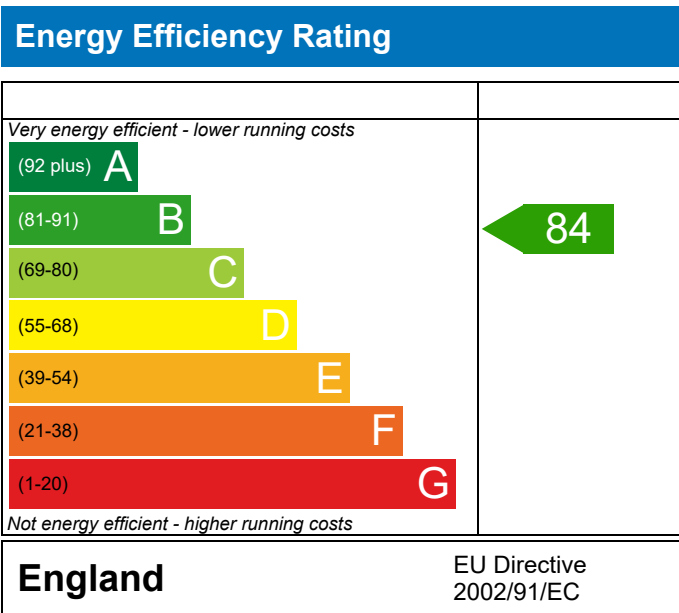


00-7, Building 2

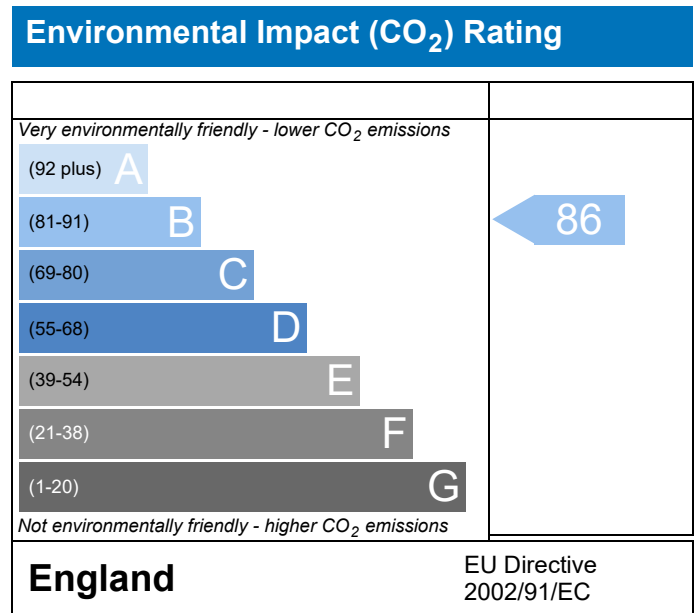
Dwelling type: Flat, End-Terrace
 Date of assessment: 02/09/2019
 Produced by: Harry Davey
 Total floor area: 86.96 m²
 DRRN: 3901-8017-2095

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	TPB2-00-F7			Issued on Date	02/09/2019
Assessment Reference	001	Prop Type Ref			
Property	00-7, Building 2				
SAP Rating	84 B	DER	17.07	TER	17.39
Environmental	86 B	% DER<TER	1.82		
CO ₂ Emissions (t/year)	1.26	DFEE	42.06	TFEE	49.82
General Requirements Compliance	Fail	% DFEE<TFEE	15.58		
Assessor Details	Mr. Harry Davey, energytest, Tel: 01892 315466, hdavey@energy-test.co.uk			Assessor ID	R434-0001
Client					

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



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

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

DWELLING AS DESIGNED

Ground-floor flat, total floor area 87 m²

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

1a TER and DER

Fuel for main heating:Mains gas
Fuel factor:1.00 (mains gas)
Target Carbon Dioxide Emission Rate (TER) 17.39 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 17.07 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)49.8 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)42.1 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.20 (max. 0.30)	0.26 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.09 (max. 0.25)	0.09 (max. 0.70)	OK
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: 0.18
Maximum 0.7 OK

9 Summertime temperature

Overheating risk (Thames Valley): High Fail

Based on:

Overshading: Average
Windows facing South East: 10.66 m², No overhang
Windows facing South West: 9.92 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
Exposed floor U-value 0.09 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 (m2)	Storey height (m)	Volume (m3)
Ground floor	86.9600 (1b)	x 2.5500 (2b)	= 221.7480 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	86.9600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 221.7480 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour
Number of chimneys	0	0	0	0 * 40 =	0.0000 (6a)
Number of open flues	0	0	0	0 * 20 =	0.0000 (6b)
Number of intermittent fans				0 * 10 =	0.0000 (7a)
Number of passive vents				0 * 10 =	0.0000 (7b)
Number of flueless gas fires				0 * 40 =	0.0000 (7c)
Air changes per hour					
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =				0.0000 / (5) =	0.0000 (8)
Pressure test				Yes	
Measured/design AP50				4.0000	
Infiltration rate				0.2000	(18)
Number of sides sheltered				2	(19)
Shelter factor			(20) = 1 - [0.075 x (19)] =		0.8500 (20)
Infiltration rate adjusted to include shelter factor			(21) = (18) x (20) =		0.1700 (21)

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

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Window (Uw = 1.30)			20.5800	1.2357	25.4316		(27)
Door to corridor			1.8900	1.4000	2.6460		(26)
Exposed Floor			86.9600	0.0900	7.8264		(28b)
External Wall	51.0800	20.5800	30.5000	0.1700	5.1850		(29a)
Sheltered Wall	18.4100	1.8900	16.5200	0.2578	4.2596		(29a)
Total net area of external elements Aum(A, m2)			156.4500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	45.3486		(33)
Party Wall			30.9800	0.0000	0.0000		(32)
Party Ceilings 1			89.9600				(32b)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							18.6015 (36)
Total fabric heat loss						(33) + (36) =	63.9501 (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	36.5884	36.5884	36.5884	36.5884	36.5884	36.5884	36.5884	36.5884	36.5884	36.5884	36.5884	36.5884 (38)
Heat transfer coeff	100.5385	100.5385	100.5385	100.5385	100.5385	100.5385	100.5385	100.5385	100.5385	100.5385	100.5385	100.5385 (39)
Average = Sum(39)m / 12 =												100.5385 (39)
HLP	1.1561	1.1561	1.1561	1.1561	1.1561	1.1561	1.1561	1.1561	1.1561	1.1561	1.1561	1.1561 (40)
HLP (average)												1.1561 (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												2.5818 (42)
Average daily hot water use (litres/day)												95.5173 (43)
Daily hot water use	105.0691	101.2484	97.4277	93.6070	89.7863	85.9656	85.9656	89.7863	93.6070	97.4277	101.2484	105.0691 (44)
Energy conte	155.8144	136.2762	140.6249	122.6002	117.6378	101.5125	94.0662	107.9424	109.2315	127.2988	138.9566	150.8979 (45)
Energy content (annual)												Total = Sum(45)m = 1502.8594 (45)
Distribution loss (46)m = 0.15 x (45)m	23.3722	20.4414	21.0937	18.3900	17.6457	15.2269	14.1099	16.1914	16.3847	19.0948	20.8435	22.6347 (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	50.9589	46.0274	49.6481	46.1623	45.7541	42.3940	43.8071	45.7541	46.1623	49.6481	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month	206.7733	182.3036	190.2729	168.7625	163.3919	143.9065	137.8733	153.6965	155.3939	176.9469	188.2717	201.8568	(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	206.7733	182.3036	190.2729	168.7625	163.3919	143.9065	137.8733	153.6965	155.3939	176.9469	188.2717	201.8568	(64)
Heat gains from water heating, kWh/month	64.5480	56.8187	59.1698	52.3051	50.5531	44.3514	42.2288	47.3294	47.8601	54.7389	58.5318	62.9133	(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	129.0891	129.0891	129.0891	129.0891	129.0891	129.0891	129.0891	129.0891	129.0891	129.0891	129.0891	129.0891	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	20.8053	18.4791	15.0282	11.3773	8.5047	7.1800	7.7583	10.0845	13.5354	17.1863	20.0589	21.3836	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	233.3724	235.7941	229.6916	216.7000	200.3004	184.8872	174.5901	172.1685	178.2710	191.2626	207.6622	223.0754	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.9089	35.9089	35.9089	35.9089	35.9089	35.9089	35.9089	35.9089	35.9089	35.9089	35.9089	35.9089	(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)	-103.2713	-103.2713	-103.2713	-103.2713	-103.2713	-103.2713	-103.2713	-103.2713	-103.2713	-103.2713	-103.2713	-103.2713	(71)
Water heating gains (Table 5)	86.7581	84.5516	79.5293	72.6460	67.9477	61.5992	56.7591	63.6147	66.4723	73.5738	81.2942	84.5609	(72)
Total internal gains	405.6626	403.5516	388.9758	365.4501	341.4795	318.3931	303.8343	310.5944	323.0054	346.7494	373.7420	393.7466	(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	10.6600	36.7938	0.6300	0.7000	0.7700	119.8682 (77)							
Southwest	9.9200	36.7938	0.6300	0.7000	0.7700	111.5472 (79)							
Solar gains	231.4154	394.1860	539.3425	668.2715	748.5198	743.1069	716.4343	656.5655	583.9939	435.6595	277.1823	198.0433	(83)
Total gains	637.0780	797.7376	928.3183	1033.7216	1089.9993	1061.4999	1020.2686	967.1599	906.9993	782.4089	650.9243	591.7899	(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	60.0654	60.0654	60.0654	60.0654	60.0654	60.0654	60.0654	60.0654	60.0654	60.0654	60.0654	60.0654	
alpha	5.0044	5.0044	5.0044	5.0044	5.0044	5.0044	5.0044	5.0044	5.0044	5.0044	5.0044	5.0044	
util living area	0.9951	0.9851	0.9593	0.8934	0.7637	0.5857	0.4298	0.4719	0.7061	0.9285	0.9882	0.9966	(86)
MIT	20.1003	20.2719	20.4868	20.7087	20.8628	20.9282	20.9427	20.9408	20.9026	20.6876	20.3355	20.0564	(87)
Th 2	19.9552	19.9552	19.9552	19.9552	19.9552	19.9552	19.9552	19.9552	19.9552	19.9552	19.9552	19.9552	(88)
util rest of house	0.9935	0.9804	0.9468	0.8622	0.7038	0.4987	0.3298	0.3680	0.6207	0.9000	0.9837	0.9954	(89)
MIT 2	18.7607	19.0089	19.3143	19.6148	19.8013	19.8651	19.8748	19.8740	19.8454	19.5956	19.1030	18.6968	(90)
Living area fraction	19.3057	19.5228	19.7913	20.0599	20.2332	20.2976	20.3092	20.3080	20.2755	20.0399	19.6045	19.2500	(91)
Temperature adjustment	19.3057	19.5228	19.7913	20.0599	20.2332	20.2976	20.3092	20.3080	20.2755	20.0399	19.6045	19.2500	(92)
adjusted MIT	19.3057	19.5228	19.7913	20.0599	20.2332	20.2976	20.3092	20.3080	20.2755	20.0399	19.6045	19.2500	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Useful gains	0.9922	0.9780	0.9444	0.8657	0.7208	0.5280	0.3640	0.4036	0.6484	0.9027	0.9818	0.9944	(94)	
Ext temp.	632.1263	780.1720	876.7465	894.8415	785.6284	560.4897	371.3807	390.3253	588.1225	706.2477	639.0494	588.4940	(95)	
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)	
Month fracti	1508.6514	1470.1538	1336.2911	1121.9956	857.9149	572.8296	372.9213	392.9082	620.8799	949.0723	1257.1807	1513.0995	(97)	
Space heating kWh	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	(97a)	
Space heating per m2	652.1347	463.6677	341.9012	163.5509	53.7812	0.0000	0.0000	0.0000	0.0000	180.6615	445.0545	687.9065	(98)	
												2988.6583	(98)	
													(98) / (4) =	34.3682 (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													3203.2780 (211)
Space heating requirement	652.1347	463.6677	341.9012	163.5509	53.7812	0.0000	0.0000	0.0000	0.0000	180.6615	445.0545	687.9065	(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)	698.9654	496.9644	366.4536	175.2957	57.6433	0.0000	0.0000	0.0000	0.0000	193.6350	477.0145	737.3060	(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	206.7733	182.3036	190.2729	168.7625	163.3919	143.9065	137.8733	153.6965	155.3939	176.9469	188.2717	201.8568	(64)
Efficiency of water heater (217)m	87.6429	87.2008	86.4093	84.8720	82.4847	80.2000	80.2000	80.2000	80.2000	85.0032	87.0414	87.7918	(216)
Fuel for water heating, kWh/month	235.9271	209.0619	220.1997	198.8436	198.0875	179.4345	171.9119	191.6415	193.7580	208.1651	216.3013	229.9268	(219)
Water heating fuel used													2453.2588 (219)
Annual totals kWh/year													
Space heating fuel - main system													3203.2780 (211)
Space heating fuel - secondary													0.0000 (215)
Electricity for pumps and fans:													
(MEV)Centralised, Database: in-use factor = 1.3000, SFP = 0.2340													63.3046 (230a)
mechanical ventilation fans (SFP = 0.2340)													30.0000 (230c)
central heating pump													45.0000 (230e)
main heating flue fan													138.3046 (231)
Total electricity for the above, kWh/year													367.4285 (232)
Electricity for lighting (calculated in Appendix L)													6162.2699 (238)
Total delivered energy for all uses													

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	3203.2780	0.2160	691.9080	(261)
Space heating - secondary	0.0000	0.0000	0.0000	(263)
Water heating (other fuel)	2453.2588	0.2160	529.9039	(264)
Space and water heating			1221.8119	(265)
Pumps and fans	138.3046	0.5190	71.7801	(267)
Energy for lighting	367.4285	0.5190	190.6954	(268)
Total CO2, kg/year			1484.2874	(272)
Dwelling Carbon Dioxide Emission Rate (DER)			17.0700	(273)

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

DER			17.0700	ZC1
Total Floor Area		TFA	86.9600	
Assumed number of occupants		N	2.5818	
CO2 emission factor in Table 12 for electricity displaced from grid		EF	0.5190	
CO2 emissions from appliances, equation (L14)			15.9029	ZC2
CO2 emissions from cooking, equation (L16)			2.0810	ZC3
Total CO2 emissions			35.0539	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			35.0539	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	86.9600 (1b)	x 2.5500 (2b)	= 221.7480 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	86.9600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 221.7480 (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) =	0.1353 (8)
Pressure test				Yes	
Measured/design AP50				5.0000	
Infiltration rate				0.3853	(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) =		0.3275 (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	0.4176	0.4094	0.4012	0.3602	0.3521	0.3111	0.3111	0.3029	0.3275	0.3521	0.3684	0.3848 (22b)
Effective ac	0.5872	0.5838	0.5805	0.5649	0.5620	0.5484	0.5484	0.5459	0.5536	0.5620	0.5679	0.5740 (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)			19.8500	1.3258	26.3163		(27)					
Exposed Floor			86.9600	0.1300	11.3048		(28b)					
External Wall	51.0800	19.8500	31.2300	0.1800	5.6214		(29a)					
Sheltered Wall	18.4100	1.8900	16.5200	0.1800	2.9736		(29a)					
Total net area of external elements Aum(A, m ²)			156.4500				(31)					
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	48.1061	(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)							15.7485 (36)					
Total fabric heat loss						(33) + (36) =	63.8546 (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	42.9677	42.7200	42.4772	41.3367	41.1234	40.1300	40.1300	39.9461	40.5126	41.1234	41.5550	42.0063 (38)
Average = Sum(39)m / 12 =	106.8223	106.5746	106.3318	105.1913	104.9779	103.9846	103.9846	103.8007	104.3672	104.9779	105.4096	105.1903 (39)
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.2284	1.2256	1.2228	1.2097	1.2072	1.1958	1.1958	1.1937	1.2002	1.2072	1.2122	1.2174 (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												2.5818 (42)
Average daily hot water use (litres/day)												95.5173 (43)
Daily hot water use	105.0691	101.2484	97.4277	93.6070	89.7863	85.9656	85.9656	89.7863	93.6070	97.4277	101.2484	105.0691 (44)
Energy conte	155.8144	136.2762	140.6249	122.6002	117.6378	101.5125	94.0662	107.9424	109.2315	127.2988	138.9566	150.8979 (45)
Energy content (annual)												Total = Sum(45)m = 1502.8594 (45)
Distribution loss (46)m = 0.15 x (45)m	23.3722	20.4414	21.0937	18.3900	17.6457	15.2269	14.1099	16.1914	16.3847	19.0948	20.8435	22.6347 (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)

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Combi loss	50.9589	46.0274	49.6481	46.1623	45.7541	42.3940	43.8071	45.7541	46.1623	49.6481	49.3151	50.9589 (61)
Total heat required for water heating calculated for each month	206.7733	182.3036	190.2729	168.7625	163.3919	143.9065	137.8733	153.6965	155.3939	176.9469	188.2717	201.8568 (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	206.7733	182.3036	190.2729	168.7625	163.3919	143.9065	137.8733	153.6965	155.3939	176.9469	188.2717	201.8568 (64)
Heat gains from water heating, kWh/month	64.5480	56.8187	59.1698	52.3051	50.5531	44.3514	42.2288	47.3294	47.8601	54.7389	58.5318	62.9133 (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	129.0891	129.0891	129.0891	129.0891	129.0891	129.0891	129.0891	129.0891	129.0891	129.0891	129.0891	129.0891 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	20.8053	18.4791	15.0282	11.3773	8.5047	7.1800	7.7583	10.0845	13.5354	17.1863	20.0589	21.3836 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	233.3724	235.7941	229.6916	216.7000	200.3004	184.8872	174.5901	172.1685	178.2710	191.2626	207.6622	223.0754 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.9089	35.9089	35.9089	35.9089	35.9089	35.9089	35.9089	35.9089	35.9089	35.9089	35.9089	35.9089 (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)	-103.2713	-103.2713	-103.2713	-103.2713	-103.2713	-103.2713	-103.2713	-103.2713	-103.2713	-103.2713	-103.2713	-103.2713 (71)
Water heating gains (Table 5)	86.7581	84.5516	79.5293	72.6460	67.9477	61.5992	56.7591	63.6147	66.4723	73.5738	81.2942	84.5609 (72)
Total internal gains	405.6626	403.5516	388.9758	365.4501	341.4795	318.3931	303.8343	310.5944	323.0054	346.7494	373.7420	393.7466 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	g	Specific data or Table 6c	FF	Access factor Table 6d	Gains W				
Southeast	10.2800	36.7938	0.6300	0.7000	0.7700	115.5952 (77)						
Southwest	9.5700	36.7938	0.6300	0.7000	0.7700	107.6115 (79)						
Solar gains	223.2068	380.2037	520.2113	644.5670	721.9688	716.7479	691.0214	633.2763	563.2788	420.2061	267.3503	191.0185 (83)
Total gains	628.8693	783.7553	909.1871	1010.0171	1063.4483	1035.1409	994.8557	943.8707	886.2842	766.9555	641.0923	584.7651 (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	56.5321	56.6635	56.7929	57.4086	57.5253	58.0748	58.0748	58.1777	57.8619	57.5253	57.2897	57.0455	
alpha	4.7688	4.7776	4.7862	4.8272	4.8350	4.8717	4.8717	4.8785	4.8575	4.8350	4.8193	4.8030	
util living area	0.9955	0.9870	0.9656	0.9086	0.7914	0.6141	0.4542	0.4967	0.7336	0.9382	0.9894	0.9968 (86)	
MIT	19.7671	19.9962	20.2924	20.6207	20.8560	20.9680	20.9939	20.9907	20.9251	20.6021	20.1127	19.7244 (87)	
Th 2	19.8973	19.8996	19.9018	19.9123	19.9142	19.9234	19.9234	19.9251	19.9199	19.9142	19.9103	19.9061 (88)	
util rest of house	0.9940	0.9828	0.9545	0.8799	0.7320	0.5227	0.3461	0.3853	0.6467	0.9120	0.9853	0.9957 (89)	
MIT 2	18.2738	18.6072	19.0319	19.4902	19.7830	19.9037	19.9213	19.9216	19.8662	19.4786	18.7862	18.2179 (90)	
Living area fraction	fLA = Living area / (4) = 0.4069 (91)												
MIT	18.8814	19.1723	19.5448	19.9501	20.2195	20.3367	20.3577	20.3566	20.2970	19.9357	19.3259	18.8308 (92)	
Temperature adjustment	0.0000												
adjusted MIT	18.8814	19.1723	19.5448	19.9501	20.2195	20.3367	20.3577	20.3566	20.2970	19.9357	19.3259	18.8308 (93)	

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9921	0.9791	0.9500	0.8810	0.7500	0.5589	0.3902	0.4308	0.6791	0.9127	0.9823	0.9942 (94)
Useful gains	623.8817	767.4088	863.7608	889.8229	797.5597	578.5849	388.2339	406.6626	601.8332	699.9685	629.7629	581.3702 (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	1557.6138	1521.0638	1387.0728	1162.3785	894.3636	596.5334	390.7447	410.6962	646.7645	980.0425	1288.7298	1548.8306 (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	694.6967	506.4562	389.3441	196.2401	72.0221	0.0000	0.0000	0.0000	0.0000	208.3751	474.4561	719.7905 (98)
Space heating	3261.3809 (98)											
Space heating per m2	(98) / (4) = 37.5044 (99)											

8c. Space cooling requirement

Not applicable

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

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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													3491.8425 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	694.6967	506.4562	389.3441	196.2401	72.0221	0.0000	0.0000	0.0000	0.0000	208.3751	474.4561	719.7905	(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)	743.7866	542.2443	416.8566	210.1072	77.1115	0.0000	0.0000	0.0000	0.0000	223.0997	507.9830	770.6537	(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	206.7733	182.3036	190.2729	168.7625	163.3919	143.9065	137.8733	153.6965	155.3939	176.9469	188.2717	201.8568	(64)
Efficiency of water heater (217)m	87.8651	87.4874	86.8154	85.4317	83.1419	80.3000	80.3000	80.3000	80.3000	85.4636	87.2813	87.9765	(217)
Fuel for water heating, kWh/month	235.3305	208.3770	219.1695	197.5408	196.5218	179.2110	171.6978	191.4028	193.5167	207.0435	215.7069	229.4441	(219)
Water heating fuel used												2444.9623	(219)
Annual totals kWh/year													
Space heating fuel - main system													3491.8425 (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)													367.4285 (232)
Total delivered energy for all uses													6379.2334 (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	3491.8425	0.2160	754.2380 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2444.9623	0.2160	528.1119 (264)
Space and water heating			1282.3498 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	367.4285	0.5190	190.6954 (268)
Total CO2, kg/m2/year			1511.9702 (272)
Emissions per m2 for space and water heating			14.7464 (272a)
Fuel factor (mains gas)			1.0000
Emissions per m2 for lighting			2.1929 (272b)
Emissions per m2 for pumps and fans			0.4476 (272c)
Target Carbon Dioxide Emission Rate (TER) = (14.7464 * 1.00) + 2.1929 + 0.4476, rounded to 2 d.p.			17.3900 (273)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	TPB2-00-F7	Issued on Date	02/09/2019
Assessment Reference	001	Prop Type Ref	
Property	00-7, Building 2		

SAP Rating	84 B	DER	17.07	TER	17.39
Environmental	86 B	% DER<TER	1.82		
CO ₂ Emissions (t/year)	1.26	DFEE	42.06	TREE	49.82
General Requirements Compliance	Fail	% DFEE<TFEE	15.58		

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	86.9600 (1b)	x 2.5500 (2b)	= 221.7480 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	86.9600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 221.7480 (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) =	0.1353 (8)
Pressure test				Yes	
Measured/design AP50				4.0000	
Infiltration rate				0.3353	(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) =	0.2850 (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	0.3634	0.3562	0.3491	0.3135	0.3064	0.2707	0.2707	0.2636	0.2850	0.3064	0.3206	0.3349 (22b)
Effective ac	0.5660	0.5635	0.5609	0.5491	0.5469	0.5367	0.5367	0.5347	0.5406	0.5469	0.5514	0.5561 (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)			20.5800	1.2357	25.4316		(27)					
Door to corridor			1.8900	1.4000	2.6460		(26)					
Exposed Floor			86.9600	0.0900	7.8264		(28b)					
External Wall	51.0800	20.5800	30.5000	0.1700	5.1850		(29a)					
Sheltered Wall	18.4100	1.8900	16.5200	0.2578	4.2596		(29a)					
Total net area of external elements Aum(A, m ²)			156.4500				(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	45.3486		(33)					
Party Wall			30.9800	0.0000	0.0000		(32)					
Party Ceilings 1			89.9600				(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)							18.6015 (36)					
Total fabric heat loss							(33) + (36) = 63.9501 (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
	41.4194	41.2319	41.0480	40.1843	40.0227	39.2705	39.2705	39.1312	39.5602	40.0227	40.3496	40.6914 (38)
Heat transfer coeff	105.3695	105.1819	104.9981	104.1344	103.9728	103.2206	103.2206	103.0812	103.5103	103.9728	104.2997	104.6414 (39)
Average = Sum(39)m / 12 =												104.1336 (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	1.2117	1.2095	1.2074	1.1975	1.1956	1.1870	1.1870	1.1854	1.1903	1.1956	1.1994	1.2033 (40)
HLP (average)												1.1975 (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												2.5818 (42)
Average daily hot water use (litres/day)												95.5173 (43)
Daily hot water use	105.0691	101.2484	97.4277	93.6070	89.7863	85.9656	85.9656	89.7863	93.6070	97.4277	101.2484	105.0691 (44)
Energy content (annual)	155.8144	136.2762	140.6249	122.6002	117.6378	101.5125	94.0662	107.9424	109.2315	127.2988	138.9566	150.8979 (45)
Energy content (annual)												1502.8594 (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	33.1106	28.9587	29.8828	26.0525	24.9980	21.5714	19.9891	22.9378	23.2117	27.0510	29.5283	32.0658 (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	129.0891	129.0891	129.0891	129.0891	129.0891	129.0891	129.0891	129.0891	129.0891	129.0891	129.0891	129.0891 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	20.8053	18.4791	15.0282	11.3773	8.5047	7.1800	7.7583	10.0845	13.5354	17.1863	20.0589	21.3836 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	233.3724	235.7941	229.6916	216.7000	200.3004	184.8872	174.5901	172.1685	178.2710	191.2626	207.6622	223.0754 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.9089	35.9089	35.9089	35.9089	35.9089	35.9089	35.9089	35.9089	35.9089	35.9089	35.9089	35.9089 (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)	-103.2713	-103.2713	-103.2713	-103.2713	-103.2713	-103.2713	-103.2713	-103.2713	-103.2713	-103.2713	-103.2713	-103.2713 (71)
Water heating gains (Table 5)	44.5034	43.0933	40.1650	36.1841	33.5995	29.9603	26.8670	30.8303	32.2385	36.3589	41.0115	43.0992 (72)
Total internal gains	360.4079	359.0933	346.6116	325.9881	304.1313	283.7542	270.9422	274.8100	285.7716	306.5345	330.4593	349.2849 (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	10.6600	36.7938	0.6300	0.7000	0.7700	119.8682 (77)						
Southwest	9.9200	36.7938	0.6300	0.7000	0.7700	111.5472 (79)						
Solar gains	231.4154	394.1860	539.3425	668.2715	748.5198	743.1069	716.4343	656.5655	583.9939	435.6595	277.1823	198.0433 (83)
Total gains	591.8233	753.2793	885.9540	994.2596	1052.6511	1026.8610	987.3765	931.3755	869.7654	742.1940	607.6416	547.3283 (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	57.3115	57.4137	57.5143	57.9913	58.0814	58.5047	58.5047	58.5838	58.3409	58.0814	57.8994	57.7103
alpha	4.8208	4.8276	4.8343	4.8661	4.8721	4.9003	4.9003	4.9056	4.8894	4.8721	4.8600	4.8474
util living area	0.9965	0.9888	0.9681	0.9113	0.7927	0.6148	0.4544	0.4998	0.7395	0.9437	0.9915	0.9976 (86)
MIT	19.7506	19.9865	20.2895	20.6210	20.8580	20.9686	20.9941	20.9907	20.9239	20.5920	20.0931	19.7037 (87)
Th 2	19.9107	19.9124	19.9141	19.9220	19.9235	19.9304	19.9304	19.9317	19.9278	19.9235	19.9205	19.9173 (88)
util rest of house	0.9954	0.9851	0.9577	0.8832	0.7337	0.5238	0.3469	0.3885	0.6534	0.9194	0.9881	0.9968 (89)
MIT 2	18.7831	19.0182	19.3156	19.6333	19.8349	19.9172	19.9291	19.9293	19.8903	19.6161	19.1319	18.7417 (90)
Living area fraction										fLA = Living area / (4) =		0.4069 (91)
MIT	19.1767	19.4121	19.7118	20.0351	20.2512	20.3450	20.3624	20.3612	20.3108	20.0131	19.5229	19.1331 (92)
Temperature adjustment												0.0000
adjusted MIT	19.1767	19.4121	19.7118	20.0351	20.2512	20.3450	20.3624	20.3612	20.3108	20.0131	19.5229	19.1331 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9943	0.9830	0.9554	0.8865	0.7530	0.5603	0.3908	0.4341	0.6862	0.9218	0.9864	0.9960 (94)
Useful gains	588.4468	740.4565	846.4264	881.4233	792.6273	575.3079	385.9097	404.2758	596.8686	684.1561	599.4060	545.1231 (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	1567.5492	1526.4149	1387.2157	1159.5495	889.0910	592.9979	388.3535	408.3213	642.8835	978.7096	1295.7082	1562.6204 (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	728.4522	528.1641	402.3473	200.2509	71.7690	0.0000	0.0000	0.0000	0.0000	219.1478	501.3376	757.0180 (98)
Space heating												3408.4869 (98)
Space heating per m2											(98) / (4) =	39.1960 (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	970.2732	763.8321	783.4175	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9259	0.9631	0.9513	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	898.3719	735.6218	745.2524	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1297.1359	1248.9439	1185.1317	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	287.1101	381.9116	327.2702	0.0000	0.0000	0.0000	0.0000 (104)
Space cooling												996.2919 (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	71.7775	95.4779	81.8176	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling												249.0730 (107)
Space cooling per m2												2.8642 (108)
Energy for space heating												39.1960 (99)
Energy for space cooling												2.8642 (108)
Total												42.0603 (109)
Dwelling Fabric Energy Efficiency (DFEE)												42.1 (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	86.9600 (1b)	2.5500 (2b)	221.7480 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	86.9600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	221.7480 (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) =	0.1353 (8)
Pressure test				Yes	
Measured/design AP50				5.0000	
Infiltration rate					0.3853 (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) =		0.3275 (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	0.4176	0.4094	0.4012	0.3602	0.3521	0.3111	0.3111	0.3029	0.3275	0.3521	0.3684	0.3848 (22b)
	0.5872	0.5838	0.5805	0.5649	0.5620	0.5484	0.5484	0.5459	0.5536	0.5620	0.5679	0.5740 (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)			19.8500	1.3258	26.3163		(27)
Exposed Floor			86.9600	0.1300	11.3048		(28b)
External Wall	51.0800	19.8500	31.2300	0.1800	5.6214		(29a)
Sheltered Wall	18.4100	1.8900	16.5200	0.1800	2.9736		(29a)
Total net area of external elements Aum(A, m ²)			156.4500				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	48.1061	(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)							15.7485 (36)
Total fabric heat loss							(33) + (36) = 63.8546 (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	42.9677	42.7200	42.4772	41.3367	41.1234	40.1300	40.1300	39.9461	40.5126	41.1234	41.5550	42.0063 (38)
Heat transfer coeff	106.8223	106.5746	106.3318	105.1913	104.9779	103.9846	103.9846	103.8007	104.3672	104.9779	105.4096	105.8609 (39)
Average = Sum(39)m / 12 =												105.1903 (39)
HLP	1.2284	1.2256	1.2228	1.2097	1.2072	1.1958	1.1958	1.1937	1.2002	1.2072	1.2122	1.2174 (40)
HLP (average)												1.2096 (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												2.5818 (42)
Average daily hot water use (litres/day)												95.5173 (43)
Daily hot water use	105.0691	101.2484	97.4277	93.6070	89.7863	85.9656	85.9656	89.7863	93.6070	97.4277	101.2484	105.0691 (44)
Energy conte	155.8144	136.2762	140.6249	122.6002	117.6378	101.5125	94.0662	107.9424	109.2315	127.2988	138.9566	150.8979 (45)
Energy content (annual)												Total = Sum(45)m = 1502.8594 (45)
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Heat gains from water heating, kWh/month	33.1106	28.9587	29.8828	26.0525	24.9980	21.5714	19.9891	22.9378	23.2117	27.0510	29.5283	32.0658 (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	129.0891	129.0891	129.0891	129.0891	129.0891	129.0891	129.0891	129.0891	129.0891	129.0891	129.0891	129.0891 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	20.8053	18.4791	15.0282	11.3773	8.5047	7.1800	7.7583	10.0845	13.5354	17.1863	20.0589	21.3836 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	233.3724	235.7941	229.6916	216.7000	200.3004	184.8872	174.5901	172.1685	178.2710	191.2626	207.6622	223.0754 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.9089	35.9089	35.9089	35.9089	35.9089	35.9089	35.9089	35.9089	35.9089	35.9089	35.9089	35.9089 (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)	-103.2713	-103.2713	-103.2713	-103.2713	-103.2713	-103.2713	-103.2713	-103.2713	-103.2713	-103.2713	-103.2713	-103.2713 (71)
Water heating gains (Table 5)	44.5034	43.0933	40.1650	36.1841	33.5995	29.9603	26.8670	30.8303	32.2385	36.3589	41.0115	43.0992 (72)
Total internal gains	360.4079	359.0933	346.6116	325.9881	304.1313	283.7542	270.9422	274.8100	285.7716	306.5345	330.4593	349.2849 (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	10.2800	36.7938	0.6300	0.7000	0.7700	115.5952 (77)						
Southwest	9.5700	36.7938	0.6300	0.7000	0.7700	107.6115 (79)						
Solar gains	223.2068	380.2037	520.2113	644.5670	721.9688	716.7479	691.0214	633.2763	563.2788	420.2061	267.3503	191.0185 (83)
Total gains	583.6147	739.2970	866.8229	970.5551	1026.1001	1000.5021	961.9636	908.0862	849.0504	726.7406	597.8096	540.3034 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation factor for gains for living area, nil,m (see Table 9a)												21.0000 (85)
tau	56.5321	56.6635	56.7929	57.4086	57.5253	58.0748	58.0748	58.1777	57.8619	57.5253	57.2897	57.0455
alpha	4.7688	4.7776	4.7862	4.8272	4.8350	4.8717	4.8717	4.8785	4.8575	4.8350	4.8193	4.8030
util living area	0.9967	0.9897	0.9712	0.9192	0.8074	0.6315	0.4689	0.5147	0.7547	0.9485	0.9921	0.9977 (86)
MIT	19.7199	19.9516	20.2539	20.5933	20.8420	20.9640	20.9930	20.9892	20.9150	20.5698	20.0687	19.6777 (87)
Th 2	19.8973	19.8996	19.9018	19.9123	19.9142	19.9234	19.9234	19.9251	19.9199	19.9142	19.9103	19.9061 (88)
util rest of house	0.9956	0.9863	0.9616	0.8927	0.7496	0.5390	0.3577	0.4001	0.6688	0.9257	0.9889	0.9969 (89)
MIT 2	18.7420	18.9734	19.2713	19.6003	19.8147	19.9081	19.9218	19.9223	19.8775	19.5882	19.0996	18.7069 (90)
Living area fraction									fLA = Living area / (4) =			
MIT	19.1398	19.3714	19.6711	20.0043	20.2326	20.3377	20.3576	20.3564	20.2997	19.9876	19.4939	19.1019 (92)
Temperature adjustment												0.0000
adjusted MIT	19.1398	19.3714	19.6711	20.0043	20.2326	20.3377	20.3576	20.3564	20.2997	19.9876	19.4939	19.1019 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9946	0.9843	0.9591	0.8953	0.7679	0.5760	0.4032	0.4470	0.7012	0.9275	0.9873	0.9962 (94)
Useful gains	580.4626	727.6578	831.3713	868.9040	787.9676	576.2425	387.8392	405.9431	595.3922	674.0748	590.2372	538.2316 (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	1585.2256	1542.2825	1400.5060	1168.0787	895.7397	596.6303	390.7336	410.6736	647.0407	985.4872	1306.4327	1577.5270 (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	747.5437	547.4278	423.4362	215.4058	80.1824	0.0000	0.0000	0.0000	0.0000	231.6908	515.6608	773.2358 (98)
Space heating												3534.5833 (98)
Space heating per m2												(98) / (4) = 40.6461 (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	977.4554	769.4862	788.8851	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9173	0.9580	0.9452	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	896.6212	737.1689	745.6929	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1266.3267	1219.2405	1157.9105	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	266.1879	358.6613	306.6899	0.0000	0.0000	0.0000	0.0000 (104)
Space cooling												931.5391 (104)
Cooled fraction												1.0000 (105)
Intermittency factor (Table 10b)												fC = cooled area / (4) = 1.0000 (105)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.2500	0.2500	0.2500	0.0000	0.0000	0.0000	0.0000 (106)
Space cooling	0.0000	0.0000	0.0000	0.0000	0.0000	66.5470	89.6653	76.6725	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling per m2												232.8848 (107)
Energy for space heating												2.6781 (108)
Energy for space cooling												40.6461 (99)
Total												2.6781 (108)
Target Fabric Energy Efficiency (TFEE)												43.3242 (109)
												49.8 (109)

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)



Property Reference	TPB2-00-F7	Issued on Date	02/09/2019	
Assessment Reference	001	Prop Type Ref		
Property	00-7, Building 2			
SAP Rating	84 B	DER	17.07	
Environmental	86 B	TER	17.39	
CO₂ Emissions (t/year)	1.26	% DER<TER	1.82	
General Requirements Compliance	Fail	DFEE	42.06	
		TFEE	49.82	
		% DFEE<TFEE	15.58	
Assessor Details	Mr. Harry Davey, energytest, Tel: 01892 315466, hdavey@energy-test.co.uk		Assessor ID	R434-0001
Client				

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Criterion 1 – Achieving the TER and TFEE rate

1a TER and DER

Fuel for main heating	Mains gas		
Fuel factor	1.00 (mains gas)		
Target Carbon Dioxide Emission Rate (TER)	17.39	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	17.07	kgCO ₂ /m ²	Pass
	-0.32 (-1.8%)	kgCO ₂ /m ²	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	49.82	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	42.06	kWh/m ² /yr	
	-7.7 (-15.5%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.20 (max. 0.30)	0.26 (max. 0.70)	Pass
Party wall	0.00 (max. 0.20)	-	Pass
Floor	0.09 (max. 0.25)	0.09 (max. 0.70)	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	

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)



5 Cylinder insulation

Hot water storage

6 Controls

Space heating controls

Hot water controls

Boiler interlock

7 Low energy lights

Percentage of fixed lights with low-energy fittings %

Minimum %

8 Mechanical ventilation

Continuous extract system

Specific fan power

Maximum

Criterion 3 – Limiting the effects of heat gains in summer

9 Summertime temperature

Overheating risk (Thames Valley)

Based on:

Overshading

Windows facing South East

Windows facing South West

Air change rate

Blinds/curtains

Criterion 4 – Building performance consistent with DER and DFEE rate

Party Walls

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

Exposed floor U-value W/m²K

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

BLOCK COMPLIANCE

Calculation Type: New Build (As Designed)



Block Reference	TP Bd 2	Issued on Date	02/09/2019
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 2		Block Name:		
Property-Assessment Reference	Multiplier	Floor Area (m ²)	DER (kgCO ₂ /m ²)	TER (kgCO ₂ /m ²)
TPB2-00F1-001	1	95.96	-159.58	17.48
TPB2-00-F2-001	1	95.96	18.74	18.73
TPB2-00-F3-001	1	77.16	18.62	18.47
TPB2-00-F4-001	1	78.67	19.25	19.27
TPB2-00-F5-001	1	56.62	20.74	20.25
TPB2-00-F6-001	1	89.06	18.78	18.72
TPB2-00-F7-001	1	86.96	17.07	17.39
TPB2-00-F8-001	1	86.96	18.12	18.39
TPB2-01-F9-001	1	95.96	14.90	14.65
TPB2-01-F10-001	1	95.96	16.28	15.84
TPB2-01-F11-001	1	77.16	17.29	17.07
TPB2-01-F12-001	1	78.67	16.59	16.20
TPB2-01-F13-001	1	56.62	17.88	16.99
TPB2-01-F14-001	1	89.06	16.18	15.71
TPB2-01-F15-001	1	86.96	14.64	14.54
TPB2-01-F16-001	1	86.96	15.60	15.45
TPB2-02-F17-001	1	95.96	16.97	16.49
TPB2-02-F18-001	1	95.96	18.46	17.73
TPB2-02-F19-001	1	77.16	18.19	18.09
TPB2-02-F20-001	1	78.67	17.62	17.31
TPB2-02-F21-001	1	56.62	18.84	18.05
TPB2-02-F22-001	1	89.06	17.09	16.72
TPB2-02-F23-001	1	86.96	16.44	16.22
TPB2-02-F24-001	1	86.96	17.46	17.16
TPB2-03-F25-001	1	87.5	17.96	18.61
TPB2-03-F26-001	1	105.94	17.34	18.36
TPB2-03-F27-001	1	86.33	17.64	18.10
TPB2-03-F28-001	1	105.85	16.67	17.48
Totals:	28	2387.67	311.78	485.47
Average DER = 10.25 kgCO ₂ /m ²			PASS	
Average TER = 17.28 kgCO ₂ /m ²				

BLOCK COMPLIANCE

Calculation Type: New Build (As Designed)



Block Compliance Report - DFEE

Block Reference: TP Bd 2		Block Name:		
Property-Assessment Reference	Multiplier	Floor Area (m ²)	DFEE (kWh/m ² /yr)	TFEE (kWh/m ² /yr)
TPB2-00F1-001	1	95.96	45.17	52.78
TPB2-00-F2-001	1	95.96	51.13	58.90
TPB2-00-F3-001	1	77.16	44.88	51.15
TPB2-00-F4-001	1	78.67	47.71	55.37
TPB2-00-F5-001	1	56.62	47.43	53.24
TPB2-00-F6-001	1	89.06	48.27	55.99
TPB2-00-F7-001	1	86.96	42.06	49.82
TPB2-00-F8-001	1	86.96	46.37	54.69
TPB2-01-F9-001	1	95.96	35.18	38.47
TPB2-01-F10-001	1	95.96	40.84	44.23
TPB2-01-F11-001	1	77.16	39.24	44.01
TPB2-01-F12-001	1	78.67	36.42	39.68
TPB2-01-F13-001	1	56.62	35.24	36.66
TPB2-01-F14-001	1	89.06	37.24	40.63
TPB2-01-F15-001	1	86.96	31.79	35.46
TPB2-01-F16-001	1	86.96	35.78	39.90
TPB2-02-F17-001	1	95.96	43.88	47.74
TPB2-02-F18-001	1	95.96	49.93	53.82
TPB2-02-F19-001	1	77.16	43.05	49.21
TPB2-02-F20-001	1	78.67	40.79	45.33
TPB2-02-F21-001	1	56.62	39.35	42.04
TPB2-02-F22-001	1	89.06	41.10	45.76
TPB2-02-F23-001	1	86.96	39.40	43.90
TPB2-02-F24-001	1	86.96	43.61	48.50
TPB2-03-F25-001	1	87.5	45.55	56.94
TPB2-03-F26-001	1	105.94	47.09	60.54
TPB2-03-F27-001	1	86.33	43.12	53.39
TPB2-03-F28-001	1	105.85	44.26	56.05
Totals:	28	2387.67	1,185.89	1,354.22
Average DFEE = 42.52 kWh/m ² /yr			PASS	
Average TFEE = 48.73 kWh/m ² /yr				