20.5101	20.7554	20.9235	20.9893	20.9987	20.9979	20.9674	20.7526	20.4109	20.1339 (87)	
Th 2	20.1774	20.1801	20.1827	20.1951	20.1974	20.2083	20.2083	20.2103	20.2041	20.1974	20.1927	20.1878 (88)	
util rest of house	0.9963	0.9904	0.9729	0.9132	0.7686	0.5475	0.3711	0.4088	0.6745	0.9328	0.9902	0.9973 (89)	
MIT 2	19.0481	19.2629	19.5619	19.9127	20.1249	20.2013	20.2078	20.2094	20.1795	19.9169	19.4294	19.0217 (90)	
Living area fraction	fLA = Living area / (4) =												0.2013 (91)
MIT	19.2714	19.4724	19.7528	20.0824	20.2857	20.3599	20.3670	20.3681	20.3381	20.0851	19.6270	19.2456 (92)	
Temperature adjustment													0.0000
adjusted MIT	19.2714	19.4724	19.7528	20.0824	20.2857	20.3599	20.3670	20.3681	20.3381	20.0851	19.6270	19.2456 (93)	

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	0.9949	0.9877	0.9686	0.9099	0.7742	0.5614	0.3873	0.4255	0.6869	0.9295	0.9877	0.9962 (94)	
Useful gains	474.8962	541.7096	585.7096	591.9037	521.9407	367.0839	242.5381	254.5354	390.0600	480.0185	462.5086	449.8739 (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	1006.1695	975.8798	884.4076	733.9628	561.7629	371.3661	242.8747	255.1385	404.4961	620.6161	824.8528	997.2314 (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	395.2674	291.7624	222.2313	102.2825	29.6277	0.0000	0.0000	0.0000	0.0000	104.6046	260.8878	407.2339 (98)	
Space heating													1813.8976 (98)
Space heating per m2													(98) / (4) = 23.9775 (99)

8c. Space cooling requirement

Not applicable

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

FULL SAP CALCULATION PRINTOUT

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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													1942.0745 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	395.2674	291.7624	222.2313	102.2825	29.6277	0.0000	0.0000	0.0000	0.0000	104.6046	260.8878	407.2339	(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)	423.1985	312.3794	237.9350	109.5102	31.7213	0.0000	0.0000	0.0000	0.0000	111.9963	279.3231	436.0106	(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	198.6000	173.4822	180.4970	160.0917	154.9970	136.5127	130.7896	145.7997	147.4100	167.8556	179.1825	193.9361	(64)
Efficiency of water heater	86.7510	86.3501	85.5759	83.9567	81.7660	80.3000	80.3000	80.3000	80.3000	83.8988	85.9959	86.8750	(216)
Fuel for water heating, kWh/month	228.9309	200.9056	210.9203	190.6837	189.5617	170.0034	162.8762	181.5688	183.5740	200.0692	208.3617	223.2358	(219)
Water heating fuel used													2350.6914 (219)
Annual totals kWh/year													
Space heating fuel - main system													1942.0745 (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)													357.2115 (232)
Total delivered energy for all uses													4724.9774 (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	1942.0745	0.2160	419.4881 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2350.6914	0.2160	507.7493 (264)
Space and water heating			927.2374 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	357.2115	0.5190	185.3927 (268)
Total CO2, kg/m2/year			1151.5552 (272)
Emissions per m2 for space and water heating			12.2569 (272a)
Fuel factor (mains gas)			1.0000
Emissions per m2 for lighting			2.4507 (272b)
Emissions per m2 for pumps and fans			0.5145 (272c)
Target Carbon Dioxide Emission Rate (TER) = (12.2569 * 1.00) + 2.4507 + 0.5145, rounded to 2 d.p.			15.2200 (273)

FULL SAP CALCULATION PRINTOUT

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Property Reference	TPB12 02-F11	Issued on Date	12/11/2019
Assessment Reference	001	Prop Type Ref	
Property	02-F11, Building 12		

SAP Rating	85 B	DER	15.17	TER	15.22
Environmental	89 B	% DER<TER	0.34		
CO ₂ Emissions (t/year)	0.97	DFEE	29.68	TTEE	33.40
General Requirements Compliance	Fail	% DFEE<TTEE	11.15		

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	75.6500 (1b)	x 2.5400 (2b)	= 192.1510 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	75.6500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 192.1510 (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)				Air changes per hour	0.1561 (8)
Pressure test				30.0000 / (5) =	Yes
Measured/design AP50					4.0000
Infiltration rate					0.3561 (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) =	0.3027 (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	0.3860	0.3784	0.3708	0.3330	0.3254	0.2876	0.2876	0.2800	0.3027	0.3254	0.3405	0.3557 (22b)
Effective ac	0.5745	0.5716	0.5688	0.5554	0.5529	0.5413	0.5413	0.5392	0.5458	0.5529	0.5580	0.5633 (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)			10.2800	1.2357	12.7034		(27)					
Door to corridor			1.8900	1.4000	2.6460		(26)					
External Wall	43.8700	10.2800	33.5900	0.1700	5.7103		(29a)					
Sheltered Wall	11.1300	1.8900	9.2400	0.2343	2.1648		(29a)					
0.72	3.3200		3.3200	0.1000	0.3320		(30)					
Total net area of external elements Aum(A, m ²)			58.3200				(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	23.5565		(33)					
Party Wall			26.8700	0.0000	0.0000		(32)					
Party Floor 1			75.6500				(32d)					
Party Ceilings 1			72.3300				(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)							7.9020 (36)					
Total fabric heat loss						(33) + (36) =	31.4585 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	36.4277	36.2443	36.0645	35.2202	35.0622	34.3269	34.3269	34.1907	34.6101	35.0622	35.3818	35.7159 (38)
Average = Sum(39)m / 12 =	67.8862	67.7028	67.5230	66.6787	66.5208	65.7854	65.7854	65.6492	66.0686	66.5208	66.8403	67.1744 (39)
												66.6780 (39)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

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CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.8974	0.8949	0.8926	0.8814	0.8793	0.8696	0.8696	0.8678	0.8733	0.8793	0.8835	0.8880 (40)
HLP (average)												0.8814 (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												2.3751 (42)
Average daily hot water use (litres/day)												90.6098 (43)
Daily hot water use	99.6707	96.0464	92.4220	88.7976	85.1732	81.5488	81.5488	85.1732	88.7976	92.4220	96.0464	99.6707 (44)
Energy content (annual)	147.8088	129.2745	133.3998	116.3011	111.5937	96.2969	89.2332	102.3964	103.6194	120.7584	131.8172	143.1450 (45)
Energy content (annual)												Total = Sum(45)m = 1425.6445 (45)
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Heat gains from water heating, kWh/month	31.4094	27.4708	28.3474	24.7140	23.7137	20.4631	18.9621	21.7592	22.0191	25.6612	28.0112	30.4183 (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	118.7574	118.7574	118.7574	118.7574	118.7574	118.7574	118.7574	118.7574	118.7574	118.7574	118.7574	118.7574 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	20.2268	17.9653	14.6103	11.0610	8.2682	6.9804	7.5425	9.8041	13.1590	16.7084	19.5011	20.7890 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	210.1099	212.2902	206.7960	195.0994	180.3345	166.4577	157.1870	155.0068	160.5010	172.1976	186.9625	200.8393 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.8757	34.8757	34.8757	34.8757	34.8757	34.8757	34.8757	34.8757	34.8757	34.8757	34.8757	34.8757 (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)	-95.0059	-95.0059	-95.0059	-95.0059	-95.0059	-95.0059	-95.0059	-95.0059	-95.0059	-95.0059	-95.0059	-95.0059 (71)
Water heating gains (Table 5)	42.2169	40.8792	38.1014	34.3250	31.8732	28.4210	25.4866	29.2463	30.5821	34.4908	38.9044	40.8848 (72)
Total internal gains	331.1809	329.7619	318.1349	299.1126	279.1032	260.4862	248.8434	252.6843	262.8693	282.0240	303.9952	321.1403 (73)

6. Solar gains

[Jan]	Area	Solar flux	Specific data	Specific data	Access	Gains						
	m ²	Table 6a	or Table 6b	or Table 6c	factor	W						
		W/m ²			Table 6d							
Northeast	1.7100	11.2829	0.6300	0.7000	0.7700	5.8964 (75)						
Southeast	8.5700	36.7938	0.6300	0.7000	0.7700	96.3669 (77)						
Solar gains	102.2633	176.1508	246.2195	313.7977	359.4386	360.3403	345.9496	311.3642	269.5387	196.0868	122.8445	87.2853 (83)
Total gains	433.4442	505.9127	564.3544	612.9103	638.5418	620.8265	594.7930	564.0485	532.4080	478.1108	426.8397	408.4256 (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	77.3865	77.5961	77.8027	78.7878	78.9749	79.8577	79.8577	80.0234	79.5154	78.9749	78.5973	78.2064
alpha	6.1591	6.1731	6.1868	6.2525	6.2650	6.3238	6.3238	6.3349	6.3010	6.2650	6.2398	6.2138
util living area	0.9983	0.9953	0.9857	0.9501	0.8483	0.6583	0.4840	0.5306	0.7880	0.9672	0.9958	0.9988 (86)
MIT	20.0878	20.2364	20.4493	20.7070	20.8995	20.9839	20.9979	20.9965	20.9525	20.7005	20.3423	20.0606 (87)
Th 2	20.1697	20.1718	20.1738	20.1833	20.1851	20.1934	20.1934	20.1950	20.1902	20.1851	20.1815	20.1777 (88)
util rest of house												
MIT 2	0.9978	0.9938	0.9810	0.9335	0.8039	0.5837	0.3967	0.4403	0.7194	0.9530	0.9941	0.9985 (89)
Living area fraction	19.3306	19.4802	19.6923	19.9481	20.1184	20.1861	20.1929	20.1939	20.1649	19.9475	19.5943	19.3102 (90)
Living area fraction	19.4830	19.6325	19.8447	20.1009	20.2756	20.3467	20.3549	20.3555	fLA = Living area / (4) =	20.3235	20.0991	19.7449
Temperature adjustment	19.4830	19.6325	19.8447	20.1009	20.2756	20.3467	20.3549	20.3555	20.3235	20.0991	19.7449	19.4612 (92)
adjusted MIT												0.0000
adjusted MIT												19.4612 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9972	0.9925	0.9786	0.9316	0.8093	0.5983	0.4144	0.4585	0.7316	0.9511	0.9930	0.9980 (94)
Useful gains	432.2315	502.1089	552.2721	570.9657	516.7848	371.4546	246.4623	258.6424	389.5138	454.7528	423.8429	407.6175 (95)



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

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CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W												
Month fracti	1030.7177	997.4296	901.0740	746.8617	570.4585	378.0482	247.0208	259.6748	411.1772	631.8861	845.1895	1025.1647 (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	445.2738	332.8555	259.5086	126.6451	39.9332	0.0000	0.0000	0.0000	0.0000	131.7871	303.3696	459.4551 (98)
Space heating per m2												2098.8280 (98)
												(98) / (4) = 27.7439 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W												
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	618.3826	486.8118	498.9339	0.0000	0.0000	0.0000	0.0000 (100)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.9514	0.9806	0.9730	0.0000	0.0000	0.0000	0.0000 (101)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	588.3196	477.3704	485.4812	0.0000	0.0000	0.0000	0.0000 (102)
Month fracti	0.0000	0.0000	0.0000	0.0000	0.0000	814.6221	782.4361	748.1709	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	162.9378	226.9689	195.4412	0.0000	0.0000	0.0000	0.0000 (104)
Space cooling Cooled fraction												585.3479 (104)
Intermittency factor (Table 10b)												FC = cooled area / (4) = 1.0000 (105)
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	40.7344	56.7422	48.8603	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling per m2												146.3370 (107)
Energy for space heating												1.9344 (108)
Energy for space cooling												27.7439 (99)
Total												1.9344 (108)
Dwelling Fabric Energy Efficiency (DFEE)												29.6783 (109)
												29.7 (109)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

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CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

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

1. Overall dwelling dimensions

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	75.6500 (1b)	x 2.5400 (2b)	= 192.1510 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	75.6500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 192.1510 (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					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) = 0.1561 (8)
Pressure test					Yes
Measured/design AP50					5.0000
Infiltration rate					0.4061 (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) =	0.3452 (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	0.4401	0.4315	0.4229	0.3797	0.3711	0.3279	0.3279	0.3193	0.3452	0.3711	0.3884	0.4056 (22b)
	0.5969	0.5931	0.5894	0.5721	0.5689	0.5538	0.5538	0.5510	0.5596	0.5689	0.5754	0.5823 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
TER Opaque door			1.8900	1.0000	1.8900		(26)
TER Opening Type (Uw = 1.40)			10.2800	1.3258	13.6288		(27)
External Wall	43.8700	10.2800	33.5900	0.1800	6.0462		(29a)
Sheltered Wall	11.1300	1.8900	9.2400	0.1800	1.6632		(29a)
0.72	3.3200		3.3200	0.1300	0.4316		(30)
Total net area of external elements Aum(A, m2)			58.3200				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 23.6598		(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							5.6994 (36)
Total fabric heat loss							(33) + (36) = 29.3592 (37)

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

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	37.8469	37.6084	37.3746	36.2766	36.0711	35.1148	35.1148	34.9377	35.4831	36.0711	36.4867	36.9212 (38)
Average = Sum(39)m / 12 =	67.2061	66.9676	66.7338	65.6358	65.4303	64.4740	64.4740	64.2969	64.8423	65.4303	65.8459	66.2804 (39)
												65.6348 (39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.8884	0.8852	0.8821	0.8676	0.8649	0.8523	0.8523	0.8499	0.8571	0.8649	0.8704	0.8761 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.3751 (42)
Average daily hot water use (litres/day)												90.6098 (43)

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	99.6707	96.0464	92.4220	88.7976	85.1732	81.5488	81.5488	85.1732	88.7976	92.4220	96.0464	99.6707 (44)
Energy content (annual)	147.8088	129.2745	133.3998	116.3011	111.5937	96.2969	89.2332	102.3964	103.6194	120.7584	131.8172	143.1450 (45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 1425.6445 (45)
Water 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 (46)
Total storage loss												
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 (56)
	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)

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CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Heat gains from water heating, kWh/month	31.4094	27.4708	28.3474	24.7140	23.7137	20.4631	18.9621	21.7592	22.0191	25.6612	28.0112	30.4183	(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	118.7574	118.7574	118.7574	118.7574	118.7574	118.7574	118.7574	118.7574	118.7574	118.7574	118.7574	118.7574	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	20.2268	17.9653	14.6103	11.0610	8.2682	6.9804	7.5425	9.8041	13.1590	16.7084	19.5011	20.7890	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	210.1099	212.2902	206.7960	195.0994	180.3345	166.4577	157.1870	155.0068	160.5010	172.1976	186.9625	200.8393	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.8757	34.8757	34.8757	34.8757	34.8757	34.8757	34.8757	34.8757	34.8757	34.8757	34.8757	34.8757	(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)	-95.0059	-95.0059	-95.0059	-95.0059	-95.0059	-95.0059	-95.0059	-95.0059	-95.0059	-95.0059	-95.0059	-95.0059	(71)
Water heating gains (Table 5)	42.2169	40.8792	38.1014	34.3250	31.8732	28.4210	25.4866	29.2463	30.5821	34.4908	38.9044	40.8848	(72)
Total internal gains	331.1809	329.7619	318.1349	299.1126	279.1032	260.4862	248.8434	252.6843	262.8693	282.0240	303.9952	321.1403	(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							
Northeast	1.7100	11.2829	0.6300	0.7000	0.7700	5.8964 (75)							
Southeast	8.5700	36.7938	0.6300	0.7000	0.7700	96.3669 (77)							
Solar gains	102.2633	176.1508	246.2195	313.7977	359.4386	360.3403	345.9496	311.3642	269.5387	196.0868	122.8445	87.2853	(83)
Total gains	433.4442	505.9127	564.3544	612.9103	638.5418	620.8265	594.7930	564.0485	532.4080	478.1108	426.8397	408.4256	(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	78.1696	78.4480	78.7228	80.0398	80.2911	81.4821	81.4821	81.7065	81.0192	80.2911	79.7843	79.2613	
alpha	6.2113	6.2299	6.2482	6.3360	6.3527	6.4321	6.4321	6.4471	6.4013	6.3527	6.3190	6.2841	
util living area	0.9983	0.9952	0.9854	0.9480	0.8423	0.6477	0.4748	0.5204	0.7795	0.9659	0.9957	0.9988	(86)
MIT	20.1010	20.2504	20.4629	20.7211	20.9075	20.9862	20.9983	20.9971	20.9575	20.7136	20.3587	20.0781	(87)
Th 2	20.1774	20.1801	20.1827	20.1951	20.1974	20.2083	20.2083	20.2103	20.2041	20.1974	20.1927	20.1878	(88)
util rest of house	0.9978	0.9937	0.9805	0.9310	0.7976	0.5748	0.3906	0.4332	0.7112	0.9512	0.9940	0.9985	(89)
MIT 2	19.3502	19.5011	19.7132	19.9717	20.1363	20.2020	20.2078	20.2094	20.1816	19.9707	19.6200	19.3361	(90)
Living area fraction									fLA = Living area / (4) =				
MIT	19.5013	19.6519	19.8641	20.1225	20.2915	20.3599	20.3670	20.3680	20.3378	20.1202	19.7687	19.4854	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.5013	19.6519	19.8641	20.1225	20.2915	20.3599	20.3670	20.3680	20.3378	20.1202	19.7687	19.4854	(93)

8. Space heating requirement

Utilisation	0.9972	0.9924	0.9782	0.9292	0.8033	0.5892	0.4076	0.4508	0.7235	0.9495	0.9929	0.9980	(94)
Useful gains	432.2273	502.0649	552.0299	569.5380	512.9263	365.7659	242.4183	254.2886	385.2219	453.9590	423.7961	407.6162	(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	1021.6228	987.9019	891.8388	736.5994	562.1466	371.3636	242.8712	255.1302	404.4752	622.9122	834.1855	1013.1257	(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	438.5102	326.4824	252.8179	120.2841	36.6199	0.0000	0.0000	0.0000	0.0000	125.7012	295.4804	450.4991	(98)
Space heating per m ²										(98) / (4) =		2046.3953	(98)
												27.0508	(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	606.0552	477.1073	488.6561	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9570	0.9834	0.9768	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	580.0094	469.1780	477.3044	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	814.6221	782.4361	748.1709	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	168.9211	233.0640	201.5247	0.0000	0.0000	0.0000	0.0000	(104)
Space cooling												603.5099	(104)
Cooled fraction												1.0000	(105)
Intermittency factor (Table 10b)												fC = cooled area / (4) =	

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

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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	42.2303	58.2660	50.3812	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling per m2												150.8775 (107)
Energy for space heating												1.9944 (108)
Energy for space cooling												27.0508 (99)
Total												1.9944 (108)
Target Fabric Energy Efficiency (TFEE)												29.0452 (109)
												33.4 (109)

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)

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Property Reference	TPB12 02-F11			Issued on Date	12/11/2019
Assessment Reference	001	Prop Type Ref			
Property	02-F11, Building 12				
SAP Rating	85 B	DER	15.17	TER	15.22
Environmental	89 B	% DER<TER	0.34		
CO₂ Emissions (t/year)	0.97	DFEE	29.68	TFEE	33.40
General Requirements Compliance	Fail	% DFEE<TFEE	11.15		
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)	15.22	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	15.17	kgCO ₂ /m ²	Pass
	-0.05 (-0.3%)	kgCO ₂ /m ²	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	33.40	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	29.68	kWh/m ² /yr	
	-3.7 (-11.1%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.18 (max. 0.30)	0.23 (max. 0.70)	Pass
Party wall	0.00 (max. 0.20)	-	Pass
Roof	0.10 (max. 0.20)	0.10 (max. 0.35)	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)

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5 Cylinder insulation

Hot water storage

6 Controls

Space heating controls

Hot water controls

Boiler interlock

7 Low energy lights

Percentage of fixed lights with low-energy fittings %

Minimum %

8 Mechanical ventilation

Continuous extract system

Specific fan power

Maximum

Criterion 3 – Limiting the effects of heat gains in summer

9 Summertime temperature

Overheating risk (Thames Valley)

Based on:

Overshading

Windows facing North East

Windows facing South East

Air change rate

Blinds/curtains

Criterion 4 – Building performance consistent with DER and DFEE rate

Party Walls

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

Air permeability and pressure testing

3 Air permeability

Air permeability at 50 pascals

Maximum

10 Key features

Party wall U-value W/m²K

Roof U-value W/m²K

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

BLOCK COMPLIANCE

Calculation Type: New Build (As Designed)

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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)

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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				