Regulations Compliance Report

Approved Document L1A 2010 edition assessed by Stroma FSAP 2009 program, Version: 1.5.0.85
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Project Information:

Assessed By: Aymon Winter (STRO014511) **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Site Reference : Lancaster Street **Plot Reference:** 07-14-40586 B17 PL1

Address : Flat B17

Client Details:

Name: H G Construction Ltd - Hitchin
Address : 4 Hunting Gate, Hitchin, SG40TJ

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

1 TER and DER

Fuel for main heating system: Mains gas (c), Mains gas (c)
Fuel factor: 1.00 (mains gas (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)	15.98 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	11.84 kg/m²	OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.15 (max. 0.30)	0.16 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	(no floor)		
Roof	(no roof)		
Openings	1.60 (max. 2.00)	1.60 (max. 3.30)	OK

3 Air permeability

Air permeability at 50 pascals	6.00	
Maximum	10.0	OK

4 Heating efficiency

Main Heating system: Community heating schemes - mains gas

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	OK
Hot water controls:	No cylinder	

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Not applicable

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9 Summertime temperature

Overheating risk (Thames valley):	Medium	**OK**
Based on:		
Overshading:	Average or unknown	
Windows facing: North East	20.3m², Overhang twice as wide as window, ratio NaN	
Windows facing: North West	4.55m², Overhang twice as wide as window, ratio NaN	
Ventilation rate:	4.00	
Blinds/curtains:	Light-coloured curtain or roller blind shutter closed 100% of daylight hours	

10 Key features

External Walls U-value	0.13 W/m²K
External Walls U-value	0.12 W/m²K
External Walls U-value	0.16 W/m²K
Community heating, heat from boilers – mains gas	
Photovaltaic array	

SAP Input

Property Details: 07-14-40586 B17 PL1

Address:	Flat B17
Located in:	England
Region:	Thames valley
UPRN:	
Date of assessment:	16 April 2015
Date of certificate:	17 April 2015
Assessment type:	New dwelling design stage
Transaction type:	New dwelling
Tenure type:	Unknown
Related party disclosure:	No related party
Thermal Mass Parameter:	Indicative Value Low
Dwelling designed to use less than 125 litres per Person per day:	True

Property description:

Dwelling type:	Flat
Detachment:	
Year Completed:	2015

Floor Location:	Floor area:	Storey height:
Floor 0	86.75 m²	2.56 m

Living area:	30.9 m² (fraction 0.356)
Front of dwelling faces:	South West

Opening types:

Name:	Source:	Type:	Glazing:	Argon:	Frame:
Front Door	Manufacturer	Solid			PVC-U
Rear Elev	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal
Side Elev	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal

Name:	**Gap:**	**Frame Factor:**	**g-value:**	**U-value:**	**Area:**	**No. of Openings:**
Front Door	mm	0.7	0	1.6	2.12	1
Rear Elev	16mm or more	0.8	0.63	1.6	20.3	1
Side Elev	16mm or more	0.8	0.63	1.6	4.55	1

Name:	Type-Name:	Location:	Orient:	Width:	Height:
Front Door		Walls to Corridor	South West	0	0
Rear Elev		Block External Wall	North East	0	0
Side Elev		Block External Wall	North West	0	0

Overshading:	Average or unknown

Opaque Elements:

Type:	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Kappa:
External Elements							
Walls to Corridor	31.54	2.12	29.42	0.14	0.43	False	N/A
Walls to Stairwell	2.28	0	2.28	0.14	0.9	False	N/A
Block External Wall	58.57	24.85	33.72	0.16	0	False	N/A
Internal Elements							
Party Elements							
Party Walls	26.02						N/A
Party Ceiling	86.75						N/A
Party Ceiling	86.75						N/A

Thermal bridges:

Thermal bridges:	No information on thermal bridging (y=0.15) (y =0.15)

SAP Input

Ventilation:

Pressure test:	Yes (As designed)
Ventilation:	Natural ventilation (extract fans)
Number of chimneys:	0
Number of open flues:	0
Number of fans:	3
Number of sides sheltered:	2
Pressure test:	6

Main heating system:

Main heating system:	Community heating schemes Heat source: Community CHP heat from boilers – mains gas, heat fraction 0.6, efficiency 83.9 Heat source: Community boilers heat from boilers – mains gas, heat fraction 0.4, efficiency 92 Piping>=1991, pre-insulated, low temp, variable flow

Main heating Control:

Main heating Control:	Charging system linked to use of community heating, programmer and TRVs Control code: 2306

Secondary heating system:

Secondary heating system:	None

Water heating:

Water heating:	From main heating system Water code: 901 Fuel :heat from boilers – mains gas No hot water cylinder Solar panel: False

Others:

Electricity tariff:	standard tariff
In Smoke Control Area:	Unknown
Conservatory:	No conservatory
Low energy lights:	100%
Terrain type:	Dense urban
EPC language:	English
Wind turbine:	No
Photovoltaics:	Photovoltaic 1 Installed Peak power: 0.19 Tilt of collector: 30° Overshading: None or very little Collector Orientation: South East
Assess Zero Carbon Home:	No

SAP WorkSheet: New dwelling design stage

STROMA TECHNOLOGY

User Details:

Assessor Name:	Aymon Winter	**Stroma Number:**	STRO014511
Software Name:	Stroma FSAP 2009	**Software Version:**	Version: 1.5.0.85

Property Address: 07-14-40586 B17 PL1

Address : Flat B17

1. Overall dwelling dimensions:

	Area(m²)		Ave Height(m)		Volume(m³)	
Ground floor	86.75	(1a) x	2.56	(2a) =	222.08	(3a)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+.....(1n)	86.75	(4)				
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)+.....(3n) =	222.08	(5)

2. Ventilation rate:

	main heating		Secondary heating		other		total		m³ per hour	
Number of chimneys	0	+	0	+	0	=	0	x 40 =	0	(6a)
Number of open flues	0	+	0	+	0	=	0	x 20 =	0	(6b)
Number of intermittent fans							3	x 10 =	30	(7a)
Number of passive vents							0	x 10 =	0	(7b)
Number of flueless gas fires							0	x 40 =	0	(7c)

Air changes per hour

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =	30	÷ (5) =	0.14	(8)

If a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16)

Number of storeys in the dwelling (ns)		0	(9)
Additional infiltration	[(9)-1]x0.1 =	0	(10)
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction		0	(11)
if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35			
If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0		0	(12)
If no draught lobby, enter 0.05, else enter 0		0	(13)
Percentage of windows and doors draught stripped		0	(14)
Window infiltration	0.25 - [0.2 x (14) ÷ 100] =	0	(15)
Infiltration rate	(8) + (10) + (11) + (12) + (13) + (15) =	0	(16)
Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area		6	(17)
If based on air permeability value, then	(18) = [(17) ÷ 20]+(8), otherwise (18) = (16)	0.44	(18)
Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used			
Number of sides on which sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.85	(20)
Infiltration rate incorporating shelter factor	(21) = (18) x (20) =	0.37	(21)

Infiltration rate modified for monthly wind speed

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Monthly average wind speed from Table 7												
(22)m=	5.4	5.1	5.1	4.5	4.1	3.9	3.7	3.7	4.2	4.5	4.8	5.1
Wind Factor (22a)m = (22)m ÷ 4												
(22a)m=	1.35	1.27	1.27	1.12	1.02	0.98	0.92	0.92	1.05	1.12	1.2	1.27

Adjusted infiltration rate (allowing for shelter and wind speed) = (21a) x (22a)m

0.5	0.47	0.47	0.42	0.38	0.36	0.34	0.34	0.39	0.42	0.44	0.47

Calculate effective air change rate for the applicable case

If mechanical ventilation: 0 (23a)

If exhaust air heat pump using Appendix N, (23b) = (23a) × Fmv (equation (N5)) , otherwise (23b) = (23a) 0 (23b)

If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) = 0 (23c)

a) If balanced mechanical ventilation with heat recovery (MVHR) (24a)m = (22b)m + (23b) × [1 – (23c) ÷ 100]

(24a)m=	0	0	0	0	0	0	0	0	0	0	0	0	(24a)

b) If balanced mechanical ventilation without heat recovery (MV) (24b)m = (22b)m + (23b)

(24b)m=	0	0	0	0	0	0	0	0	0	0	0	0	(24b)

c) If whole house extract ventilation or positive input ventilation from outside

if (22b)m < 0.5 × (23b), then (24c) = (23b); otherwise (24c) = (22b) m + 0.5 × (23b)

(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0	(24c)

d) If natural ventilation or whole house positive input ventilation from loft

if (22b)m = 1, then (24d)m = (22b)m otherwise (24d)m = 0.5 + [(22b)m² x 0.5]

(24d)m=	0.62	0.61	0.61	0.59	0.57	0.56	0.56	0.56	0.58	0.59	0.6	0.61	(24d)

Effective air change rate - enter (24a) or (24b) or (24c) or (24d) in box (25)

(25)m=	0.62	0.61	0.61	0.59	0.57	0.56	0.56	0.56	0.58	0.59	0.6	0.61	(25)

3. Heat losses and heat loss parameter:

ELEMENT	Gross area (m²)	Openings m²	Net Area A ,m²		U-value W/m2K		A X U (W/K)	k-value kJ/m²·K	A X k kJ/K	
Doors			2.12	x	1.6	=	3.392			(26)
Windows Type 1			20.3	x1/[1/(1.6)+ 0.04]		=	30.53			(27)
Windows Type 2			4.55	x1/[1/(1.6)+ 0.04]		=	6.84			(27)
Walls Type1	31.54	2.12	29.42	x	0.13	=	3.88			(29)
Walls Type2	2.28	0	2.28	x	0.12	=	0.28			(29)
Walls Type3	58.57	24.85	33.72	x	0.16	=	5.4			(29)
Total area of elements, m²			92.39							(31)
Party wall			26.02	x	0	=	0			(32)
Party floor			86.75							(32a)
Party ceiling			86.75							(32b)

** for windows and roof windows, use effective window U-value calculated using formula 1/[(1/U-value)+0.04] as given in paragraph 3.2*

*** include the areas on both sides of internal walls and partitions*

Fabric heat loss, W/K = S (A x U) (26)…(30) + (32) = 50.32 (33)

Heat capacity Cm = S(A x k) ((28)…(30) + (32) + (32a)…(32e) = 11168.6001 (34)

Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K Indicative Value: Low 100 (35)

For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 1f can be used instead of a detailed calculation.

Thermal bridges : S (L x Y) calculated using Appendix K 13.86 (36)

if details of thermal bridging are not known (36) = 0.15 x (31)

Total fabric heat loss (33) + (36) = 64.18 (37)

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

STROMA TECHNOLOGY

(38)m=	45.78	44.79	44.79	42.99	41.91	41.41	40.93	40.93	42.17	42.99	43.86	44.79	(38)

Heat transfer coefficient, W/K (39)m = (37) + (38)m

(39)m=	109.96	108.97	108.97	107.17	106.09	105.59	105.11	105.11	106.35	107.17	108.04	108.97	

Average = $Sum(39)_{1...12}$ /12= 107.29 (39)

Heat loss parameter (HLP), W/m²K (40)m = (39)m ÷ (4)

(40)m=	1.27	1.26	1.26	1.24	1.22	1.22	1.21	1.21	1.23	1.24	1.25	1.26

Average = $Sum(40)_{1...12}$ /12= 1.24 (40)

Number of days in month (Table 1a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31	(41)

4. Water heating energy requirement: kWh/year:

Assumed occupancy, N 2.58 (42)

if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9)

if TFA £ 13.9, N = 1

Annual average hot water usage in litres per day Vd,average = (25 x N) + 36 95.44 (43)

Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target of not more that 125 litres per person per day (all water use, hot and cold)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Hot water usage in litres per day for each month Vd,m = factor from Table 1c x (43)

(44)m=	104.99	101.17	97.35	93.53	89.71	85.9	85.9	89.71	93.53	97.35	101.17	104.99

Total = $Sum(44)_{1...12}$ = 1145.29 (44)

Energy content of hot water used - calculated monthly = 4.190 x Vd,m x nm x DTm / 3600 kWh/month (see Tables 1b, 1c, 1d)

(45)m=	156.06	136.49	140.85	122.8	117.83	101.67	94.22	108.11	109.41	127.5	139.18	151.14

Total = $Sum(45)_{1...12}$ = 1505.25 (45)

If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61)

(46)m=	23.41	20.47	21.13	18.42	17.67	15.25	14.13	16.22	16.41	19.13	20.88	22.67	(46)

Water storage loss:

a) If manufacturer's declared loss factor is known (kWh/day): 0 (47)

Temperature factor from Table 2b 0 (48)

Energy lost from water storage, kWh/year (47) x (48) = 0 (49)

If manufacturer's declared cylinder loss factor is not known:

Cylinder volume (litres) including any solar storage within same 110 (50)

If community heating and no tank in dwelling, enter 110 litres in box (50)

Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in box (50)

Hot water storage loss factor from Table 2 (kWh/litre/day) 0.02 (51)

Volume factor from Table 2a 1.03 (52)

Temperature factor from Table 2b 0.6 (53)

Energy lost from water storage, kWh/year ((50) x (51) x (52) x (53) = 1.03 (54)

Enter (49) or (54) in (55) 1.03 (55)

Water storage loss calculated for each month ((56)m = (55) × (41)m

(56)m=	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01	(56)

If cylinder contains dedicated solar storage, (57)m = (56)m x [(50) – (H11)] ÷ (50), else (57)m = (56)m where (H11) is from Appendix H

(57)m=	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01	(57)

Primary circuit loss (annual) from Table 3 | 360 | (58)

Primary circuit loss calculated for each month (59)m = (58) ÷ 365 × (41)m

(modified by factor from Table H5 if there is solar water heating and a cylinder thermostat)

(59)m=	30.58	27.62	30.58	29.59	30.58	29.59	30.58	30.58	29.59	30.58	29.59	30.58	(59)

Combi loss calculated for each month (61)m = (60) ÷ 365 × (41)m

(61)m=	0	0	0	0	0	0	0	0	0	0	0	0	(61)

Total heat required for water heating calculated for each month (62)m = 0.85 × (45)m + (46)m + (57)m + (59)m + (61)m

(62)m=	218.65	193.03	203.44	183.37	180.41	162.24	156.81	170.7	169.98	190.09	199.75	213.73	(62)

Solar DHW input calculated using Appendix G or Appendix H (negative quantity) (enter '0' if no solar contribution to water heating)

(add additional lines if FGHRS and/or WWHRS applies, see Appendix G)

(63)m=	0	0	0	0	0	0	0	0	0	0	0	0	(63)

Output from water heater

(64)m=	218.65	193.03	203.44	183.37	180.41	162.24	156.81	170.7	169.98	190.09	199.75	213.73

Output from water heater (annual) 1…12 | 2242.2 | (64)

Heat gains from water heating, kWh/month 0.25 x [0.85 × (45)m + (61)m] + 0.8 x [(46)m + (57)m + (59)m]

(65)m=	101.96	90.61	96.9	89.29	89.25	82.26	81.4	86.02	84.83	92.47	94.73	100.33	(65)

include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is from community heating

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=	154.71	154.71	154.71	154.71	154.71	154.71	154.71	154.71	154.71	154.71	154.71	154.71	(66)

Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5

(67)m=	51.92	46.12	37.51	28.39	21.22	17.92	19.36	25.17	33.78	42.89	50.06	53.37	(67)

Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5

(68)m=	347.72	351.32	342.23	322.88	298.44	275.48	260.13	256.52	265.62	284.97	309.41	332.37	(68)

Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5

(69)m=	53.05	53.05	53.05	53.05	53.05	53.05	53.05	53.05	53.05	53.05	53.05	53.05	(69)

Pumps and fans gains (Table 5a)

(70)m=	0	0	0	0	0	0	0	0	0	0	0	0	(70)

Losses e.g. evaporation (negative values) (Table 5)

(71)m=	-103.14	-103.14	-103.14	-103.14	-103.14	-103.14	-103.14	-103.14	-103.14	-103.14	-103.14	-103.14	(71)

Water heating gains (Table 5)

(72)m=	137.05	134.84	130.25	124.01	119.96	114.25	109.41	115.62	117.82	124.28	131.57	134.85	(72)

Total internal gains = (66)m + (67)m + (68)m + (69)m + (70)m + (71)m + (72)m

(73)m=	641.31	636.9	614.61	579.9	544.24	512.27	493.52	501.93	521.84	556.77	595.67	625.21	(73)

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation:	Access Factor Table 6d		Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast 0.9x	0.77	x	20.3	x	11.51	x	0.63	x	0.8	=	81.61	(75)
Northeast 0.9x	0.77	x	20.3	x	23.55	x	0.63	x	0.8	=	167.01	(75)

Northeast	0.9x	0.77	x	20.3	x	41.13	x	0.63	x	0.8	=	291.6	(75)
Northeast	0.9x	0.77	x	20.3	x	67.8	x	0.63	x	0.8	=	480.7	(75)
Northeast	0.9x	0.77	x	20.3	x	89.77	x	0.63	x	0.8	=	636.46	(75)
Northeast	0.9x	0.77	x	20.3	x	97.5	x	0.63	x	0.8	=	691.31	(75)
Northeast	0.9x	0.77	x	20.3	x	92.98	x	0.63	x	0.8	=	659.24	(75)
Northeast	0.9x	0.77	x	20.3	x	75.42	x	0.63	x	0.8	=	534.73	(75)
Northeast	0.9x	0.77	x	20.3	x	51.24	x	0.63	x	0.8	=	363.34	(75)
Northeast	0.9x	0.77	x	20.3	x	29.6	x	0.63	x	0.8	=	209.86	(75)
Northeast	0.9x	0.77	x	20.3	x	14.52	x	0.63	x	0.8	=	102.99	(75)
Northeast	0.9x	0.77	x	20.3	x	9.36	x	0.63	x	0.8	=	66.37	(75)
Northwest	0.9x	0.77	x	4.55	x	11.51	x	0.63	x	0.8	=	18.29	(81)
Northwest	0.9x	0.77	x	4.55	x	23.55	x	0.63	x	0.8	=	37.43	(81)
Northwest	0.9x	0.77	x	4.55	x	41.13	x	0.63	x	0.8	=	65.36	(81)
Northwest	0.9x	0.77	x	4.55	x	67.8	x	0.63	x	0.8	=	107.74	(81)
Northwest	0.9x	0.77	x	4.55	x	89.77	x	0.63	x	0.8	=	142.66	(81)
Northwest	0.9x	0.77	x	4.55	x	97.5	x	0.63	x	0.8	=	154.95	(81)
Northwest	0.9x	0.77	x	4.55	x	92.98	x	0.63	x	0.8	=	147.76	(81)
Northwest	0.9x	0.77	x	4.55	x	75.42	x	0.63	x	0.8	=	119.85	(81)
Northwest	0.9x	0.77	x	4.55	x	51.24	x	0.63	x	0.8	=	81.44	(81)
Northwest	0.9x	0.77	x	4.55	x	29.6	x	0.63	x	0.8	=	47.04	(81)
Northwest	0.9x	0.77	x	4.55	x	14.52	x	0.63	x	0.8	=	23.08	(81)
Northwest	0.9x	0.77	x	4.55	x	9.36	x	0.63	x	0.8	=	14.88	(81)

Solar gains in watts, calculated for each month (83)m = Sum(74)m …(82)m

(83)m=	99.9	204.44	356.96	588.45	779.12	846.26	807	654.58	444.77	256.9	126.07	81.24	(83)

Total gains – internal and solar (84)m = (73)m + (83)m , watts

(84)m=	741.21	841.34	971.56	1168.34	1323.36	1358.53	1300.53	1156.51	966.62	813.67	721.73	706.45	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (°C) 21 (85)

Utilisation factor for gains for living area, h1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(86)m=	0.93	0.91	0.85	0.76	0.6	0.45	0.32	0.35	0.6	0.81	0.91	0.93	(86)

Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c)

(87)m=	18.78	19.05	19.57	20.13	20.63	20.87	20.96	20.95	20.73	20.13	19.29	18.83	(87)

Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)

(88)m=	19.87	19.88	19.88	19.89	19.9	19.91	19.91	19.91	19.9	19.89	19.89	19.88	(88)

Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a)

(89)m=	0.92	0.89	0.83	0.72	0.56	0.39	0.24	0.27	0.53	0.78	0.9	0.92	(89)

Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c)

(90)m=	16.95	17.35	18.08	18.86	19.51	19.8	19.89	19.89	19.66	18.89	17.71	17.03	(90)

fLA = Living area ÷ (4) = 0.36 (91)

Mean internal temperature (for the whole dwelling) = fLA × T1 + (1 – fLA) × T2

(92)m=	17.6	17.96	18.61	19.31	19.91	20.18	20.27	20.27	20.04	19.33	18.27	17.67	(92)

Apply adjustment to the mean internal temperature from Table 4e, where appropriate

(93)m=	17.6	17.96	18.61	19.31	19.91	20.18	20.27	20.27	20.04	19.33	18.27	17.67	(93)

8. Space heating requirement

Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation factor for gains, hm:													
(94)m=	0.89	0.87	0.8	0.7	0.56	0.4	0.27	0.3	0.54	0.75	0.87	0.9	(94)
Useful gains, hmGm , W = (94)m x (84)m													
(95)m=	663.26	728.16	781.19	823.04	735.67	546.46	344.94	341.42	521.94	613.91	626.31	634.64	(95)
Monthly average external temperature from Table 8													
(96)m=	4.5	5	6.8	8.7	11.7	14.6	16.9	16.9	14.3	10.8	7	4.9	(96)
Heat loss rate for mean internal temperature, Lm , W =[(39)m x [(93)m– (96)m]													
(97)m=	1440.58	1411.92	1287.48	1137.06	870.56	589.35	354.7	353.92	610.58	914.22	1217.97	1391.51	(97)
Space heating requirement for each month, kWh/month = 0.024 x [(97)m – (95)m] x (41)m													
(98)m=	578.32	459.48	376.68	226.09	100.36	0	0	0	0	223.43	426	563.11	

Total per year (kWh/year) = Sum(98)$_{1...5,9...12}$ = 2953.48 (98)

Space heating requirement in kWh/m²/year 34.05 (99)

9b. Energy requirements – Community heating scheme

This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none		0	(301)
Fraction of space heat from community system 1 – (301) =		1	(302)

The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the latter includes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C.

Fraction of heat from Community CHP		0.6	(303a)
Fraction of community heat from heat source 2		0.4	(303b)
Fraction of total space heat from Community CHP	(302) x (303a) =	0.6	(304a)
Fraction of total space heat from community heat source 2	(302) x (303b) =	0.4	(304b)
Factor for control and charging method (Table 4c(3)) for community heating system		1	(305)
Distribution loss factor (Table 12c) for community heating system		1.05	(306)
Space heating		**kWh/year**	
Annual space heating requirement		2953.48	
Space heat from Community CHP	(98) x (304a) x (305) x (306) =	1860.69	(307a)
Space heat from heat source 2	(98) x (304b) x (305) x (306) =	1240.46	(307b)
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)		0	(308
Space heating requirement from secondary/supplementary system	(98) x (301) x 100 ÷ (308) =	0	(309)
Water heating			
Annual water heating requirement		2242.2	
If DHW from community scheme: Water heat from Community CHP	(64) x (303a) x (305) x (306) =	1412.58	(310a)

Water heat from heat source 2	(64) x (303b) x (305) x (306) =	941.72	(310b)
Electricity used for heat distribution	0.01 × [(307a)…(307e) + (310a)…(310e)] =	54.55	(313)
Cooling System Energy Efficiency Ratio		0	(314)
Space cooling (if there is a fixed cooling system, if not enter 0)	= (107) ÷ (314) =	0	(315)
Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input from outside		0	(330a)
warm air heating system fans		0	(330b)
pump for solar water heating		0	(330g)
Total electricity for the above, kWh/year	=(330a) + (330b) + (330g) =	0	(331)
Energy for lighting (calculated in Appendix L)		366.79	(332)
Electricity generated by PVs (Appendix M) (negative quantity)		-156.1	(333)
Electricity generated by wind turbine (Appendix M) (negative quantity)		0	(334)

10b. Fuel costs – Community heating scheme

	Fuel kWh/year		Fuel Price (Table 12)		Fuel Cost £/year	
Space heating from CHP	(307a)	x	2.65	x 0.01 =	49.31	(340a)
Space heating from heat source 2	(307b)	x	3.78	x 0.01 =	46.89	(340b)
Water heating from CHP	(310a)	x	2.65	x 0.01 =	37.43	(342a)
Water heating from heat source 2	(310b)	x	3.78	x 0.01 =	35.6	(342b)
			Fuel Price			
Pumps and fans	(331)		11.46	x 0.01 =	0	(349)
Energy for lighting	(332)		11.46	x 0.01 =	42.03	(350)
Additional standing charges (Table 12)					106	(351)
Energy saving/generation technologies Item 1			11.46	x 0.01 =	-17.89	(352)
Total energy cost	= (340a)…(342e) + (345)…(354) =				299.37	(355)

11b. SAP rating - Community heating scheme

Energy cost deflator (Table 12)		0.47	(356)
Energy cost factor (ECF)	[(355) x (356)] ÷ [(4) + 45.0] =	1.07	(357)
SAP rating (section12)		85.1	(358)

12b. CO2 Emissions – Community heating scheme

Electrical efficiency of CHP unit		25.58	(361)
Heat efficiency of CHP unit		58.32	(362)

		Energy kWh/year		Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating from CHP)	(307a) × 100 ÷ (362) =	3190.45	x	0.2	631.71	(363)
less credit emissions for electricity	–(307a) × (361) ÷ (362) =	816.09	x	0.53	-431.71	(364)

Water heated by CHP	(310a) × 100 ÷ (362) =	2422.1	x	0.2		479.57	(365)
less credit emissions for electricity	–(310a) × (361) ÷ (362) =	619.55	x	0.53		-327.74	(366)
Efficiency of heat source 2 (%)	If there is CHP using two fuels repeat (363) to (366) for the second fuel					92	(367b)
CO2 associated with heat source 2	[(307b)+(310b)] x 100 ÷ (367b) x			0.2	=	469.64	(368)
Electrical energy for heat distribution	[(313) x			0.52	=	28.2	(372)
Total CO2 associated with community systems	(363)…(366) + (368)...(372)				=	849.67	(373)
CO2 associated with space heating (secondary)	(309) x			0	=	0	(374)
CO2 associated with water from immersion heater or instantaneous heater	(312) x			0.2	=	0	(375)
Total CO2 associated with space and water heating	(373) + (374) + (375) =					849.67	(376)
CO2 associated with electricity for pumps and fans within dwelling	(331)) x			0.52	=	0	(378)
CO2 associated with electricity for lighting	(332))) x			0.52	=	189.63	(379)
Energy saving/generation technologies (333) to (334) as applicable Item 1				0.53	x 0.01 =	-82.58	(380)
Total CO2, kg/year	sum of (376)…(382) =					956.73	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =					11.03	(384)
EI rating (section 14)						90.27	(385)

13b. Primary Energy – Community heating scheme

Electrical efficiency of CHP unit						25.58	(361)
Heat efficiency of CHP unit						58.32	(362)
		Energy kWh/year		**Primary factor**		**P.Energy kWh/year**	
Space heating from CHP)	(307a) × 100 ÷ (362) =	3190.45	x	1.02		3254.25	(363)
less credit emissions for electricity	–(307a) × (361) ÷ (362) =	816.09	x	2.92		-2382.99	(364)
Water heated by CHP	(310a) × 100 ÷ (362) =	2422.1	x	1.02		2470.54	(365)
less credit emissions for electricity	–(310a) × (361) ÷ (362) =	619.55	x	2.92		-1809.1	(366)
Efficiency of heat source 2 (%)	If there is CHP using two fuels repeat (363) to (366) for the second fuel					92	(367b)
Energy associated with heat source 2	[(307b)+(310b)] x 100 ÷ (367b) x			1.02	=	2419.38	(368)
Electrical energy for heat distribution	[(313) x				=	159.3	(372)
Total Energy associated with community systems	(363)…(366) + (368)...(372)				=	4111.38	(373)
if it is negative set (373) to zero (unless specified otherwise, see C7 in Appendix C)						4111.38	(373)
Energy associated with space heating (secondary)	(309) x			0	=	0	(374)
Energy associated with water from immersion heater or instantaneous heater	(312) x			1.02	=	0	(375)
Total Energy associated with space and water heating	(373) + (374) + (375) =					4111.38	(376)
Energy associated with space cooling	(315) x			2.92	=	0	(377)
Energy associated with electricity for pumps and fans within dwelling	(331)) x			2.92	=	0	(378)
Energy associated with electricity for lighting	(332))) x			2.92	=	1071.04	(379)

Energy saving/generation technologies Item 1		2.92	x 0.01 =	-455.82 (380)
Total Primary Energy, kWh/year	sum of (376)…(382) =			4726.6 (383)

SAP 2009 Overheating Assessment

Calculated by Stroma FSAP 2009 program, produced and printed on 17 April 2015

STROMA TECHNOLOGY

Property Details: 07-14-40586 B17 PL1

Dwelling type:	Flat
Located in:	England
Region:	Thames valley
Cross ventilation possible:	No
Number of storeys:	1
Front of dwelling faces:	South West
Overshading:	Average or unknown
Overhangs:	None
Thermal mass parameter:	Indicative Value Low
Night ventilation:	False
Blinds, curtains, shutters:	Light-coloured curtain or roller blind
Ventilation rate during hot weather (ach):	4 (Windows fully open)

Overheating Details:

Summer ventilation heat loss coefficient:	293.15	**(P1)**
Transmission heat loss coefficient:	64.2	
Summer heat loss coefficient:	357.33	**(P2)**

Overhangs:

Orientation:	**Ratio:**	**Z_overhangs:**
North East (Rear Elev)	0	1
North West (Side Elev)	0	1

Solar shading:

Orientation:	**Z blinds:**	**Solar access:**	**Overhangs:**	**Z summer:**	
North East (Rear Elev)	0.6	0.9	1	0.54	**(P8)**
North West (Side Elev)	0.6	0.9	1	0.54	**(P8)**

Solar gains:

Orientation		**Area**	**Flux**	**g_**	**FF**	**Shading**	**Gains**	
North East (Rear Elev)	0.9 x	20.3	98.96	0.63	0.8	0.54	492.05	
North West (Side Elev)	0.9 x	4.55	98.96	0.63	0.8	0.54	110.29	
						Total	602.34	**(P3/P4)**

Internal gains:

	June	**July**	**August**	
Internal gains	512.27	493.52	501.93	
Total summer gains	1152.17	1095.86	1002.1	**(P5)**
Summer gain/loss ratio	3.22	3.07	2.8	**(P6)**
Mean summer external temperature (Thames valley)	15.4	17.8	17.8	
Thermal mass temperature increment	1.3	1.3	1.3	
Threshold temperature	19.92	22.17	21.9	**(P7)**
Likelihood of high internal temperature	**Not significant**	**Medium**	**Slight**	

Assessment of likelihood of high internal temperature: Medium

Predicted Energy Assessment

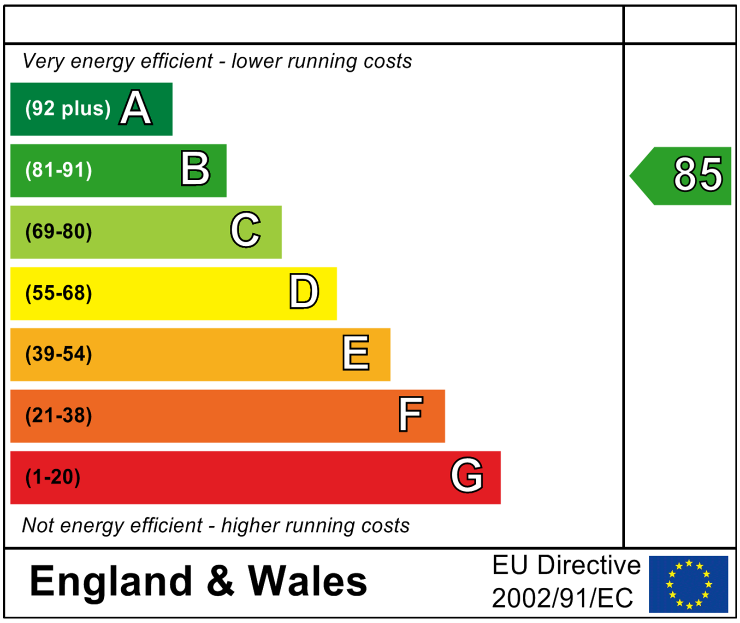
Flat B17

Dwelling type:	Mid floor Flat
Date of assessment:	16 April 2015
Produced by:	Aymon Winter
Total floor area:	86.75 m²

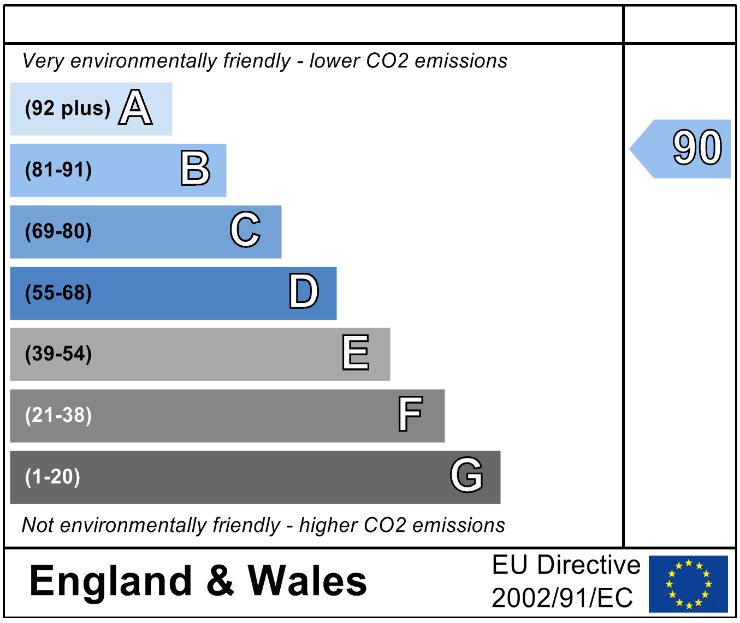
This is a Predicted Energy Assessment for a property which is not yet complete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, an Energy Performance Certificate is required providing information about the energy performance of the completed property.

Energy performance has been assessed using the SAP 2009 methodology and is rated in terms of the energy use per square metre of floor area, energy efficiency based on fuel costs and environmental impact based on carbon dioxide (CO2) emissions.

Energy Efficiency Rating



Environmental Impact (CO_2) Rating



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 carbonn dioxide (CO2) emissions. The higher the rating the less impact it has on the environment.

Code for Sustainable Homes Report

STROMA TECHNOLOGY

Assessor and House Details

Assessor Name: Aymon Winter **Assessor Number:** STRO014511
Property Address: Flat B17

Buiding regulation assessment

	kg/m²/year
TER	15.98
DER	11.84

The following code calculations are taken from the Code for Sustainable Homes Technical Guide (Nov 10)

Ene 1 Assessment - Dwelling Emission Rate

Total Energy Type CO2 Emissions for Codes Levels 1 - 5

	%	kg/m²/year	
DER from SAP 2009 DER Worksheet		11.84	*(ZC1)*
TER		15.98	
Residual CO2 emissions offset from biofuel CHP		0	*(ZC5)*
CO2 emissions offset from additional allowable electricty generation		0	*(ZC7)*
Total CO2 emissions offset from SAP Section 16 allowances		0	
DER accounting for SAP Section 16 allowances		11.84	
% improvement DER/TER	25.9		

Total Energy Type CO2 Emissions for Codes Levels 6

	kg/m²/year	
DER accounting for SAP Section 16 allowances	11.84	*(ZC1)*
CO2 emissions from appliances, equation (L14)	15.85	*(ZC2)*
CO2 emissions from cooking, equation (L16)	2.09	*(ZC3)*
Net CO2 emissions	29.8	*(ZC8)*

Result:

Credits awarded for Ene 1 = 3.1

Code Level = 4

Ene 2 - Fabric energy Efficiency

Fabric energy Efficiency: 49.67
Credits awarded for Ene 2 = 0

Ene 7 - Low or Zero Carbon (LZC) Technologies

Reduction in CO2 Emissions

	%	kg/m²/year
Standard Case CO2 emissions		36.88
Standard DER		18.94
Actual Case CO2 emissions		29.78
Actual DER		11.84
Reduction in CO2 emissions	19.25	

Credits awarded for Ene 7 = 2

Technologies eligible to contribute to achieving the requirements of this issue must produce energy from renewable sources and meet all other ancillary requirements as defined by Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC.

The following requirements must also be met:

- Where not provided by accredited external renewables there must be a direct supply of energy produced to the dwelling under assessment.
- Where covered by the Microgeneration Certification Scheme (MCS), technologies under 50kWe or 300kWth must be certified.
- Combined Heat and Power (CHP) schemes above 50kWe must be certified under the CHPQA standard.
- All technologies must be accounted for by SAP.

CHP schemes fuelled by mains gas are eligible to contribute to performance against this issue. Where these schemes are above 50kWe they must be certified under the CHPQA.
It is the responsibly of the Accredited OCDEA and Code Assessor to ensure all technologies use in the calculation are appropriate before awarding credits.