

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.1.22
Printed on 11 September 2015 at 15:31:23

Project Information:

Assessed By: Michael Brogden (STRO000212)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 62.31m²

Site Reference : 252 Finchley Road

Plot Reference: Apartment 5 - PV

Address : Apartment 5, 252 Finchley Road , London

Client Details:

Name: Douglas and King Architects

Address : 148-150 Curtain Road, London, EC2A 3AR

**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 system: Mains gas (c)

Fuel factor: 1.00 (mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

15.7 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

8.79 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

34.2 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

33.6 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.18 (max. 0.30)

0.18 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

(no roof)

Openings

1.20 (max. 2.00)

1.20 (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

4.50 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - mains gas
Community boilers

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 at least two room thermostats

OK

Hot water controls:

No cylinder

Regulations Compliance Report

7 Low energy lights

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

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.77	
Maximum	1.5	OK
MVHR efficiency:	92%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Thames valley):	Medium	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: South West	9.19m ²	
Windows facing: North East	5.88m ²	
Ventilation rate:	4.00	
Blinds/curtains:	Dark-coloured curtain or roller blind Closed 100% of daylight hours	

10 Key features

Party Walls U-value	0 W/m ² K
Community heating, heat from boilers – mains gas	
Photovoltaic array	

Predicted Energy Assessment



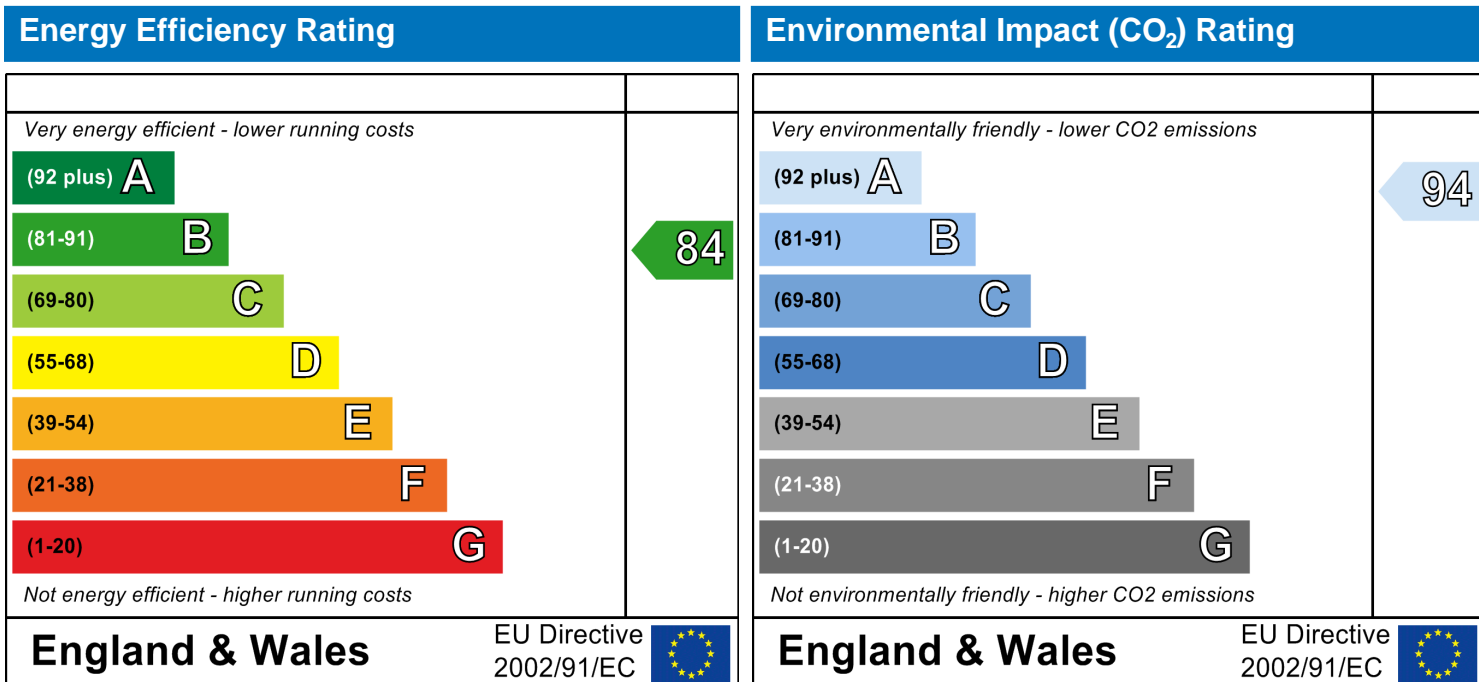
Apartment 5
252 Finchley Road
London

Dwelling type:
Date of assessment:
Produced by:
Total floor area:

Mid floor Flat
20 March 2015
Michael Brogden
62.31 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 2012 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.



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.

SAP WorkSheet: New dwelling design stage

User Details:

Assessor Name: Michael Brogden **Stroma Number:** STRO000212
Software Name: Stroma FSAP 2012 **Software Version:** Version: 1.0.1.22

Property Address: Apartment 5 - PV

Address : Apartment 5, 252 Finchley Road , London

1. Overall dwelling dimensions:

	Area(m ²)	Av. Height(m)	Volume(m ³)
Ground floor	<input type="text" value="62.31"/> (1a) x	<input type="text" value="2.4"/> (2a) =	<input type="text" value="149.54"/> (3a)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+.....(1n)	<input type="text" value="62.31"/> (4)		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)+.....(3n) =	<input type="text" value="149.54"/> (5)

2. Ventilation rate:

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/> x 40 =	<input type="text" value="0"/> (6a)
Number of open flues	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/> x 20 =	<input type="text" value="0"/> (6b)
Number of intermittent fans				<input type="text" value="0"/> x 10 =	<input type="text" value="0"/> (7a)
Number of passive vents				<input type="text" value="0"/> x 10 =	<input type="text" value="0"/> (7b)
Number of flueless gas fires				<input type="text" value="0"/> x 40 =	<input type="text" value="0"/> (7c)

Air changes per hour

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =	<input type="text" value="0"/>	÷ (5) =	<input type="text" value="0"/> (8)
<i>If a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16)</i>			
Number of storeys in the dwelling (ns)			<input type="text" value="0"/> (9)
Additional infiltration		[(9)-1]x0.1 =	<input type="text" value="0"/> (10)
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction <i>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</i>			<input type="text" value="0"/> (11)
If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0			<input type="text" value="0"/> (12)
If no draught lobby, enter 0.05, else enter 0			<input type="text" value="0"/> (13)
Percentage of windows and doors draught stripped			<input type="text" value="0"/> (14)
Window infiltration	0.25 - [0.2 x (14) ÷ 100] =		<input type="text" value="0"/> (15)
Infiltration rate	(8) + (10) + (11) + (12) + (13) + (15) =		<input type="text" value="0"/> (16)
Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area			<input type="text" value="4.5"/> (17)
If based on air permeability value, then (18) = [(17) ÷ 20] + (8), otherwise (18) = (16)			<input type="text" value="0.22"/> (18)
<i>Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used</i>			
Number of sides sheltered			<input type="text" value="2"/> (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =		<input type="text" value="0.85"/> (20)
Infiltration rate incorporating shelter factor	(21) = (18) x (20) =		<input type="text" value="0.19"/> (21)

Infiltration rate modified for monthly wind speed

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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Monthly average wind speed from Table 7

(22)m=	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7
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Wind Factor (22a)m = (22)m ÷ 4

(22a)m=	1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18
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SAP WorkSheet: New dwelling design stage

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

0.24	0.24	0.23	0.21	0.21	0.18	0.18	0.18	0.19	0.21	0.22	0.22
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Calculate effective air change rate for the applicable case

If mechanical ventilation:

0.5 (23a)

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

0.5 (23b)

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

78.2 (23c)

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

(24a)m= 0.35 0.35 0.34 0.32 0.31 0.29 0.29 0.29 0.3 0.31 0.32 0.33 (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 x (23b), then (24c) = (23b); otherwise (24c) = (22b) m + 0.5 x (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 0 0 0 0 0 0 0 0 0 0 0 (24d)

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

(25)m= 0.35 0.35 0.34 0.32 0.31 0.29 0.29 0.29 0.3 0.31 0.32 0.33 (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			1.89	x 1.2	= 2.268		(26)
Windows Type 1			9.19	x1/[1/(1.2)+0.04]	= 10.52		(27)
Windows Type 2			5.88	x1/[1/(1.2)+0.04]	= 6.73		(27)
Walls Type1	35.93	9.19	26.74	x 0.18	= 4.81		(29)
Walls Type2	7.71	1.89	5.82	x 0.18	= 1.05		(29)
Walls Type3	13.21	5.88	7.33	x 0.18	= 1.32		(29)
Total area of elements, m²			56.85				(31)
Party wall			29.92	x 0	= 0		(32)
Party floor			62.31				(32a)
Party ceiling			62.31				(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) = 26.7 (33)

Heat capacity Cm = S(A x k) ((28)...(30) + (32) + (32a)...(32e) = 4072.91 (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 7.16 (36)

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

Total fabric heat loss (33) + (36) = 33.86 (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
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SAP WorkSheet: New dwelling design stage

(38)m=

17.41	17.18	16.94	15.76	15.53	14.35	14.35	14.11	14.82	15.53	16	16.47
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 (38)

Heat transfer coefficient, W/K

(39)m = (37) + (38)m

(39)m=

51.27	51.04	50.8	49.62	49.39	48.21	48.21	47.97	48.68	49.39	49.86	50.33
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Average = Sum(39)_{1...12} / 12 =

49.56 (39)

Heat loss parameter (HLP), W/m²K

(40)m = (39)m ÷ (4)

(40)m=

0.82	0.82	0.82	0.8	0.79	0.77	0.77	0.77	0.78	0.79	0.8	0.81
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Average = Sum(40)_{1...12} / 12 =

0.8 (40)

Number of days in month (Table 1a)

(41)m=

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
31	28	31	30	31	30	31	31	30	31	30	31

 (41)

4. Water heating energy requirement:

kWh/year:

Assumed occupancy, N

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

2.05 (42)

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

82.8 (43)

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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Hot water usage in litres per day for each month Vd,m = factor from Table 1c x (43)

(44)m=

91.08	87.76	84.45	81.14	77.83	74.52	74.52	77.83	81.14	84.45	87.76	91.08
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Total = Sum(44)_{1...12} =

993.55 (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=

135.06	118.13	121.9	106.27	101.97	87.99	81.54	93.57	94.68	110.34	120.45	130.8
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Total = Sum(45)_{1...12} =

1302.7 (45)

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

(46)m=

20.26	17.72	18.28	15.94	15.3	13.2	12.23	14.03	14.2	16.55	18.07	19.62
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 (46)

Water storage loss:

Storage volume (litres) including any solar or WWHRS storage within same vessel

0 (47)

If community heating and no tank in dwelling, enter 110 litres in (47)

Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47)

Water storage loss:

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

0 (48)

Temperature factor from Table 2b

0 (49)

Energy lost from water storage, kWh/year

(48) x (49) =

110 (50)

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

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

0.02 (51)

If community heating see section 4.3

Volume factor from Table 2a

1.03 (52)

Temperature factor from Table 2b

0.6 (53)

Energy lost from water storage, kWh/year

(47) x (51) x (52) x (53) =

1.03 (54)

Enter (50) or (54) in (55)

1.03 (55)

Water storage loss calculated for each month

((56)m = (55) x (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
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 (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
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 (57)

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Primary circuit loss (annual) from Table 3

0

(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=

23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26
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(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
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(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=

190.34	168.05	177.17	159.77	157.25	141.49	136.81	148.84	148.18	165.62	173.94	186.08
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(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
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(63)

Output from water heater

(64)m=

190.34	168.05	177.17	159.77	157.25	141.49	136.81	148.84	148.18	165.62	173.94	186.08
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Output from water heater (annual)_{1...12}

1953.54

(64)

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

(65)m=

89.13	79.22	84.75	78.13	78.13	72.05	71.33	75.33	74.28	80.91	82.84	87.71
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(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

(66)m=

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
122.77	122.77	122.77	122.77	122.77	122.77	122.77	122.77	122.77	122.77	122.77	122.77

(66)

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

(67)m=

39.84	35.38	28.77	21.78	16.28	13.75	14.85	19.31	25.92	32.91	38.41	40.94
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(67)

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

(68)m=

266.77	269.53	262.56	247.71	228.96	211.34	199.57	196.8	203.78	218.63	237.38	255
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(68)

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

(69)m=

49.32	49.32	49.32	49.32	49.32	49.32	49.32	49.32	49.32	49.32	49.32	49.32
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(69)

Pumps and fans gains (Table 5a)

(70)m=

0	0	0	0	0	0	0	0	0	0	0	0
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(70)

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

(71)m=

-81.85	-81.85	-81.85	-81.85	-81.85	-81.85	-81.85	-81.85	-81.85	-81.85	-81.85	-81.85
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(71)

Water heating gains (Table 5)

(72)m=

119.8	117.89	113.91	108.51	105.01	100.07	95.88	101.25	103.16	108.75	115.06	117.89
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(72)

Total internal gains =

(66)m + (67)m + (68)m + (69)m + (70)m + (71)m + (72)m

(73)m=

516.64	513.05	495.49	468.25	440.5	415.41	400.55	407.61	423.1	450.53	481.09	504.08
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(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 m ²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)						
Northeast 0.9x	<table><tr><td>0.77</td></tr></table>	0.77	x	<table><tr><td>5.88</td></tr></table>	5.88	x	<table><tr><td>11.28</td></tr></table>	11.28	x	<table><tr><td>0.63</td></tr></table>	0.63	x	<table><tr><td>0.7</td></tr></table>	0.7	=	<table><tr><td>20.28</td></tr></table> (75)	20.28
0.77																	
5.88																	
11.28																	
0.63																	
0.7																	
20.28																	
Northeast 0.9x	<table><tr><td>0.77</td></tr></table>	0.77	x	<table><tr><td>5.88</td></tr></table>	5.88	x	<table><tr><td>22.97</td></tr></table>	22.97	x	<table><tr><td>0.63</td></tr></table>	0.63	x	<table><tr><td>0.7</td></tr></table>	0.7	=	<table><tr><td>41.27</td></tr></table> (75)	41.27
0.77																	
5.88																	
22.97																	
0.63																	
0.7																	
41.27																	

SAP WorkSheet: New dwelling design stage

Northeast 0.9x	0.77	x	5.88	x	41.38	x	0.63	x	0.7	=	74.36	(75)
Northeast 0.9x	0.77	x	5.88	x	67.96	x	0.63	x	0.7	=	122.12	(75)
Northeast 0.9x	0.77	x	5.88	x	91.35	x	0.63	x	0.7	=	164.15	(75)
Northeast 0.9x	0.77	x	5.88	x	97.38	x	0.63	x	0.7	=	175	(75)
Northeast 0.9x	0.77	x	5.88	x	91.1	x	0.63	x	0.7	=	163.71	(75)
Northeast 0.9x	0.77	x	5.88	x	72.63	x	0.63	x	0.7	=	130.51	(75)
Northeast 0.9x	0.77	x	5.88	x	50.42	x	0.63	x	0.7	=	90.61	(75)
Northeast 0.9x	0.77	x	5.88	x	28.07	x	0.63	x	0.7	=	50.44	(75)
Northeast 0.9x	0.77	x	5.88	x	14.2	x	0.63	x	0.7	=	25.51	(75)
Northeast 0.9x	0.77	x	5.88	x	9.21	x	0.63	x	0.7	=	16.56	(75)
Southwest 0.9x	0.77	x	9.19	x	36.79		0.63	x	0.7	=	103.34	(79)
Southwest 0.9x	0.77	x	9.19	x	62.67		0.63	x	0.7	=	176.02	(79)
Southwest 0.9x	0.77	x	9.19	x	85.75		0.63	x	0.7	=	240.84	(79)
Southwest 0.9x	0.77	x	9.19	x	106.25		0.63	x	0.7	=	298.42	(79)
Southwest 0.9x	0.77	x	9.19	x	119.01		0.63	x	0.7	=	334.25	(79)
Southwest 0.9x	0.77	x	9.19	x	118.15		0.63	x	0.7	=	331.83	(79)
Southwest 0.9x	0.77	x	9.19	x	113.91		0.63	x	0.7	=	319.92	(79)
Southwest 0.9x	0.77	x	9.19	x	104.39		0.63	x	0.7	=	293.19	(79)
Southwest 0.9x	0.77	x	9.19	x	92.85		0.63	x	0.7	=	260.78	(79)
Southwest 0.9x	0.77	x	9.19	x	69.27		0.63	x	0.7	=	194.54	(79)
Southwest 0.9x	0.77	x	9.19	x	44.07		0.63	x	0.7	=	123.78	(79)
Southwest 0.9x	0.77	x	9.19	x	31.49		0.63	x	0.7	=	88.44	(79)

Solar gains in watts, calculated for each month

(83)m = Sum(74)m ... (82)m

(83)m=	123.61	217.3	315.2	420.53	498.4	506.83	483.63	423.7	351.39	244.98	149.29	104.99	(83)
--------	--------	-------	-------	--------	-------	--------	--------	-------	--------	--------	--------	--------	------

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

(84)m=	640.26	730.34	810.69	888.78	938.9	922.24	884.18	831.31	774.49	695.51	630.38	609.07	(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=	0.86	0.81	0.73	0.6	0.47	0.33	0.24	0.26	0.42	0.64	0.8	0.87	(86)

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

(87)m=	20.02	20.25	20.52	20.79	20.93	20.98	21	20.99	20.96	20.78	20.39	19.98	(87)
--------	-------	-------	-------	-------	-------	-------	----	-------	-------	-------	-------	-------	------

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

(88)m=	20.23	20.24	20.24	20.26	20.26	20.28	20.28	20.28	20.27	20.26	20.25	20.25	(88)
--------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------

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

(89)m=	0.85	0.79	0.71	0.57	0.43	0.29	0.2	0.22	0.38	0.61	0.78	0.86	(89)
--------	------	------	------	------	------	------	-----	------	------	------	------	------	------

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

(90)m=	18.94	19.26	19.64	20	20.18	20.26	20.27	20.28	20.23	20.01	19.48	18.9	(90)
--------	-------	-------	-------	----	-------	-------	-------	-------	-------	-------	-------	------	------

fLA = Living area ÷ (4) =

0.44 (91)

SAP WorkSheet: New dwelling design stage

Mean internal temperature (for the whole dwelling) = $fLA \times T1 + (1 - fLA) \times T2$

(92)m=

19.41	19.7	20.03	20.35	20.51	20.58	20.59	20.59	20.55	20.35	19.88	19.38
-------	------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------

 (92)

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

(93)m=

19.41	19.7	20.03	20.35	20.51	20.58	20.59	20.59	20.55	20.35	19.88	19.38
-------	------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------

 (93)

8. Space heating requirement

Set T_i to the mean internal temperature obtained at step 11 of Table 9b, so that $T_{i,m}=(76)m$ 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, h_m :

(94)m=

0.83	0.78	0.7	0.58	0.44	0.31	0.22	0.24	0.39	0.61	0.77	0.85
------	------	-----	------	------	------	------	------	------	------	------	------

 (94)

Useful gains, $h_m G_m$, $W = (94)m \times (84)m$

(95)m=

532.6	568.22	566.92	514.09	416.46	284.42	191.6	199.9	305.09	426.96	486.88	514.88
-------	--------	--------	--------	--------	--------	-------	-------	--------	--------	--------	--------

 (95)

Monthly average external temperature from Table 8

(96)m=

4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2
-----	-----	-----	-----	------	------	------	------	------	------	-----	-----

 (96)

Heat loss rate for mean internal temperature, L_m , $W = [(39)m \times ((93)m - (96)m)]$

(97)m=

774.88	755.35	687.44	568.2	435.05	288.27	192.45	201.12	314.19	481.44	637.25	763.87
--------	--------	--------	-------	--------	--------	--------	--------	--------	--------	--------	--------

 (97)

Space heating requirement for each month, $kWh/month = 0.024 \times [(97)m - (95)m] \times (41)m$

(98)m=

180.26	125.75	89.67	38.96	13.83	0	0	0	0	40.53	108.27	185.24
--------	--------	-------	-------	-------	---	---	---	---	-------	--------	--------

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

782.52

 (98)

Space heating requirement in $kWh/m^2/year$

12.56

 (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 boilers

1

 (303a)

Fraction of total space heat from Community boilers

(302) x (303a) =

1

 (304a)

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

Annual space heating requirement

kWh/year

782.52

Space heat from Community boilers

(98) x (304a) x (305) x (306) =

821.64

 (307a)

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

1953.54

If DHW from community scheme:

Water heat from Community boilers

(64) x (303a) x (305) x (306) =

2051.22

 (310a)

Electricity used for heat distribution

$0.01 \times [(307a)...(307e) + (310a)...(310e)] =$

28.73

 (313)

Cooling System Energy Efficiency Ratio

0

 (314)

Space cooling (if there is a fixed cooling system, if not enter 0)

$= (107) \div (314) =$

0

 (315)

SAP WorkSheet: New dwelling design stage

Electricity for pumps and fans within dwelling (Table 4f):

mechanical ventilation - balanced, extract or positive input from outside

175.6 (330a)

warm air heating system fans

0 (330b)

pump for solar water heating

0 (330g)

Total electricity for the above, kWh/year

$=(330a) + (330b) + (330g) =$

175.6 (331)

Energy for lighting (calculated in Appendix L)

281.4 (332)

Electricity generated by PVs (Appendix M) (negative quantity)

-795.16 (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	4.24	x 0.01 = 34.84 (340a)
Water heating from CHP	(310a) x	4.24	x 0.01 = 86.97 (342a)
Pumps and fans	(331)	13.19	x 0.01 = 23.16 (349)
Energy for lighting	(332)	13.19	x 0.01 = 37.12 (350)
Additional standing charges (Table 12)			120 (351)
Energy saving/generation technologies			
Total energy cost	$=(340a)...(342e) + (345)...(354) =$		302.09 (355)

11b. SAP rating - Community heating scheme

Energy cost deflator (Table 12)	0.42 (356)
Energy cost factor (ECF)	$[(355) \times (356)] \div [(4) + 45.0] =$ 1.18 (357)
SAP rating (section12)	83.51 (358)

12b. CO2 Emissions – Community heating scheme

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
CO2 from other sources of space and water heating (not CHP)			
Efficiency of heat source 1 (%)	If there is CHP using two fuels repeat (363) to (366) for the second fuel		96 (367a)
CO2 associated with heat source 1	$[(307b)+(310b)] \times 100 \div (367b) \times$	0	= 646.39 (367)
Electrical energy for heat distribution	$[(313) \times$	0.52	= 14.91 (372)
Total CO2 associated with community systems	$(363)...(366) + (368)...(372)$		= 661.3 (373)
CO2 associated with space heating (secondary)	(309) x	0	= 0 (374)
CO2 associated with water from immersion heater or instantaneous heater	(312) x	0.22	= 0 (375)
Total CO2 associated with space and water heating	$(373) + (374) + (375) =$		661.3 (376)
CO2 associated with electricity for pumps and fans within dwelling	(331)) x	0.52	= 91.14 (378)
CO2 associated with electricity for lighting	(332))) x	0.52	= 146.05 (379)
Energy saving/generation technologies (333) to (334) as applicable			

SAP WorkSheet: New dwelling design stage

Item 1		<input type="text" value="0.52"/>	x 0.01 =	<input type="text" value="-412.69"/>	(380)
Total CO2, kg/year	sum of (376)...(382) =			<input type="text" value="485.8"/>	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =			<input type="text" value="7.8"/>	(384)
EI rating (section 14)				<input type="text" value="93.93"/>	(385)

13b. Primary Energy – Community heating scheme

	Energy kWh/year	Primary factor	P.Energy kWh/year
Energy from other sources of space and water heating (not CHP)			
Efficiency of heat source 1 (%)	If there is CHP using two fuels repeat (363) to (366) for the second fuel		<div>96</div> (367a)
Energy associated with heat source 1	$[(307b)+(310b)] \times 100 \div (367b) \times$	<div>0</div>	= <div>3650.92</div> (367)
Electrical energy for heat distribution	$[(313) \times$	<div></div>	= <div>88.2</div> (372)
Total Energy associated with community systems	$(363)...(366) + (368)...(372)$		= <div>3739.12</div> (373)
<i>if it is negative set (373) to zero (unless specified otherwise, see C7 in Appendix C)</i>			<div>3739.12</div> (373)
Energy associated with space heating (secondary)	$(309) \times$	<div>0</div>	= <div>0</div> (374)
Energy associated with water from immersion heater or instantaneous heater	$(312) \times$	<div>1.22</div>	= <div>0</div> (375)
Total Energy associated with space and water heating	$(373) + (374) + (375) =$		<div>3739.12</div> (376)
Energy associated with space cooling	$(315) \times$	<div>3.07</div>	= <div>0</div> (377)
Energy associated with electricity for pumps and fans within dwelling	$(331)) \times$	<div>3.07</div>	= <div>539.1</div> (378)
Energy associated with electricity for lighting	$(332))) \times$	<div>3.07</div>	= <div>863.91</div> (379)
Energy saving/generation technologies			
Item 1		<div>3.07</div>	$\times 0.01 =$ <div>-2441.16</div> (380)
Total Primary Energy, kWh/year	sum of (376)...(382) =		<div>2700.97</div> (383)