

SAP 2012 Overheating Assessment

Calculated by Stroma FSAP 2012 program, produced and printed on 19 June 2023

Property Details: Level 38 Flat 38 07

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

Overheating Details:

Summer ventilation heat loss coefficient: 287.79 (P1)
Transmission heat loss coefficient: 37.7
Summer heat loss coefficient: 325.49 (P2)

Overhangs:

Orientation:	Ratio:	Z_overhangs:
South West (SW)	0	1
West (W)	0	1
North (N)	0	1
North (N GLAZED DOOR)	0	1

Solar shading:

Orientation:	Z blinds:	Solar access:	Overhangs:	Z summer:	
South West (SW)	1	0.9	1	0.9	(P8)
West (W)	1	0.9	1	0.9	(P8)
North (N)	1	0.9	1	0.9	(P8)
North (N GLAZED DOOR)	1	0.9	1	0.9	(P8)

Solar gains:

Orientation	Area	Flux	g_	FF	Shading	Gains
South West (SW)	0.9 x 21.27	112.1	0.4	0.8	0.9	618.03
West (W)	0.9 x 8.52	108.47	0.4	1	0.9	299.43
North (N)	0.9 x 1.57	73.49	0.4	1	0.9	37.38
North (N GLAZED DOOR)	0.9 x 2.56	73.49	0.4	0.7	0.9	42.67
Total						997.51 (P3/P4)

Internal gains:

	June	July	August
Internal gains	458.05	440.16	448.28
Total summer gains	1532.02	1437.67	1320.98 (P5)
Summer gain/loss ratio	4.71	4.42	4.06 (P6)
Mean summer external temperature (West Pennines)	14.7	16.4	16.3
Thermal mass temperature increment	1.3	1.3	1.3
Threshold temperature	20.71	22.12	21.66 (P7)
Likelihood of high internal temperature	Slight	Medium	Slight

SAP 2012 Overheating Assessment

Assessment of likelihood of high internal temperature: Medium

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 19 June 2023 at 15:45:39

Project Information:

Assessed By: ()

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 80.45m²

Site Reference : P1785 St Michaels

Plot Reference: Level 38 Flat 38 08

Address :

Client Details:

Name:

Address :

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: Electricity

Fuel factor: 1.55 (electricity)

Target Carbon Dioxide Emission Rate (TER)

22.29 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

21.21 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

38.9 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

34.4 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.00 (max. 0.30)

0.00 (max. 0.70)

Party wall

0.00 (max. 0.20)

-

Floor

(no floor)

Roof

(no roof)

Openings

0.87 (max. 2.00)

1.00 (max. 3.30)

OK

OK

OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals

5.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Heat pumps with warm air distribution - electric

Air source heat pump

Efficiency 170 %

Minimum 170 %

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

Measured cylinder loss: 1.61 kWh/day

Permitted by DBSCG: 2.17 kWh/day

OK

Regulations Compliance Report

Primary pipework insulated: No primary pipework

6 Controls

Space heating controls	Time and temperature zone control	OK
Hot water controls:	Cylinderstat	OK

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:	0.67	
Maximum	1.5	OK
MVHR efficiency:	89%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (West Pennines):	Slight	OK
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Based on:

Overshading:	Average or unknown
Windows facing: North West	21.25m ²
Windows facing: West	8.52m ²
Windows facing: South	1.57m ²
Windows facing: South	2.56m ²
Ventilation rate:	4.00

10 Key features

Windows U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Fixed cooling system	

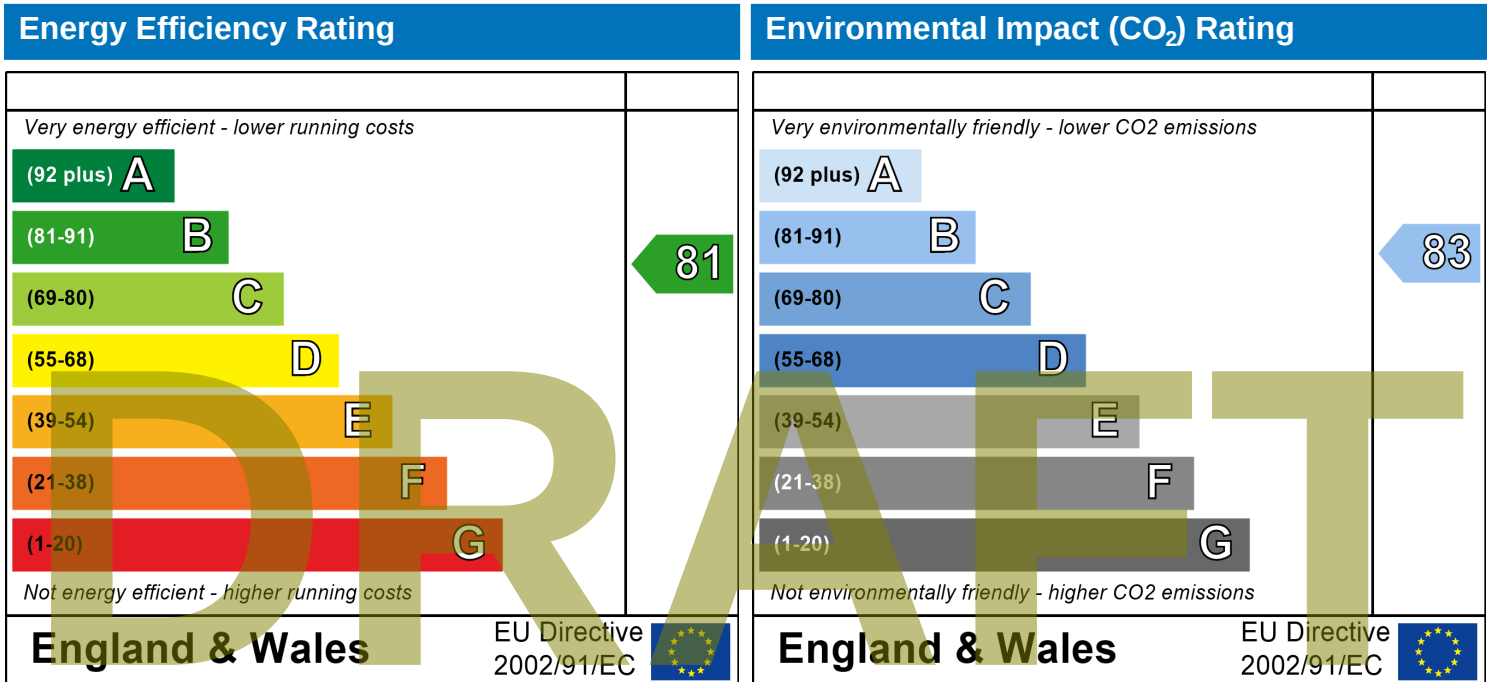
Predicted Energy Assessment

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

Mid floor Flat
11 August 2022
Stroma Certification
80.45 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:

Stroma Number:

Software Name: Stroma FSAP 2012

Software Version:

Version: 1.0.5.60

Property Address: Level 38 Flat 38 08

Address :

1. Overall dwelling dimensions:

	Area(m ²)	Av. Height(m)	Volume(m ³)
Ground floor	80.45 (1a) ×	2.7 (2a) =	217.21 (3a)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+.....(1n)	80.45 (4)		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)+.....(3n) =	217.21 (5)

2. Ventilation rate:

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	0	0	0 × 40 =	0 (6a)
Number of open flues	0	0	0	0 × 20 =	0 (6b)
Number of intermittent fans				0 × 10 =	0 (7a)
Number of passive vents				0 × 10 =	0 (7b)
Number of flueless gas fires				0 × 40 =	0 (7c)

	Air changes per hour
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =	0 ÷ (5) = 0 (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]×0.1 = 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 × (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 5 (17)

If based on air permeability value, then (18) = [(17) ÷ 20] + (8), otherwise (18) = (16) 0.25 (18)

Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used

Number of sides sheltered 3 (19)

Shelter factor (20) = 1 - [0.075 × (19)] = 0.78 (20)

Infiltration rate incorporating shelter factor (21) = (18) × (20) = 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

0.25	0.24	0.24	0.21	0.21	0.18	0.18	0.18	0.19	0.21	0.22	0.23
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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) =

75.65 (23c)

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

(24a)m= 0.37 0.36 0.36 0.33 0.33 0.31 0.31 0.3 0.32 0.33 0.34 0.35 (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= 0.37 0.36 0.36 0.33 0.33 0.31 0.31 0.3 0.32 0.33 0.34 0.35 (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
Windows Type 1			21.25	x 1/[1/(1) + 0.04]	20.43		(27)
Windows Type 2			8.52	x 1/[1/(1) + 0.04]	8.19		(27)
Windows Type 3			1.57	x 1/[1/(1) + 0.04]	1.51		(27)
Windows Type 4			2.56	x 1/[1/(1) + 0.04]	2.46		(27)
Walls	41.22	33.9	7.32	x 0.24	1.76		(29)
Total area of elements, m²			41.22				(31)
Party wall			35.41	x 0	0		(32)
Party wall			29.66	x 0	0		(32)
Party floor			80.45				(32a)
Party ceiling			80.45				(32b)
Internal wall **			102.06				(32c)

* 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) = 34.35 (33)

Heat capacity Cm = S(A x k) ((28)...(30) + (32) + (32a)...(32e) = 16803.42 (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 3.36 (36)

if details of thermal bridging are not known (36) = 0.05 x (31)

Total fabric heat loss (33) + (36) = 37.71 (37)

SAP WorkSheet: New dwelling design stage

Ventilation heat loss calculated monthly

$$(38)m = 0.33 \times (25)m \times (5)$$

(38)m=

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
26.43	26.09	25.74	24	23.66	21.92	21.92	21.57	22.62	23.66	24.35	25.05

(38)

Heat transfer coefficient, W/K

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

(39)m=

64.14	63.8	63.45	61.71	61.37	59.63	59.63	59.28	60.33	61.37	62.06	62.76
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$$\text{Average} = \text{Sum}(39)_{1...12} / 12 =$$

61.63

(39)

Heat loss parameter (HLP), W/m²K

$$(40)m = (39)m \div (4)$$

(40)m=

0.8	0.79	0.79	0.77	0.76	0.74	0.74	0.74	0.75	0.76	0.77	0.78
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$$\text{Average} = \text{Sum}(40)_{1...12} / 12 =$$

0.77

(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

2.47

(42)

if TFA > 13.9, $N = 1 + 1.76 \times [1 - \exp(-0.000349 \times (TFA - 13.9)^2)] + 0.0013 \times (TFA - 13.9)$

if TFA ≤ 13.9, N = 1

Annual average hot water usage in litres per day $V_{d,average} = (25 \times N) + 36$

92.89

(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 $V_{d,m} = \text{factor from Table 1c} \times (43)$

(44)m=

102.18	98.47	94.75	91.04	87.32	83.6	83.6	87.32	91.04	94.75	98.47	102.18
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$$\text{Total} = \text{Sum}(44)_{1...12} =$$

1114.73

(44)

Energy content of hot water used - calculated monthly = $4.190 \times V_{d,m} \times n_m \times DT_m / 3600$ kWh/month (see Tables 1b, 1c, 1d)

(45)m=

151.54	132.53	136.76	119.23	114.41	98.72	91.48	104.98	106.23	123.8	135.14	146.75
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$$\text{Total} = \text{Sum}(45)_{1...12} =$$

1461.59

(45)

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

(46)m=

22.73	19.88	20.51	17.89	17.16	14.81	13.72	15.75	15.93	18.57	20.27	22.01
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(46)

Water storage loss:

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

190

(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):

1.61

(48)

Temperature factor from Table 2b

0.6

(49)

Energy lost from water storage, kWh/year

$$(48) \times (49) =$$

0.97

(50)

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

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

0

(51)

If community heating see section 4.3

Volume factor from Table 2a

0

(52)

Temperature factor from Table 2b

0

(53)

Energy lost from water storage, kWh/year

$$(47) \times (51) \times (52) \times (53) =$$

0

(54)

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

0.97

(55)

Water storage loss calculated for each month

$$((56)m = (55) \times (41)m$$

(56)m=

29.95	27.05	29.95	28.98	29.95	28.98	29.95	29.95	28.98	29.95	28.98	29.95
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(56)

SAP WorkSheet: New dwelling design stage

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

(57)m=

29.95	27.05	29.95	28.98	29.95	28.98	29.95	29.95	28.98	29.95	28.98	29.95
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 (57)

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=

0	0	0	0	0	0	0	0	0	0	0	0
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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=

181.48	159.58	166.71	148.21	144.35	127.7	121.43	134.92	135.21	153.75	164.12	176.7
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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=

181.48	159.58	166.71	148.21	144.35	127.7	121.43	134.92	135.21	153.75	164.12	176.7
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Output from water heater (annual) _{1...12}	1814.18
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 (64)

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

(65)m=

74.34	65.71	69.43	62.83	62	56.01	54.37	58.86	58.51	65.12	68.12	72.75
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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
148.28	148.28	148.28	148.28	148.28	148.28	148.28	148.28	148.28	148.28	148.28	148.28

 (66)

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

(67)m=

49.12	43.63	35.48	26.86	20.08	16.95	18.32	23.81	31.95	40.57	47.36	50.48
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 (67)

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

(68)m=

328.92	332.34	323.74	305.42	282.31	260.59	246.07	242.66	251.26	269.57	292.69	314.41
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 (68)

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

(69)m=

52.3	52.3	52.3	52.3	52.3	52.3	52.3	52.3	52.3	52.3	52.3	52.3
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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=

-98.85	-98.85	-98.85	-98.85	-98.85	-98.85	-98.85	-98.85	-98.85	-98.85	-98.85	-98.85
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 (71)

Water heating gains (Table 5)

(72)m=

99.92	97.78	93.32	87.26	83.33	77.79	73.08	79.12	81.26	87.53	94.61	97.79
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 (72)

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

(73)m=

579.69	575.46	554.26	521.27	487.44	457.05	439.2	447.31	466.2	499.4	536.38	564.4
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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)
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SAP WorkSheet: New dwelling design stage

South	0.9x	0.77	x	1.57	x	46.75	x	0.4	x	1	=	20.35	(78)
South	0.9x	0.77	x	2.56	x	46.75	x	0.4	x	0.7	=	23.22	(78)
South	0.9x	0.77	x	1.57	x	76.57	x	0.4	x	1	=	33.32	(78)
South	0.9x	0.77	x	2.56	x	76.57	x	0.4	x	0.7	=	38.03	(78)
South	0.9x	0.77	x	1.57	x	97.53	x	0.4	x	1	=	42.45	(78)
South	0.9x	0.77	x	2.56	x	97.53	x	0.4	x	0.7	=	48.45	(78)
South	0.9x	0.77	x	1.57	x	110.23	x	0.4	x	1	=	47.97	(78)
South	0.9x	0.77	x	2.56	x	110.23	x	0.4	x	0.7	=	54.76	(78)
South	0.9x	0.77	x	1.57	x	114.87	x	0.4	x	1	=	49.99	(78)
South	0.9x	0.77	x	2.56	x	114.87	x	0.4	x	0.7	=	57.06	(78)
South	0.9x	0.77	x	1.57	x	110.55	x	0.4	x	1	=	48.11	(78)
South	0.9x	0.77	x	2.56	x	110.55	x	0.4	x	0.7	=	54.91	(78)
South	0.9x	0.77	x	1.57	x	108.01	x	0.4	x	1	=	47.01	(78)
South	0.9x	0.77	x	2.56	x	108.01	x	0.4	x	0.7	=	53.65	(78)
South	0.9x	0.77	x	1.57	x	104.89	x	0.4	x	1	=	45.65	(78)
South	0.9x	0.77	x	2.56	x	104.89	x	0.4	x	0.7	=	52.11	(78)
South	0.9x	0.77	x	1.57	x	101.89	x	0.4	x	1	=	44.34	(78)
South	0.9x	0.77	x	2.56	x	101.89	x	0.4	x	0.7	=	50.61	(78)
South	0.9x	0.77	x	1.57	x	82.59	x	0.4	x	1	=	35.94	(78)
South	0.9x	0.77	x	2.56	x	82.59	x	0.4	x	0.7	=	41.02	(78)
South	0.9x	0.77	x	1.57	x	55.42	x	0.4	x	1	=	24.12	(78)
South	0.9x	0.77	x	2.56	x	55.42	x	0.4	x	0.7	=	27.53	(78)
South	0.9x	0.77	x	1.57	x	40.4	x	0.4	x	1	=	17.58	(78)
South	0.9x	0.77	x	2.56	x	40.4	x	0.4	x	0.7	=	20.07	(78)
West	0.9x	0.77	x	8.52	x	19.64	x	0.4	x	1	=	46.39	(80)
West	0.9x	0.77	x	8.52	x	38.42	x	0.4	x	1	=	90.74	(80)
West	0.9x	0.77	x	8.52	x	63.27	x	0.4	x	1	=	149.43	(80)
West	0.9x	0.77	x	8.52	x	92.28	x	0.4	x	1	=	217.94	(80)
West	0.9x	0.77	x	8.52	x	113.09	x	0.4	x	1	=	267.1	(80)
West	0.9x	0.77	x	8.52	x	115.77	x	0.4	x	1	=	273.42	(80)
West	0.9x	0.77	x	8.52	x	110.22	x	0.4	x	1	=	260.31	(80)
West	0.9x	0.77	x	8.52	x	94.68	x	0.4	x	1	=	223.6	(80)
West	0.9x	0.77	x	8.52	x	73.59	x	0.4	x	1	=	173.8	(80)
West	0.9x	0.77	x	8.52	x	45.59	x	0.4	x	1	=	107.67	(80)
West	0.9x	0.77	x	8.52	x	24.49	x	0.4	x	1	=	57.84	(80)
West	0.9x	0.77	x	8.52	x	16.15	x	0.4	x	1	=	38.14	(80)
Northwest	0.9x	0.77	x	21.25	x	11.28	x	0.4	x	0.8	=	53.17	(81)
Northwest	0.9x	0.77	x	21.25	x	22.97	x	0.4	x	0.8	=	108.23	(81)
Northwest	0.9x	0.77	x	21.25	x	41.38	x	0.4	x	0.8	=	194.99	(81)
Northwest	0.9x	0.77	x	21.25	x	67.96	x	0.4	x	0.8	=	320.24	(81)
Northwest	0.9x	0.77	x	21.25	x	91.35	x	0.4	x	0.8	=	430.46	(81)

SAP WorkSheet: New dwelling design stage

Northwest 0.9x	0.77	x	21.25	x	97.38	x	0.4	x	0.8	=	458.91	(81)
Northwest 0.9x	0.77	x	21.25	x	91.1	x	0.4	x	0.8	=	429.31	(81)
Northwest 0.9x	0.77	x	21.25	x	72.63	x	0.4	x	0.8	=	342.25	(81)
Northwest 0.9x	0.77	x	21.25	x	50.42	x	0.4	x	0.8	=	237.6	(81)
Northwest 0.9x	0.77	x	21.25	x	28.07	x	0.4	x	0.8	=	132.26	(81)
Northwest 0.9x	0.77	x	21.25	x	14.2	x	0.4	x	0.8	=	66.9	(81)
Northwest 0.9x	0.77	x	21.25	x	9.21	x	0.4	x	0.8	=	43.42	(81)

Solar gains in watts, calculated for each month

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

(83)m=	143.13	270.33	435.32	640.91	804.61	835.36	790.27	663.6	506.35	316.9	176.38	119.21	(83)
--------	--------	--------	--------	--------	--------	--------	--------	-------	--------	-------	--------	--------	------

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

(84)m=	722.81	845.79	989.59	1162.18	1292.05	1292.41	1229.47	1110.91	972.55	816.3	712.76	683.62	(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=	0.89	0.84	0.74	0.58	0.43	0.29	0.21	0.24	0.41	0.67	0.84	0.9	(86)

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

(87)m=	19.92	20.19	20.53	20.82	20.95	20.99	21	21	20.97	20.77	20.33	19.89	(87)
--------	-------	-------	-------	-------	-------	-------	----	----	-------	-------	-------	-------	------

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

(88)m=	20.26	20.26	20.26	20.28	20.29	20.3	20.3	20.31	20.3	20.29	20.28	20.27	(88)
--------	-------	-------	-------	-------	-------	------	------	-------	------	-------	-------	-------	------

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

(89)m=	0.88	0.82	0.72	0.56	0.4	0.26	0.18	0.21	0.38	0.64	0.82	0.89	(89)
--------	------	------	------	------	-----	------	------	------	------	------	------	------	------

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

(90)m=	18.82	19.2	19.66	20.07	20.23	20.3	20.3	20.31	20.27	20.01	19.41	18.79	(90)
--------	-------	------	-------	-------	-------	------	------	-------	-------	-------	-------	-------	------

fLA = Living area ÷ (4) =

0.52

(91)

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

(92)m=	19.4	19.72	20.11	20.46	20.61	20.66	20.67	20.67	20.63	20.41	19.89	19.36	(92)
--------	------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------

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

(93)m=	19.4	19.72	20.11	20.46	20.61	20.66	20.67	20.67	20.63	20.41	19.89	19.36	(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=	0.87	0.81	0.72	0.56	0.41	0.28	0.2	0.23	0.39	0.65	0.81	0.88	(94)
--------	------	------	------	------	------	------	-----	------	------	------	------	------	------

Useful gains, hmGm , W = (94)m x (84)m

(95)m=	626.14	685.25	707.73	654.71	529.59	358.21	241.74	251.8	383.61	526.75	579.03	601.12	(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, Lm , W =[(39)m x [(93)m– (96)m]

(97)m=	968.32	945.45	863.8	713.68	546.48	361.23	242.41	252.88	393.99	601.87	793.66	951.49	(97)
--------	--------	--------	-------	--------	--------	--------	--------	--------	--------	--------	--------	--------	------

Space heating requirement for each month, kWh/month = 0.024 x [(97)m – (95)m] x (41)m

(98)m=	254.58	174.85	116.12	42.46	12.56	0	0	0	0	55.88	154.53	260.68	
--------	--------	--------	--------	-------	-------	---	---	---	---	-------	--------	--------	--

SAP WorkSheet: New dwelling design stage

Total per year (kWh/year) = Sum(98)_{1...5,9...12} = 1071.67 (98)

Space heating requirement in kWh/m²/year

13.32 (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
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Heat loss rate Lm (calculated using 25°C internal temperature and external temperature from Table 10)

(100)m= 0 0 0 0 0 560.53 441.27 450.55 0 0 0 0 (100)

Utilisation factor for loss hm

(101)m= 0 0 0 0 0 0.98 0.99 0.98 0 0 0 0 (101)

Useful loss, hmLm (Watts) = (100)m x (101)m

(102)m= 0 0 0 0 0 547.56 435.46 441.93 0 0 0 0 (102)

Gains (solar gains calculated for applicable weather region, see Table 10)

(103)m= 0 0 0 0 0 1433.45 1362.9 1222.95 0 0 0 0 (103)

Space cooling requirement for month, whole dwelling, continuous (kWh) = 0.024 x [(103)m – (102)m] x (41)m

set (104)m to zero if (104)m < 3 x (98)m

(104)m= 0 0 0 0 0 637.84 690.01 581.08 0 0 0 0

Total = Sum(104) = 1908.93 (104)

Cooled fraction

f C = cooled area ÷ (4) = 0.86 (105)

Intermittency factor (Table 10b)

(106)m= 0 0 0 0 0 0.25 0.25 0.25 0 0 0 0

Total = Sum(104) = 0 (106)

Space cooling requirement for month = (104)m x (105) x (106)m

(107)m= 0 0 0 0 0 136.45 147.61 124.3 0 0 0 0

Total = Sum(107) = 408.36 (107)

Space cooling requirement in kWh/m²/year

(107) ÷ (4) = 5.08 (108)

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

Space heating:

Fraction of space heat from secondary/supplementary system

0 (201)

Fraction of space heat from main system(s)

(202) = 1 – (201) =

1 (202)

Fraction of total heating from main system 1

(204) = (202) x [1 – (203)] =

1 (204)

Efficiency of main space heating system 1

170 (206)

Efficiency of secondary/supplementary heating system, %

0 (208)

Cooling System Energy Efficiency Ratio

5.6 (209)

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

kWh/year

Space heating requirement (calculated above)

254.58	174.85	116.12	42.46	12.56	0	0	0	0	55.88	154.53	260.68
--------	--------	--------	-------	-------	---	---	---	---	-------	--------	--------

(211)m = {[(98)m x (204)] } x 100 ÷ (206)

(211)

149.75	102.86	68.3	24.98	7.39	0	0	0	0	32.87	90.9	153.34
--------	--------	------	-------	------	---	---	---	---	-------	------	--------

Total (kWh/year) =Sum(211)_{1...5,10...12} = 630.39 (211)

Space heating fuel (secondary), kWh/month

= {[(98)m x (201)] } x 100 ÷ (208)

(215)m= 0 0 0 0 0 0 0 0 0 0 0 0

Total (kWh/year) =Sum(215)_{1...5,10...12} = 0 (215)

SAP WorkSheet: New dwelling design stage

Water heating

Output from water heater (calculated above)

181.48	159.58	166.71	148.21	144.35	127.7	121.43	134.92	135.21	153.75	164.12	176.7
--------	--------	--------	--------	--------	-------	--------	--------	--------	--------	--------	-------

Efficiency of water heater

100 (216)

(217)m= 100 100 100 100 100 100 100 100 100 100 100 100 (217)

Fuel for water heating, kWh/month

(219)m = (64)m x 100 ÷ (217)m

181.48	159.58	166.71	148.21	144.35	127.7	121.43	134.92	135.21	153.75	164.12	176.7
--------	--------	--------	--------	--------	-------	--------	--------	--------	--------	--------	-------

Total = Sum(219a)_{1..12} =

1814.18 (219)

Space cooling fuel, kWh/month.

(221)m = (107)m ÷ (209)

0	0	0	0	0	24.35	26.35	22.19	0	0	0	0
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Total = Sum(221)_{6..8} =

72.89 (221)

Annual totals

Space heating fuel used, main system 1

kWh/year

kWh/year

630.39

Water heating fuel used

1814.18

Space cooling fuel used

72.89

Electricity for pumps, fans and electric keep-hot

mechanical ventilation - balanced, extract or positive input from outside

221.94

(230a)

Total electricity for the above, kWh/year

sum of (230a)...(230g) =

221.94

(231)

Electricity for lighting

346.97

(232)

Total delivered energy for all uses (211)...(221) + (231) + (232)...(237b) =

3086.37

(238)

10a. Fuel costs - individual heating systems:

	Fuel kWh/year	Fuel Price (Table 12)	Fuel Cost £/year
Space heating - main system 1	(211) x	13.19 x 0.01 =	83.15 (240)
Space heating - main system 2	(213) x	0 x 0.01 =	0 (241)
Space heating - secondary	(215) x	13.19 x 0.01 =	0 (242)
Water heating (electric off-peak tariff)			
High-rate fraction (Table 13, or Appendix F for electric CPSU)		1	(243)
Low-rate fraction	1.0 - (243) =	0	(244)
High-rate cost	(219) x (243) x	13.19 x 0.01 =	239.29 (245)
Low-rate cost	(219) x (244) x	13.19 x 0.01 =	0 (246)
Space cooling	(221)	13.19 x 0.01 =	9.61 (248)
Pumps, fans and electric keep-hot	(231)	13.19 x 0.01 =	29.27 (249)
(if off-peak tariff, list each of (230a) to (230g) separately as applicable and apply fuel price according to Table 12a)			
Energy for lighting	(232)	13.19 x 0.01 =	45.77 (250)
Additional standing charges (Table 12)			0 (251)
Appendix Q items: repeat lines (253) and (254) as needed			
Total energy cost	(245)...(247) + (250)...(254) =		407.09 (255)

SAP WorkSheet: New dwelling design stage

11a. SAP rating - individual heating systems

Energy cost deflator (Table 12)		0.42	(256)
Energy cost factor (ECF)	$[(255) \times (256)] \div [(4) + 45.0] =$	1.36	(257)
SAP rating (Section 12)		80.99	(258)

12a. CO2 emissions – Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh		Emissions kg CO2/year	
Space heating (main system 1)	(211) x	0.519	=	327.17	(261)
Space heating (secondary)	(215) x	0.519	=	0	(263)
Water heating	(219) x	0.519	=	941.56	(264)
Space and water heating	(261) + (262) + (263) + (264) =			1268.73	(265)
Space cooling	(221) x	0.519	=	37.83	(266)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519	=	115.19	(267)
Electricity for lighting	(232) x	0.519	=	180.08	(268)
Total CO2, kg/year		sum of (265)...(271) =		1601.83	(272)
CO2 emissions per m²		(272) ÷ (4) =		19.91	(273)
El rating (section 14)				83	(274)

13a. Primary Energy

	Energy kWh/year	Primary factor		P. Energy kWh/year	
Space heating (main system 1)	(211) x	3.07	=	1935.31	(261)
Space heating (secondary)	(215) x	3.07	=	0	(263)
Energy for water heating	(219) x	3.07	=	5569.54	(264)
Space and water heating	(261) + (262) + (263) + (264) =			7504.85	(265)
Space cooling	(221) x	3.07	=	223.77	(266)
Electricity for pumps, fans and electric keep-hot	(231) x	3.07	=	681.35	(267)
Electricity for lighting	(232) x	0	=	1065.2	(268)
'Total Primary Energy		sum of (265)...(271) =		9475.17	(272)
Primary energy kWh/m²/year		(272) ÷ (4) =		117.78	(273)

DER WorkSheet: New dwelling design stage

User Details:

Assessor Name:

Stroma Number:

Software Name: Stroma FSAP 2012

Software Version:

Version: 1.0.5.60

Property Address: Level 38 Flat 38 08

Address :

1. Overall dwelling dimensions:

	Area(m ²)	Av. Height(m)	Volume(m ³)
Ground floor	80.45 (1a)	2.7 (2a)	217.21 (3a)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+.....(1n)	80.45 (4)		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)+.....(3n) =	217.21 (5)

2. Ventilation rate:

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	0	0	0	0 (6a)
Number of open flues	0	0	0	0	0 (6b)
Number of intermittent fans				0	0 (7a)
Number of passive vents				0	0 (7b)
Number of flueless gas fires				0	0 (7c)

	Air changes per hour
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =	0 (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)
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Additional infiltration	0 (10)
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Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction	0 (11)
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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)
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If no draught lobby, enter 0.05, else enter 0	0 (13)
---	--------

Percentage of windows and doors draught stripped	0 (14)
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Window infiltration	0 (15)
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Infiltration rate	0 (16)
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Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area	5 (17)
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If based on air permeability value, then (18) = [(17) ÷ 20] + (8), otherwise (18) = (16)	0.25 (18)
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Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used

Number of sides sheltered	3 (19)
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Shelter factor	0.78 (20)
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Infiltration rate incorporating shelter factor	0.19 (21)
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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=	5.1	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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DER WorkSheet: New dwelling design stage

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

0.25	0.24	0.24	0.21	0.21	0.18	0.18	0.18	0.19	0.21	0.22	0.23
------	------	------	------	------	------	------	------	------	------	------	------

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) =

75.65 (23c)

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

(24a)m= 0.37 0.36 0.36 0.33 0.33 0.31 0.31 0.3 0.32 0.33 0.34 0.35 (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= 0.37 0.36 0.36 0.33 0.33 0.31 0.31 0.3 0.32 0.33 0.34 0.35 (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
Windows Type 1			21.25	x 1/[1/(1) + 0.04]	20.43		(27)
Windows Type 2			8.52	x 1/[1/(1) + 0.04]	8.19		(27)
Windows Type 3			1.57	x 1/[1/(1) + 0.04]	1.51		(27)
Windows Type 4			2.56	x 1/[1/(1) + 0.04]	2.46		(27)
Walls	41.22	33.9	7.32	x 0.24	1.76		(29)
Total area of elements, m²			41.22				(31)
Party wall			35.41	x 0	0		(32)
Party wall			29.66	x 0	0		(32)
Party floor			80.45				(32a)
Party ceiling			80.45				(32b)
Internal wall **			102.06				(32c)

* 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) = 34.35 (33)

Heat capacity Cm = S(A x k) ((28)...(30) + (32) + (32a)...(32e) = 16803.42 (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 3.36 (36)

if details of thermal bridging are not known (36) = 0.05 x (31)

Total fabric heat loss (33) + (36) = 37.71 (37)

DER WorkSheet: New dwelling design stage

Ventilation heat loss calculated monthly

$$(38)m = 0.33 \times (25)m \times (5)$$

(38)m=

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
26.43	26.09	25.74	24	23.66	21.92	21.92	21.57	22.62	23.66	24.35	25.05

(38)

Heat transfer coefficient, W/K

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

(39)m=

64.14	63.8	63.45	61.71	61.37	59.63	59.63	59.28	60.33	61.37	62.06	62.76
-------	------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------

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

61.63

(39)

Heat loss parameter (HLP), W/m²K

$$(40)m = (39)m \div (4)$$

(40)m=

0.8	0.79	0.79	0.77	0.76	0.74	0.74	0.74	0.75	0.76	0.77	0.78
-----	------	------	------	------	------	------	------	------	------	------	------

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

0.77

(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

2.47

(42)

if TFA > 13.9, $N = 1 + 1.76 \times [1 - \exp(-0.000349 \times (TFA - 13.9)^2)] + 0.0013 \times (TFA - 13.9)$

if TFA ≤ 13.9, N = 1

Annual average hot water usage in litres per day $V_{d, \text{average}} = (25 \times N) + 36$

92.89

(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
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Hot water usage in litres per day for each month $V_{d,m} = \text{factor from Table 1c} \times (43)$

(44)m=

102.18	98.47	94.75	91.04	87.32	83.6	83.6	87.32	91.04	94.75	98.47	102.18
--------	-------	-------	-------	-------	------	------	-------	-------	-------	-------	--------

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

1114.73

(44)

Energy content of hot water used - calculated monthly = $4.190 \times V_{d,m} \times n_m \times DT_m / 3600$ kWh/month (see Tables 1b, 1c, 1d)

(45)m=

151.54	132.53	136.76	119.23	114.41	98.72	91.48	104.98	106.23	123.8	135.14	146.75
--------	--------	--------	--------	--------	-------	-------	--------	--------	-------	--------	--------

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

1461.59

(45)

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

(46)m=

22.73	19.88	20.51	17.89	17.16	14.81	13.72	15.75	15.93	18.57	20.27	22.01
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------

(46)

Water storage loss:

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

190

(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):

1.61

(48)

Temperature factor from Table 2b

0.6

(49)

Energy lost from water storage, kWh/year

$$(48) \times (49) =$$

0.97

(50)

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

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

0

(51)

If community heating see section 4.3

Volume factor from Table 2a

0

(52)

Temperature factor from Table 2b

0

(53)

Energy lost from water storage, kWh/year

$$(47) \times (51) \times (52) \times (53) =$$

0

(54)

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

0.97

(55)

Water storage loss calculated for each month

$$((56)m = (55) \times (41)m$$

(56)m=

29.95	27.05	29.95	28.98	29.95	28.98	29.95	29.95	28.98	29.95	28.98	29.95
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------

(56)

DER WorkSheet: New dwelling design stage

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=

29.95	27.05	29.95	28.98	29.95	28.98	29.95	29.95	28.98	29.95	28.98	29.95
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------

 (57)

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=

0	0	0	0	0	0	0	0	0	0	0	0
---	---	---	---	---	---	---	---	---	---	---	---

 (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=

181.48	159.58	166.71	148.21	144.35	127.7	121.43	134.92	135.21	153.75	164.12	176.7
--------	--------	--------	--------	--------	-------	--------	--------	--------	--------	--------	-------

 (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=

181.48	159.58	166.71	148.21	144.35	127.7	121.43	134.92	135.21	153.75	164.12	176.7
--------	--------	--------	--------	--------	-------	--------	--------	--------	--------	--------	-------

Output from water heater (annual) ^{1...12}	1814.18
---	---------

 (64)

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

(65)m=

74.34	65.71	69.43	62.83	62	56.01	54.37	58.86	58.51	65.12	68.12	72.75
-------	-------	-------	-------	----	-------	-------	-------	-------	-------	-------	-------

 (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
123.57	123.57	123.57	123.57	123.57	123.57	123.57	123.57	123.57	123.57	123.57	123.57

 (66)

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

(67)m=

19.65	17.45	14.19	10.74	8.03	6.78	7.33	9.52	12.78	16.23	18.94	20.19
-------	-------	-------	-------	------	------	------	------	-------	-------	-------	-------

 (67)

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

(68)m=

220.38	222.67	216.9	204.63	189.15	174.59	164.87	162.58	168.35	180.61	196.1	210.65
--------	--------	-------	--------	--------	--------	--------	--------	--------	--------	-------	--------

 (68)

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

(69)m=

35.36	35.36	35.36	35.36	35.36	35.36	35.36	35.36	35.36	35.36	35.36	35.36
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------

 (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=

-98.85	-98.85	-98.85	-98.85	-98.85	-98.85	-98.85	-98.85	-98.85	-98.85	-98.85	-98.85
--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------

 (71)

Water heating gains (Table 5)

(72)m=

99.92	97.78	93.32	87.26	83.33	77.79	73.08	79.12	81.26	87.53	94.61	97.79
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------

 (72)

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

(73)m=

400.02	397.96	384.48	362.71	340.58	319.23	305.35	311.29	322.46	344.44	369.72	388.7
--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	-------

 (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)
--------------	---------------------------	------------------------	------------------	----------------	----------------	--------------

DER WorkSheet: New dwelling design stage

South	0.9x	0.77	x	1.57	x	46.75	x	0.4	x	1	=	20.35	(78)
South	0.9x	0.77	x	2.56	x	46.75	x	0.4	x	0.7	=	23.22	(78)
South	0.9x	0.77	x	1.57	x	76.57	x	0.4	x	1	=	33.32	(78)
South	0.9x	0.77	x	2.56	x	76.57	x	0.4	x	0.7	=	38.03	(78)
South	0.9x	0.77	x	1.57	x	97.53	x	0.4	x	1	=	42.45	(78)
South	0.9x	0.77	x	2.56	x	97.53	x	0.4	x	0.7	=	48.45	(78)
South	0.9x	0.77	x	1.57	x	110.23	x	0.4	x	1	=	47.97	(78)
South	0.9x	0.77	x	2.56	x	110.23	x	0.4	x	0.7	=	54.76	(78)
South	0.9x	0.77	x	1.57	x	114.87	x	0.4	x	1	=	49.99	(78)
South	0.9x	0.77	x	2.56	x	114.87	x	0.4	x	0.7	=	57.06	(78)
South	0.9x	0.77	x	1.57	x	110.55	x	0.4	x	1	=	48.11	(78)
South	0.9x	0.77	x	2.56	x	110.55	x	0.4	x	0.7	=	54.91	(78)
South	0.9x	0.77	x	1.57	x	108.01	x	0.4	x	1	=	47.01	(78)
South	0.9x	0.77	x	2.56	x	108.01	x	0.4	x	0.7	=	53.65	(78)
South	0.9x	0.77	x	1.57	x	104.89	x	0.4	x	1	=	45.65	(78)
South	0.9x	0.77	x	2.56	x	104.89	x	0.4	x	0.7	=	52.11	(78)
South	0.9x	0.77	x	1.57	x	101.89	x	0.4	x	1	=	44.34	(78)
South	0.9x	0.77	x	2.56	x	101.89	x	0.4	x	0.7	=	50.61	(78)
South	0.9x	0.77	x	1.57	x	82.59	x	0.4	x	1	=	35.94	(78)
South	0.9x	0.77	x	2.56	x	82.59	x	0.4	x	0.7	=	41.02	(78)
South	0.9x	0.77	x	1.57	x	55.42	x	0.4	x	1	=	24.12	(78)
South	0.9x	0.77	x	2.56	x	55.42	x	0.4	x	0.7	=	27.53	(78)
South	0.9x	0.77	x	1.57	x	40.4	x	0.4	x	1	=	17.58	(78)
South	0.9x	0.77	x	2.56	x	40.4	x	0.4	x	0.7	=	20.07	(78)
West	0.9x	0.77	x	8.52	x	19.64	x	0.4	x	1	=	46.39	(80)
West	0.9x	0.77	x	8.52	x	38.42	x	0.4	x	1	=	90.74	(80)
West	0.9x	0.77	x	8.52	x	63.27	x	0.4	x	1	=	149.43	(80)
West	0.9x	0.77	x	8.52	x	92.28	x	0.4	x	1	=	217.94	(80)
West	0.9x	0.77	x	8.52	x	113.09	x	0.4	x	1	=	267.1	(80)
West	0.9x	0.77	x	8.52	x	115.77	x	0.4	x	1	=	273.42	(80)
West	0.9x	0.77	x	8.52	x	110.22	x	0.4	x	1	=	260.31	(80)
West	0.9x	0.77	x	8.52	x	94.68	x	0.4	x	1	=	223.6	(80)
West	0.9x	0.77	x	8.52	x	73.59	x	0.4	x	1	=	173.8	(80)
West	0.9x	0.77	x	8.52	x	45.59	x	0.4	x	1	=	107.67	(80)
West	0.9x	0.77	x	8.52	x	24.49	x	0.4	x	1	=	57.84	(80)
West	0.9x	0.77	x	8.52	x	16.15	x	0.4	x	1	=	38.14	(80)
Northwest	0.9x	0.77	x	21.25	x	11.28	x	0.4	x	0.8	=	53.17	(81)
Northwest	0.9x	0.77	x	21.25	x	22.97	x	0.4	x	0.8	=	108.23	(81)
Northwest	0.9x	0.77	x	21.25	x	41.38	x	0.4	x	0.8	=	194.99	(81)
Northwest	0.9x	0.77	x	21.25	x	67.96	x	0.4	x	0.8	=	320.24	(81)
Northwest	0.9x	0.77	x	21.25	x	91.35	x	0.4	x	0.8	=	430.46	(81)

DER WorkSheet: New dwelling design stage

Northwest 0.9x	0.77	x	21.25	x	97.38	x	0.4	x	0.8	=	458.91	(81)
Northwest 0.9x	0.77	x	21.25	x	91.1	x	0.4	x	0.8	=	429.31	(81)
Northwest 0.9x	0.77	x	21.25	x	72.63	x	0.4	x	0.8	=	342.25	(81)
Northwest 0.9x	0.77	x	21.25	x	50.42	x	0.4	x	0.8	=	237.6	(81)
Northwest 0.9x	0.77	x	21.25	x	28.07	x	0.4	x	0.8	=	132.26	(81)
Northwest 0.9x	0.77	x	21.25	x	14.2	x	0.4	x	0.8	=	66.9	(81)
Northwest 0.9x	0.77	x	21.25	x	9.21	x	0.4	x	0.8	=	43.42	(81)

Solar gains in watts, calculated for each month

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

(83)m=	143.13	270.33	435.32	640.91	804.61	835.36	790.27	663.6	506.35	316.9	176.38	119.21	(83)
--------	--------	--------	--------	--------	--------	--------	--------	-------	--------	-------	--------	--------	------

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

(84)m=	543.14	668.29	819.81	1003.62	1145.19	1154.59	1095.62	974.89	828.81	661.34	546.1	507.92	(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=	0.95	0.9	0.81	0.65	0.47	0.33	0.24	0.28	0.48	0.76	0.91	0.95	(86)

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

(87)m=	19.59	19.92	20.35	20.76	20.93	20.99	21	20.99	20.95	20.65	20.07	19.55	(87)
--------	-------	-------	-------	-------	-------	-------	----	-------	-------	-------	-------	-------	------

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

(88)m=	20.26	20.26	20.26	20.28	20.29	20.3	20.3	20.31	20.3	20.29	20.28	20.27	(88)
--------	-------	-------	-------	-------	-------	------	------	-------	------	-------	-------	-------	------

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

(89)m=	0.94	0.89	0.79	0.62	0.44	0.29	0.2	0.24	0.43	0.73	0.9	0.95	(89)
--------	------	------	------	------	------	------	-----	------	------	------	-----	------	------

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

(90)m=	18.35	18.83	19.44	19.99	20.21	20.29	20.3	20.3	20.25	19.87	19.05	18.31	(90)
--------	-------	-------	-------	-------	-------	-------	------	------	-------	-------	-------	-------	------

fLA = Living area ÷ (4) =

0.52 (91)

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

(92)m=	19	19.4	19.91	20.39	20.58	20.65	20.66	20.66	20.61	20.28	19.58	18.95	(92)
--------	----	------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------

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

(93)m=	19	19.4	19.91	20.39	20.58	20.65	20.66	20.66	20.61	20.28	19.58	18.95	(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=	0.93	0.88	0.78	0.63	0.46	0.31	0.22	0.26	0.45	0.73	0.89	0.94	(94)
--------	------	------	------	------	------	------	------	------	------	------	------	------	------

Useful gains, hmGm , W = (94)m x (84)m

(95)m=	502.55	585.31	642.93	627.95	521.89	356.73	241.39	251.14	376.81	483.34	483.61	475.32	(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, Lm , W = [(39)m x [(93)m – (96)m]

(97)m=	942.76	925.11	851.18	708.95	545.2	361	242.35	252.78	392.88	593.89	774.62	925.87	(97)
--------	--------	--------	--------	--------	-------	-----	--------	--------	--------	--------	--------	--------	------

Space heating requirement for each month, kWh/month = 0.024 x [(97)m – (95)m] x (41)m

(98)m=	327.52	228.34	154.93	58.32	17.34	0	0	0	0	82.25	209.53	335.21	
--------	--------	--------	--------	-------	-------	---	---	---	---	-------	--------	--------	--

DER WorkSheet: New dwelling design stage

Total per year (kWh/year) = Sum(98)_{1...5,9...12} = 1413.45 (98)

Space heating requirement in kWh/m²/year

17.57 (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
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Heat loss rate Lm (calculated using 25°C internal temperature and external temperature from Table 10)

(100)m = 0 0 0 0 0 560.53 441.27 450.55 0 0 0 0 (100)

Utilisation factor for loss hm

(101)m = 0 0 0 0 0 0.98 0.99 0.98 0 0 0 0 (101)

Useful loss, hmLm (Watts) = (100)m x (101)m

(102)m = 0 0 0 0 0 547.56 435.46 441.93 0 0 0 0 (102)

Gains (solar gains calculated for applicable weather region, see Table 10)

(103)m = 0 0 0 0 0 1433.45 1362.9 1222.95 0 0 0 0 (103)

Space cooling requirement for month, whole dwelling, continuous (kWh) = 0.024 x [(103)m – (102)m] x (41)m

set (104)m to zero if (104)m < 3 x (98)m

(104)m = 0 0 0 0 0 637.84 690.01 581.08 0 0 0 0

Total = Sum(104) = 1908.93 (104)

Cooled fraction

f C = cooled area ÷ (4) = 0.86 (105)

Intermittency factor (Table 10b)

(106)m = 0 0 0 0 0 0.25 0.25 0.25 0 0 0 0

Total = Sum(104) = 0 (106)

Space cooling requirement for month = (104)m x (105) x (106)m

(107)m = 0 0 0 0 0 136.45 147.61 124.3 0 0 0 0

Total = Sum(107) = 408.36 (107)

Space cooling requirement in kWh/m²/year

(107) ÷ (4) = 5.08 (108)

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

Space heating:

Fraction of space heat from secondary/supplementary system

0 (201)

Fraction of space heat from main system(s)

(202) = 1 – (201) =

1 (202)

Fraction of total heating from main system 1

(204) = (202) x [1 – (203)] =

1 (204)

Efficiency of main space heating system 1

170 (206)

Efficiency of secondary/supplementary heating system, %

0 (208)

Cooling System Energy Efficiency Ratio

5.6 (209)

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

kWh/year

Space heating requirement (calculated above)

327.52	228.34	154.93	58.32	17.34	0	0	0	0	82.25	209.53	335.21
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(211)m = {[(98)m x (204)] } x 100 ÷ (206) (211)

192.66	134.32	91.14	34.31	10.2	0	0	0	0	48.38	123.25	197.18
--------	--------	-------	-------	------	---	---	---	---	-------	--------	--------

Total (kWh/year) =Sum(211)_{1...5,10...12} = 831.44 (211)

Space heating fuel (secondary), kWh/month

= {[(98)m x (201)] } x 100 ÷ (208)

(215)m = 0 0 0 0 0 0 0 0 0 0 0 0

Total (kWh/year) =Sum(215)_{1...5,10...12} = 0 (215)

DER WorkSheet: New dwelling design stage

Water heating

Output from water heater (calculated above)

181.48	159.58	166.71	148.21	144.35	127.7	121.43	134.92	135.21	153.75	164.12	176.7
--------	--------	--------	--------	--------	-------	--------	--------	--------	--------	--------	-------

Efficiency of water heater

100 (216)

(217)m= 100 100 100 100 100 100 100 100 100 100 100 100 (217)

Fuel for water heating, kWh/month

(219)m = (64)m x 100 ÷ (217)m

181.48	159.58	166.71	148.21	144.35	127.7	121.43	134.92	135.21	153.75	164.12	176.7
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Total = Sum(219a)_{1..12} = 1814.18 (219)

Space cooling fuel, kWh/month.

(221)m = (107)m ÷ (209)

0	0	0	0	0	24.35	26.35	22.19	0	0	0	0
---	---	---	---	---	-------	-------	-------	---	---	---	---

Total = Sum(221)_{6..8} = 72.89 (221)

Annual totals

Space heating fuel used, main system 1

kWh/year

831.44

Water heating fuel used

1814.18

Space cooling fuel used

72.89

Electricity for pumps, fans and electric keep-hot

mechanical ventilation - balanced, extract or positive input from outside

221.94 (230a)

Total electricity for the above, kWh/year

sum of (230a)...(230g) = 221.94 (231)

Electricity for lighting

346.97 (232)

Total delivered energy for all uses (211)...(221) + (231) + (232)...(237b) =

3287.42 (338)

12a. CO2 emissions – Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating (main system 1)	(211) x	0.519	431.52 (261)
Space heating (secondary)	(215) x	0.519	0 (263)
Water heating	(219) x	0.519	941.56 (264)
Space and water heating	(261) + (262) + (263) + (264) =		1373.08 (265)
Space cooling	(221) x	0.519	37.83 (266)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519	115.19 (267)
Electricity for lighting	(232) x	0.519	180.08 (268)
Total CO2, kg/year		sum of (265)...(271) =	1706.17 (272)
Dwelling CO2 Emission Rate		(272) ÷ (4) =	21.21 (273)
EI rating (section 14)			82 (274)

SAP 2012 Overheating Assessment

Calculated by Stroma FSAP 2012 program, produced and printed on 19 June 2023

Property Details: Level 38 Flat 38 08

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

Overheating Details:

Summer ventilation heat loss coefficient: 286.72 (P1)
Transmission heat loss coefficient: 37.7
Summer heat loss coefficient: 324.43 (P2)

Overhangs:

Orientation:	Ratio:	Z_overhangs:
North West (NW)	0	1
West (W)	0	1
South (S)	0	1
South (S GLAZED DOOR)	0	1

Solar shading:

Orientation:	Z blinds:	Solar access:	Overhangs:	Z summer:	
North West (NW)	1	0.9	1	0.9	(P8)
West (W)	1	0.9	1	0.9	(P8)
South (S)	1	0.9	1	0.9	(P8)
South (S GLAZED DOOR)	1	0.9	1	0.9	(P8)

Solar gains:

Orientation	Area	Flux	g_	FF	Shading	Gains
North West (NW)	0.9 x 21.25	89.66	0.4	0.8	0.9	493.82
West (W)	0.9 x 8.52	108.47	0.4	1	0.9	299.43
South (S)	0.9 x 1.57	106.3	0.4	1	0.9	54.07
South (S GLAZED DOOR)	0.9 x 2.56	106.3	0.4	0.7	0.9	61.72
Total						909.03 (P3/P4)

Internal gains:

	June	July	August
Internal gains	457.05	439.2	447.31
Total summer gains	1448.1	1348.23	1198.25 (P5)
Summer gain/loss ratio	4.46	4.16	3.69 (P6)
Mean summer external temperature (West Pennines)	14.7	16.4	16.3
Thermal mass temperature increment	1.3	1.3	1.3
Threshold temperature	20.46	21.86	21.29 (P7)
Likelihood of high internal temperature	Not significant	Slight	Slight

SAP 2012 Overheating Assessment

Assessment of likelihood of high internal temperature: Slight

DRAFT

Appendix B

BRUKL report (issued separately)

Project name

P1785 - St. Michael's

As designed

Date: Tue Aug 23 12:33:43 2022

Administrative information

Building Details

Address: Address 1, Manchester, Postcode

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.15

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.15

BRUKL compliance check version: v5.6.b.0

Certifier details

Name: Ben Duckworth

Telephone number: 0113 257 7300

Address: 7 Feast Field, Horsforth, West Yorkshire, Leeds, LS18 4TJ

Criterion 1: The calculated CO₂ emission rate for the building must not exceed the target

CO ₂ emission rate from the notional building, kgCO ₂ /m ² .annum	30
Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	30
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	28.2
Are emissions from the building less than or equal to the target?	BER ≤ TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	U _a -Limit	U _a -Calc	U _i -Calc	Surface where the maximum value occurs*
Wall**	0.35	0.25	0.26	B3000002:Surf[1]
Floor	0.25	0.15	0.18	B3000002:Surf[0]
Roof	0.25	0.15	0.15	B1000011:Surf[4]
Windows***, roof windows, and rooflights	2.2	1	1	SP00001A:Surf[1]
Personnel doors	2.2	2.2	2.2	00000015:Surf[1]
Vehicle access & similar large doors	1.5	-	-	No Vehicle access doors in building
High usage entrance doors	3.5	-	-	No High usage entrance doors in building

U_a-Limit = Limiting area-weighted average U-values [W/(m²K)]U_a-Calc = Calculated area-weighted average U-values [W/(m²K)]U_i-Calc = Calculated maximum individual element U-values [W/(m²K)]

* There might be more than one surface where the maximum U-value occurs.

** Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

*** Display windows and similar glazing are excluded from the U-value check.

N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air Permeability	Worst acceptable standard	This building
m ³ /(h.m ²) at 50 Pa	10	5

Building services

The standard values listed below are minimum values for efficiencies and maximum values for SFPs. Refer to the Non-Domestic Building Services Compliance Guide for details.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	>0.95

1- System 7 - Electric Panel Nat Vent

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	0.2	-	-
Standard value	N/A	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO

2- System 6 - Electric Panel Mech Vent

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	-	-	0.85
Standard value	N/A	N/A	N/A	N/A	0.5
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO

3- System 5 - Basement VRF Mech Vent

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4.79	3.8	0	-	0.85
Standard value	2.5*	2.6	N/A	N/A	0.5
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO

* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards.

4- System 8 - Data Room AC

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4.79	3.8	0	-	0.85
Standard value	2.5*	2.6	N/A	N/A	0.5
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO

* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards.

5- System 1 - Office VRF Mech Vent

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4.79	3.8	0	-	0.85
Standard value	2.5*	2.6	N/A	N/A	0.5
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO

* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards.

6- System 2 - Ground Floor VRF Mech Vent

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4.79	3.8	0	-	0.85
Standard value	2.5*	2.6	N/A	N/A	0.5
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO

* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards.

7- System 4 - Hotel Lobby VRF Mech Vent

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4.79	3.8	0	-	0.85
Standard value	2.5*	2.6	N/A	N/A	0.5
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards.					

8- System 3 - Hotel VRF Mech Vent

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4.79	3.8	0	-	0.85
Standard value	2.5*	2.6	N/A	N/A	0.5
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards.					

1- System 11 - Instantaneous DHW

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	-
Standard value	1	N/A

Local mechanical ventilation, exhaust, and terminal units

ID	System type in Non-domestic Building Services Compliance Guide
A	Local supply or extract ventilation units serving a single area
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal supply and extract ventilation units serving a single room or zone with heating and heat recovery
E	Local supply and extract ventilation system serving a single area with heating and heat recovery
F	Other local ventilation units
G	Fan-assisted terminal VAV unit
H	Fan coil units
I	Zonal extract system where the fan is remote from the zone with grease filter

Zone name	SFP [W/(l/s)]										HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		Zone	Standard
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1			
B2 - Uniform/Housekeeping 08	-	-	0.3	-	-	-	-	-	-	-	-	N/A
B2 - Laundry 09	-	-	0.3	-	-	-	-	-	-	-	-	N/A
B2 - Staff Changing 10	-	-	-	1.2	-	-	-	-	-	-	-	N/A
B2 - Staff Changing 11	-	-	-	1.2	-	-	-	-	-	-	-	N/A
B2 - IT Office 02	-	-	-	1.2	-	-	-	-	-	-	-	N/A
B2 - Room 1	-	-	-	1.2	-	-	-	-	-	-	-	N/A
B2 - Gym/Spa	-	-	-	1.2	-	-	-	-	-	-	-	N/A
B1 - Changing 12	-	-	-	1.2	-	-	-	-	-	-	-	N/A
02 - Open Plan Office	-	-	-	1.2	-	-	-	-	-	-	-	N/A
02 - Male WC	-	-	0.3	-	-	-	-	-	-	-	-	N/A
02 - Female WC	-	-	0.3	-	-	-	-	-	-	-	-	N/A
03 - Open Plan Office	-	-	-	1.2	-	-	-	-	-	-	-	N/A
03 - Male WC	-	-	0.3	-	-	-	-	-	-	-	-	N/A

Zone name	SFP [W/(l/s)]										HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I			
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1		Zone	Standard
03 - Female WC	-	-	0.3	-	-	-	-	-	-	-	-	N/A
04 - Open Plan Office	-	-	-	1.2	-	-	-	-	-	-	-	N/A
04 - Male WC	-	-	0.3	-	-	-	-	-	-	-	-	N/A
04 - Female WC	-	-	0.3	-	-	-	-	-	-	-	-	N/A
05 - Open Plan Office	-	-	-	1.2	-	-	-	-	-	-	-	N/A
05 - Male WC	-	-	0.3	-	-	-	-	-	-	-	-	N/A
05 - Female WC	-	-	0.3	-	-	-	-	-	-	-	-	N/A
00 - WC 06.07	-	-	0.3	-	-	-	-	-	-	-	-	N/A
00 - Kitchen 01.16	-	-	0.3	-	-	-	-	-	-	-	-	N/A
00 - WC 01.12	-	-	0.3	-	-	-	-	-	-	-	-	N/A
00 - Admin/BOH 01.18	-	-	-	1.2	-	-	-	-	-	-	-	N/A
00 - BOH Kitchen 01.07	-	-	-	1.2	-	-	-	-	-	-	-	N/A
00 - BOH 01.05	-	-	-	1.2	-	-	-	-	-	-	-	N/A
01 - Male WC	-	-	0.3	-	-	-	-	-	-	-	-	N/A
01 - Female WC	-	-	0.3	-	-	-	-	-	-	-	-	N/A
01 - Staff Offices 01.03	-	-	-	1.2	-	-	-	-	-	-	-	N/A
01 - Staff Canteen 01.02	-	-	0.3	-	-	-	-	-	-	-	-	N/A
01 - Open Plan Office 01.01	-	-	-	1.2	-	-	-	-	-	-	-	N/A
06 - Toilets 06.03	-	-	0.3	-	-	-	-	-	-	-	-	N/A
06 - Toilets 06.02	-	-	0.3	-	-	-	-	-	-	-	-	N/A
06 - Hotel 06.01	-	-	-	1.2	-	-	-	-	-	-	-	N/A
07 - King Room 07.01	-	-	-	0.5	-	-	-	-	-	-	-	N/A
07 - Twin Room 07.11	-	-	-	0.5	-	-	-	-	-	-	-	N/A
07 - Access King Room 07.17	-	-	-	0.5	-	-	-	-	-	-	-	N/A
07 - King Room 07.16	-	-	-	0.5	-	-	-	-	-	-	-	N/A
07 - Twin Room 07.15	-	-	-	0.5	-	-	-	-	-	-	-	N/A
07 - Twin Room 07.14	-	-	-	0.5	-	-	-	-	-	-	-	N/A
07 - King Room 07.12	-	-	-	0.5	-	-	-	-	-	-	-	N/A
07 - King Room 07.13	-	-	-	0.5	-	-	-	-	-	-	-	N/A
07 - King Room 07.02	-	-	-	0.5	-	-	-	-	-	-	-	N/A
07 - Twin Room 07.09	-	-	-	0.5	-	-	-	-	-	-	-	N/A
07 - Access King Room 07.03	-	-	-	0.5	-	-	-	-	-	-	-	N/A
07 - King Room 07.04	-	-	-	0.5	-	-	-	-	-	-	-	N/A
07 - Twin Room 07.05	-	-	-	0.5	-	-	-	-	-	-	-	N/A
07 - Twin Room 07.06	-	-	-	0.5	-	-	-	-	-	-	-	N/A
07 - King Room 07.08	-	-	-	0.5	-	-	-	-	-	-	-	N/A
07 - King Room 07.07	-	-	-	0.5	-	-	-	-	-	-	-	N/A
07 - WS Suite 07.10	-	-	-	0.5	-	-	-	-	-	-	-	N/A
08 - King Room 07.01	-	-	-	0.5	-	-	-	-	-	-	-	N/A
08 - Twin Room 07.11	-	-	-	0.5	-	-	-	-	-	-	-	N/A
08 - Access King Room 07.17	-	-	-	0.5	-	-	-	-	-	-	-	N/A
08 - King Room 07.16	-	-	-	0.5	-	-	-	-	-	-	-	N/A
08 - Twin Room 07.15	-	-	-	0.5	-	-	-	-	-	-	-	N/A

Zone name	SFP [W/(l/s)]										HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I			
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1		Zone	Standard
08 - Twin Room 07.14	-	-	-	0.5	-	-	-	-	-	-	-	N/A
08 - King Room 07.12	-	-	-	0.5	-	-	-	-	-	-	-	N/A
08 - King Room 07.13	-	-	-	0.5	-	-	-	-	-	-	-	N/A
08 - King Room 07.02	-	-	-	0.5	-	-	-	-	-	-	-	N/A
08 - Twin Room 07.09	-	-	-	0.5	-	-	-	-	-	-	-	N/A
08 - Access King Room 07.03	-	-	-	0.5	-	-	-	-	-	-	-	N/A
08 - King Room 07.04	-	-	-	0.5	-	-	-	-	-	-	-	N/A
08 - Twin Room 07.05	-	-	-	0.5	-	-	-	-	-	-	-	N/A
08 - Twin Room 07.06	-	-	-	0.5	-	-	-	-	-	-	-	N/A
08 - King Room 07.08	-	-	-	0.5	-	-	-	-	-	-	-	N/A
08 - King Room 07.07	-	-	-	0.5	-	-	-	-	-	-	-	N/A
08 - WS Suite 07.10	-	-	-	0.5	-	-	-	-	-	-	-	N/A
09 - King Room 07.01	-	-	-	0.5	-	-	-	-	-	-	-	N/A
09 - Twin Room 07.11	-	-	-	0.5	-	-	-	-	-	-	-	N/A
09 - Access King Room 07.17	-	-	-	0.5	-	-	-	-	-	-	-	N/A
09 - King Room 07.16	-	-	-	0.5	-	-	-	-	-	-	-	N/A
09 - Twin Room 07.15	-	-	-	0.5	-	-	-	-	-	-	-	N/A
09 - Twin Room 07.14	-	-	-	0.5	-	-	-	-	-	-	-	N/A
09 - King Room 07.12	-	-	-	0.5	-	-	-	-	-	-	-	N/A
09 - King Room 07.13	-	-	-	0.5	-	-	-	-	-	-	-	N/A
09 - King Room 07.02	-	-	-	0.5	-	-	-	-	-	-	-	N/A
09 - Twin Room 07.09	-	-	-	0.5	-	-	-	-	-	-	-	N/A
09 - Access King Room 07.03	-	-	-	0.5	-	-	-	-	-	-	-	N/A
09 - King Room 07.04	-	-	-	0.5	-	-	-	-	-	-	-	N/A
09 - Twin Room 07.05	-	-	-	0.5	-	-	-	-	-	-	-	N/A
09 - Twin Room 07.06	-	-	-	0.5	-	-	-	-	-	-	-	N/A
09 - King Room 07.08	-	-	-	0.5	-	-	-	-	-	-	-	N/A
09 - King Room 07.07	-	-	-	0.5	-	-	-	-	-	-	-	N/A
09 - WS Suite 07.10	-	-	-	0.5	-	-	-	-	-	-	-	N/A
10 - King Room 07.01	-	-	-	0.5	-	-	-	-	-	-	-	N/A
10 - Twin Room 07.11	-	-	-	0.5	-	-	-	-	-	-	-	N/A
10 - Access King Room 07.17	-	-	-	0.5	-	-	-	-	-	-	-	N/A
10 - King Room 07.16	-	-	-	0.5	-	-	-	-	-	-	-	N/A
10 - Twin Room 07.15	-	-	-	0.5	-	-	-	-	-	-	-	N/A
10 - Twin Room 07.14	-	-	-	0.5	-	-	-	-	-	-	-	N/A
10 - King Room 07.12	-	-	-	0.5	-	-	-	-	-	-	-	N/A
10 - King Room 07.13	-	-	-	0.5	-	-	-	-	-	-	-	N/A
10 - King Room 07.02	-	-	-	0.5	-	-	-	-	-	-	-	N/A
10 - Twin Room 07.09	-	-	-	0.5	-	-	-	-	-	-	-	N/A
10 - Access King Room 07.03	-	-	-	0.5	-	-	-	-	-	-	-	N/A
10 - King Room 07.04	-	-	-	0.5	-	-	-	-	-	-	-	N/A
10 - Twin Room 07.05	-	-	-	0.5	-	-	-	-	-	-	-	N/A
10 - Twin Room 07.06	-	-	-	0.5	-	-	-	-	-	-	-	N/A

Zone name	SFP [W/(l/s)]										HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I			
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1		Zone	Standard
10 - King Room 07.08	-	-	-	0.5	-	-	-	-	-	-	-	N/A
10 - King Room 07.07	-	-	-	0.5	-	-	-	-	-	-	-	N/A
10 - WS Suite 07.10	-	-	-	0.5	-	-	-	-	-	-	-	N/A
11 - King Room 07.01	-	-	-	0.5	-	-	-	-	-	-	-	N/A
11 - Twin Room 07.11	-	-	-	0.5	-	-	-	-	-	-	-	N/A
11 - Access King Room 07.17	-	-	-	0.5	-	-	-	-	-	-	-	N/A
11 - King Room 07.16	-	-	-	0.5	-	-	-	-	-	-	-	N/A
11 - Twin Room 07.15	-	-	-	0.5	-	-	-	-	-	-	-	N/A
11 - Twin Room 07.14	-	-	-	0.5	-	-	-	-	-	-	-	N/A
11 - King Room 07.12	-	-	-	0.5	-	-	-	-	-	-	-	N/A
11 - King Room 07.13	-	-	-	0.5	-	-	-	-	-	-	-	N/A
11 - King Room 07.02	-	-	-	0.5	-	-	-	-	-	-	-	N/A
11 - Twin Room 07.09	-	-	-	0.5	-	-	-	-	-	-	-	N/A
11 - Access King Room 07.03	-	-	-	0.5	-	-	-	-	-	-	-	N/A
11 - King Room 07.04	-	-	-	0.5	-	-	-	-	-	-	-	N/A
11 - Twin Room 07.05	-	-	-	0.5	-	-	-	-	-	-	-	N/A
11 - Twin Room 07.06	-	-	-	0.5	-	-	-	-	-	-	-	N/A
11 - King Room 07.08	-	-	-	0.5	-	-	-	-	-	-	-	N/A
11 - King Room 07.07	-	-	-	0.5	-	-	-	-	-	-	-	N/A
11 - WS Suite 07.10	-	-	-	0.5	-	-	-	-	-	-	-	N/A
12 - King Room 07.01	-	-	-	0.5	-	-	-	-	-	-	-	N/A
12 - Twin Room 07.11	-	-	-	0.5	-	-	-	-	-	-	-	N/A
12 - Access King Room 07.17	-	-	-	0.5	-	-	-	-	-	-	-	N/A
12 - King Room 07.16	-	-	-	0.5	-	-	-	-	-	-	-	N/A
12 - Twin Room 07.15	-	-	-	0.5	-	-	-	-	-	-	-	N/A
12 - Twin Room 07.14	-	-	-	0.5	-	-	-	-	-	-	-	N/A
12 - King Room 07.12	-	-	-	0.5	-	-	-	-	-	-	-	N/A
12 - King Room 07.13	-	-	-	0.5	-	-	-	-	-	-	-	N/A
12 - King Room 07.02	-	-	-	0.5	-	-	-	-	-	-	-	N/A
12 - Twin Room 07.09	-	-	-	0.5	-	-	-	-	-	-	-	N/A
12 - Access King Room 07.03	-	-	-	0.5	-	-	-	-	-	-	-	N/A
12 - King Room 07.04	-	-	-	0.5	-	-	-	-	-	-	-	N/A
12 - Twin Room 07.05	-	-	-	0.5	-	-	-	-	-	-	-	N/A
12 - Twin Room 07.06	-	-	-	0.5	-	-	-	-	-	-	-	N/A
12 - King Room 07.08	-	-	-	0.5	-	-	-	-	-	-	-	N/A
12 - King Room 07.07	-	-	-	0.5	-	-	-	-	-	-	-	N/A
12 - WS Suite 07.10	-	-	-	0.5	-	-	-	-	-	-	-	N/A
13 - King Room 07.01	-	-	-	0.5	-	-	-	-	-	-	-	N/A
13 - Twin Room 07.11	-	-	-	0.5	-	-	-	-	-	-	-	N/A
13 - Access King Room 07.17	-	-	-	0.5	-	-	-	-	-	-	-	N/A
13 - King Room 07.16	-	-	-	0.5	-	-	-	-	-	-	-	N/A
13 - Twin Room 07.15	-	-	-	0.5	-	-	-	-	-	-	-	N/A
13 - Twin Room 07.14	-	-	-	0.5	-	-	-	-	-	-	-	N/A

Zone name	SFP [W/(l/s)]										HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I			
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1		Zone	Standard
13 - King Room 07.12	-	-	-	0.5	-	-	-	-	-	-	-	N/A
13 - King Room 07.13	-	-	-	0.5	-	-	-	-	-	-	-	N/A
13 - King Room 07.02	-	-	-	0.5	-	-	-	-	-	-	-	N/A
13 - Twin Room 07.09	-	-	-	0.5	-	-	-	-	-	-	-	N/A
13 - Access King Room 07.03	-	-	-	0.5	-	-	-	-	-	-	-	N/A
13 - King Room 07.04	-	-	-	0.5	-	-	-	-	-	-	-	N/A
13 - Twin Room 07.05	-	-	-	0.5	-	-	-	-	-	-	-	N/A
13 - Twin Room 07.06	-	-	-	0.5	-	-	-	-	-	-	-	N/A
13 - King Room 07.08	-	-	-	0.5	-	-	-	-	-	-	-	N/A
13 - King Room 07.07	-	-	-	0.5	-	-	-	-	-	-	-	N/A
13 - WS Suite 07.10	-	-	-	0.5	-	-	-	-	-	-	-	N/A
14 - King Room 07.01	-	-	-	0.5	-	-	-	-	-	-	-	N/A
14 - Twin Room 07.11	-	-	-	0.5	-	-	-	-	-	-	-	N/A
14 - Access King Room 07.17	-	-	-	0.5	-	-	-	-	-	-	-	N/A
14 - King Room 07.16	-	-	-	0.5	-	-	-	-	-	-	-	N/A
14 - Twin Room 07.15	-	-	-	0.5	-	-	-	-	-	-	-	N/A
14 - Twin Room 07.14	-	-	-	0.5	-	-	-	-	-	-	-	N/A
14 - King Room 07.12	-	-	-	0.5	-	-	-	-	-	-	-	N/A
14 - King Room 07.13	-	-	-	0.5	-	-	-	-	-	-	-	N/A
14 - King Room 07.02	-	-	-	0.5	-	-	-	-	-	-	-	N/A
14 - Twin Room 07.09	-	-	-	0.5	-	-	-	-	-	-	-	N/A
14 - Access King Room 07.03	-	-	-	0.5	-	-	-	-	-	-	-	N/A
14 - King Room 07.04	-	-	-	0.5	-	-	-	-	-	-	-	N/A
14 - Twin Room 07.05	-	-	-	0.5	-	-	-	-	-	-	-	N/A
14 - Twin Room 07.06	-	-	-	0.5	-	-	-	-	-	-	-	N/A
14 - King Room 07.08	-	-	-	0.5	-	-	-	-	-	-	-	N/A
14 - King Room 07.07	-	-	-	0.5	-	-	-	-	-	-	-	N/A
14 - WS Suite 07.10	-	-	-	0.5	-	-	-	-	-	-	-	N/A
15 - King Room 15.01	-	-	-	0.5	-	-	-	-	-	-	-	N/A
15 - King Room 15.11	-	-	-	0.5	-	-	-	-	-	-	-	N/A
15 - King Room 15.11	-	-	-	0.5	-	-	-	-	-	-	-	N/A
15 - Twin Room 15.10	-	-	-	0.5	-	-	-	-	-	-	-	N/A
15 - Twin Room 15.09	-	-	-	0.5	-	-	-	-	-	-	-	N/A
15 - King Room 15.08	-	-	-	0.5	-	-	-	-	-	-	-	N/A
15 - King Room 15.02	-	-	-	0.5	-	-	-	-	-	-	-	N/A
15 - Access King Room 15.03	-	-	-	0.5	-	-	-	-	-	-	-	N/A
15 - WOW Suite 15.06	-	-	-	0.5	-	-	-	-	-	-	-	N/A
15 - WOW Suite 15.07	-	-	-	0.5	-	-	-	-	-	-	-	N/A
15 - W Suite 15.05	-	-	-	0.5	-	-	-	-	-	-	-	N/A
15 - W Suite 15.04	-	-	-	0.5	-	-	-	-	-	-	-	N/A
16 - King Room 16.01	-	-	-	0.5	-	-	-	-	-	-	-	N/A
16 - Access King Room 16.14	-	-	-	0.5	-	-	-	-	-	-	-	N/A
16 - King Room 16.13	-	-	-	0.5	-	-	-	-	-	-	-	N/A

Zone name	SFP [W/(l/s)]										HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I			
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1		Zone	Standard
16 - Twin Room 16.12	-	-	-	0.5	-	-	-	-	-	-	-	N/A
16 - Twin Room 16.11	-	-	-	0.5	-	-	-	-	-	-	-	N/A
16 - King Room 16.10	-	-	-	0.5	-	-	-	-	-	-	-	N/A
16 - King Room 16.02	-	-	-	0.5	-	-	-	-	-	-	-	N/A
16 - Access King Room 16.03	-	-	-	0.5	-	-	-	-	-	-	-	N/A
16 - W Suite 16.06	-	-	-	0.5	-	-	-	-	-	-	-	N/A
16 - King Room 16.07	-	-	-	0.5	-	-	-	-	-	-	-	N/A
16 - E WOW Suite 16.08	-	-	-	0.5	-	-	-	-	-	-	-	N/A
16 - King Room 16.09	-	-	-	0.5	-	-	-	-	-	-	-	N/A
15 - King Room 16.04	-	-	-	0.5	-	-	-	-	-	-	-	N/A
16 - King Room 16.05	-	-	-	0.5	-	-	-	-	-	-	-	N/A

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name		Luminaire	Lamp	Display lamp	
	Standard value	60	60	22	
B3 - Plant 04		78	-	-	309
B3 - Plant 05		78	-	-	299
B3 - Stairs		-	125	-	79
B3 - Plant 03		85	-	-	144
B3 - Lobby		-	204	-	23
B3 - Plant 02		73	-	-	2554
B3 - Core		-	100	-	988
B3 - Plant 01		74	-	-	1671
B2 - Switch Room 06		53	-	-	412
B2 - Stairs		-	125	-	80
B2 - Plant 05		81	-	-	208
B2 - Generator Room 07		51	-	-	890
B2 - Uniform/Housekeeping 08		-	108	-	578
B2 - Laundry 09		-	107	-	663
B2 - Staff Changing 10		-	130	-	150
B2 - Staff Changing 11		-	130	-	149
B2 - Data Room 01		56	-	-	56
B2 - IT Office 02		72	-	-	262
B2 - Lobby 1		-	184	-	29
B2 - Stair Core 3		-	109	-	151
B2 - Residential Lobby 04		-	135	-	50
B2 - Stair Core 2		-	114	-	101
B2 - Stair Core 1		-	133	-	53
B2 - Room 1		66	-	-	430
B2 - Gym/Spa		-	98	-	3104
B2 - Main Corridor		-	146	-	281
B2 - Store 2		109	-	-	8
B2 -Store 1		119	-	-	6

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name		Luminaire	Lamp	Display lamp	
	Standard value	60	60	22	
B1 - Room 2		74	-	-	20
B1 - Room 3		66	-	-	33
B1 - Room 1		72	-	-	32
B1 - Room 4		73	-	-	21
B1 - Core 1		67	-	-	207
B1 Core 2		57	-	-	408
B1 - Core 3		54	-	-	607
B1 - Store 2		108	-	-	8
B1 - Store 1		120	-	-	6
B1 - Bin Store 04		56	-	-	63
B1 - Bin Store 05		54	-	-	101
B1 - Bin Store 03		55	-	-	181
B1 - Stairs 2		62	-	-	331
B1 - Switch Room 09		65	-	-	114
B1 - Attenuation Tank 07		53	-	-	426
B1 - Cycle Store Lobby		-	213	-	18
B1 - Cycle Store 10		50	-	-	314
B1 - Bin Lobby		-	147	-	55
B1 - Changing 12		-	141	-	70
B1 - Cycle Store 13		51	-	-	224
B1 - Changing Lobby		-	151	-	47
B1 - Stairs 1		74	-	-	322
B1 - Corridor 1		-	154	-	38
B1 - Corridor 2		-	121	-	323
B1 - Corridor 3		-	114	-	324
B1 Residential Lobby 06		-	128	-	124
02 -- Store 4		81	-	-	17
02 - Stairs 4		-	121	-	95
02 - Open Plan Office		98	-	-	9250
02 - Male WC		-	122	-	181
02 - Stairs 1		-	120	-	98
02 - Store 1		99	-	-	11
02 - Store 2		98	-	-	11
02 - Lobby		-	147	-	64
02 - Lift Lobby/Lift		-	117	-	106
02 - Stairs 2		-	141	-	52
02 - Hotel Lift Lobby		-	148	-	47
02 - Main Corridor		-	116	-	294
02 - Female WC		-	119	-	215
02 - Stairs 3		-	144	-	49
02 - Lift Lobby		-	214	-	21
02 - Store 3		100	-	-	11
03 - Store 4		81	-	-	17

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name		Luminaire	Lamp	Display lamp	
	Standard value	60	60	22	
03 - Stairs 4		-	121	-	95
03 - Open Plan Office		98	-	-	9250
03 - Male WC		-	122	-	181
03 - Stairs 1		-	120	-	98
03 - Store 1		99	-	-	11
03 - Store 2		98	-	-	11
03 - Lobby		-	147	-	64
03 - Lift Lobby/Lift		-	117	-	106
03 - Stairs 2		-	141	-	52
03 - Hotel Lift Lobby		-	148	-	47
03 - Main Corridor		-	116	-	294
03 - Female WC		-	119	-	215
03 - Stairs 3		-	144	-	49
03 - Lift Lobby		-	214	-	21
03 - Store 3		100	-	-	11
04 - Store 4		81	-	-	17
04 - Stairs 4		-	121	-	95
04 - Open Plan Office		98	-	-	9250
04 - Male WC		-	122	-	181
04 - Stairs 1		-	120	-	98
04 - Store 1		99	-	-	11
04 - Store 2		98	-	-	11
04 - Lobby		-	147	-	64
04 - Lift Lobby/Lift		-	117	-	106
04 - Stairs 2		-	141	-	52
04 - Hotel Lift Lobby		-	148	-	47
04 - Main Corridor		-	116	-	294
04 - Female WC		-	119	-	215
04 - Stairs 3		-	144	-	49
04 - Lift Lobby		-	214	-	21
04 - Store 3		100	-	-	11
05 - Store 4		81	-	-	17
05 - Stairs 4		-	121	-	95
05 - Open Plan Office		98	-	-	9250
05 - Male WC		-	122	-	181
05 - Stairs 1		-	120	-	98
05 - Store 1		99	-	-	11
05 - Store 2		98	-	-	11
05 - Lobby		-	147	-	64
05 - Lift Lobby/Lift		-	117	-	106
05 - Stairs 2		-	141	-	52
05 - Hotel Lift Lobby		-	148	-	47
05 - Main Corridor		-	116	-	294

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name		Luminaire	Lamp	Display lamp	
	Standard value	60	60	22	
05 - Female WC		-	119	-	215
05 - Stairs 3		-	144	-	49
05 - Lift Lobby		-	214	-	21
05 - Store 3		100	-	-	11
00 - Entrance Lobby		-	106	15	720
00 - Lift Lobby/Business Lounge		-	139	-	203
00 - Stairs 1		-	243	-	55
00 - WC 06.07		-	258	-	43
00 - Post 01.15		100	-	-	17
00 - Kitchen 01.16		-	244	-	118
00 - WC 01.12		-	285	-	38
00 - Escape Stair		-	137	-	156
00 - Substation 01.09		80	-	-	106
00 - Substation 01.35		80	-	-	106
00 - Substation 01.10		81	-	-	105
00 - Conference Facilities 01.06		61	-	-	2893
00 - Circulation 01.19		-	263	-	21
00 - Admin/BOH 01.18		81	-	-	452
00 - Corridor		-	182	-	184
00 - H/S Lift Lobby		-	198	-	45
00 - Stair Core 3		-	120	-	153
00 - BOH Kitchen 01.07		-	130	-	582
00 - BOH Kitchen Lobby		-	173	-	120
00 - Hotel Lobby 01.04		-	103	-	865
00 - BOH 01.05		90	-	-	213
00 - Stair Core 2		-	130	-	103
00 - Stair Core 1		-	170	-	51
00 - Circulation 01.23		-	144	-	185
00 - Residential Lobby 01.20		-	130	-	308
00 - Stairs 3		-	193	-	49
00 - Stairs 2		-	208	-	45
01 - Store 4		81	-	-	17
01 - Stairs 4		-	121	-	95
01 - Male WC		-	122	-	181
01 - Stairs 1		-	120	-	98
01 - Store 1		99	-	-	11
01 - Store 2		98	-	-	11
01 - Lobby		-	147	-	64
01 - Stairs 2		-	141	-	52
01 - Hotel Lift Lobby		-	148	-	47
01 - Main Corridor		-	116	-	294
01 - Female WC		-	119	-	215
02 - Stairs 3		-	144	-	49

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name		Luminaire	Lamp	Display lamp	
	Standard value	60	60	22	
01 - Lift Lobby		-	214	-	21
01 - Store 3		100	-	-	11
01 - Staff Offices 01.03		68	-	-	571
01 - Staff Canteen 01.02		-	136	-	215
01 - Office Lobby		-	147	-	82
01 - Plant 01.04		50	-	-	1423
01 - Open Plan Office 01.01		98	-	-	6380
06 - Circulation		-	110	-	478
06 - Stairs		-	138	-	98
06 - Circulation		-	135	-	226
06 - Room 2		75	-	-	46
06 - Store 2		150	-	-	7
06 - Toilets Lobby		-	301	-	24
06 - Toilets 06.03		-	161	-	139
06 - Circulation		-	108	-	721
06 - Room 1		76	-	-	42
06 - Toilets 06.02		-	151	-	155
06 - Hotel 06.01		-	201	-	1766
06 - Stair Core		-	111	-	500
06 - Store 1		150	-	-	5
01 - Toilets Lobby		-	301	-	13
07 - King Room 07.01		-	223	-	55
07 - Twin Room 07.11		-	238	-	49
07 - Access King Room 07.17		-	221	-	64
07 - King Room 07.16		-	225	-	48
07 - Twin Room 07.15		-	221	-	55
07 - Twin Room 07.14		-	221	-	55
07 - King Room 07.12		-	223	-	53
07 - King Room 07.13		-	225	-	48
07 - King Room 07.02		-	223	-	55
07 - Twin Room 07.09		-	238	-	49
07 - Access King Room 07.03		-	221	-	64
07 - King Room 07.04		-	225	-	48
07 - Twin Room 07.05		-	221	-	55
07 - Twin Room 07.06		-	221	-	55
07 - King Room 07.08		-	223	-	53
07 - King Room 07.07		-	225	-	48
07 - WS Suite 07.10		-	208	-	124
07 - Stairs		-	126	-	53
07 - Resi Lift Lobby		-	152	-	29
07 - Riser Lobby		-	222	-	13
07 - Corridor 3		-	127	-	222
07 - Stair		-	128	-	49

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name		Luminaire	Lamp	Display lamp	
	Standard value	60	60	22	
07 - Lift Lobby		-	176	-	21
07 - Corridor 2		-	123	-	157
07 - Corridor 1		-	123	-	165
08 - King Room 07.01		-	223	-	55
08 - Twin Room 07.11		-	238	-	49
08 - Access King Room 07.17		-	221	-	64
08 - King Room 07.16		-	225	-	48
08 - Twin Room 07.15		-	221	-	55
08 - Twin Room 07.14		-	221	-	55
08 - King Room 07.12		-	223	-	53
08 - King Room 07.13		-	225	-	48
08 - King Room 07.02		-	223	-	55
08 - Twin Room 07.09		-	238	-	49
08 - Access King Room 07.03		-	221	-	64
08 - King Room 07.04		-	225	-	48
08 - Twin Room 07.05		-	221	-	55
08 - Twin Room 07.06		-	221	-	55
08 - King Room 07.08		-	223	-	53
08 - King Room 07.07		-	225	-	48
08 - WS Suite 07.10		-	208	-	124
08 - Stairs		-	126	-	53
08 - Resi Lift Lobby		-	152	-	29
08 - Riser Lobby		-	222	-	13
08 - Corridor 3		-	127	-	222
08 - Stair		-	128	-	49
08 - Lift Lobby		-	176	-	21
08 - Corridor 2		-	123	-	157
08 - Corridor 1		-	123	-	165
09 - King Room 07.01		-	223	-	55
09 - Twin Room 07.11		-	238	-	49
09 - Access King Room 07.17		-	221	-	64
09 - King Room 07.16		-	225	-	48
09 - Twin Room 07.15		-	221	-	55
09 - Twin Room 07.14		-	221	-	55
09 - King Room 07.12		-	223	-	53
09 - King Room 07.13		-	225	-	48
09 - King Room 07.02		-	223	-	55
09 - Twin Room 07.09		-	238	-	49
09 - Access King Room 07.03		-	221	-	64
09 - King Room 07.04		-	225	-	48
09 - Twin Room 07.05		-	221	-	55
09 - Twin Room 07.06		-	221	-	55
09 - King Room 07.08		-	223	-	53

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name		Luminaire	Lamp	Display lamp	
	Standard value	60	60	22	
09 - King Room 07.07		-	225	-	48
09 - WS Suite 07.10		-	208	-	124
09 - Stairs		-	126	-	53
09 - Resi Lift Lobby		-	152	-	29
09 - Riser Lobby		-	222	-	13
09 - Corridor 3		-	127	-	222
09 - Stair		-	128	-	49
09 - Lift Lobby		-	176	-	21
09 - Corridor 2		-	123	-	157
09 - Corridor 1		-	123	-	165
10 - King Room 07.01		-	223	-	55
10 - Twin Room 07.11		-	238	-	49
10 - Access King Room 07.17		-	221	-	64
10 - King Room 07.16		-	225	-	48
10 - Twin Room 07.15		-	221	-	55
10 - Twin Room 07.14		-	221	-	55
10 - King Room 07.12		-	223	-	53
10 - King Room 07.13		-	225	-	48
10 - King Room 07.02		-	223	-	55
10 - Twin Room 07.09		-	238	-	49
10 - Access King Room 07.03		-	221	-	64
10 - King Room 07.04		-	225	-	48
10 - Twin Room 07.05		-	221	-	55
10 - Twin Room 07.06		-	221	-	55
10 - King Room 07.08		-	223	-	53
10 - King Room 07.07		-	225	-	48
10 - WS Suite 07.10		-	208	-	124
10 - Stairs		-	126	-	53
10 - Resi Lift Lobby		-	152	-	29
10 - Riser Lobby		-	222	-	13
10 - Corridor 3		-	127	-	222
10 - Stair		-	128	-	49
10 - Lift Lobby		-	176	-	21
10 - Corridor 2		-	123	-	157
10 - Corridor 1		-	123	-	165
11 - King Room 07.01		-	223	-	55
11 - Twin Room 07.11		-	238	-	49
11 - Access King Room 07.17		-	221	-	64
11 - King Room 07.16		-	225	-	48
11 - Twin Room 07.15		-	221	-	55
11 - Twin Room 07.14		-	221	-	55
11 - King Room 07.12		-	223	-	53
11 - King Room 07.13		-	225	-	48

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name		Luminaire	Lamp	Display lamp	
	Standard value	60	60	22	
11 - King Room 07.02		-	223	-	55
11 - Twin Room 07.09		-	238	-	49
11 - Access King Room 07.03		-	221	-	64
11 - King Room 07.04		-	225	-	48
11 - Twin Room 07.05		-	221	-	55
11 - Twin Room 07.06		-	221	-	55
11 - King Room 07.08		-	223	-	53
11 - King Room 07.07		-	225	-	48
11 - WS Suite 07.10		-	208	-	124
11 - Stairs		-	126	-	53
11 - Resi Lift Lobby		-	152	-	29
11 - Riser Lobby		-	222	-	13
11 - Corridor 3		-	127	-	222
11 - Stair		-	128	-	49
11 - Lift Lobby		-	176	-	21
11 - Corridor 2		-	123	-	157
11 - Corridor 1		-	123	-	165
12 - King Room 07.01		-	223	-	55
12 - Twin Room 07.11		-	238	-	49
12 - Access King Room 07.17		-	221	-	64
12 - King Room 07.16		-	225	-	48
12 - Twin Room 07.15		-	221	-	55
12 - Twin Room 07.14		-	221	-	55
12 - King Room 07.12		-	223	-	53
12 - King Room 07.13		-	225	-	48
12 - King Room 07.02		-	223	-	55
12 - Twin Room 07.09		-	238	-	49
12 - Access King Room 07.03		-	221	-	64
12 - King Room 07.04		-	225	-	48
12 - Twin Room 07.05		-	221	-	55
12 - Twin Room 07.06		-	221	-	55
12 - King Room 07.08		-	223	-	53
12 - King Room 07.07		-	225	-	48
12 - WS Suite 07.10		-	208	-	124
12 - Stairs		-	126	-	53
12 - Resi Lift Lobby		-	152	-	29
12 - Riser Lobby		-	222	-	13
12 - Corridor 3		-	127	-	222
12 - Stair		-	128	-	49
12 - Lift Lobby		-	176	-	21
12 - Corridor 2		-	123	-	157
12 - Corridor 1		-	123	-	165
13 - King Room 07.01		-	223	-	55

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name		Luminaire	Lamp	Display lamp	
	Standard value	60	60	22	
13 - Twin Room 07.11		-	238	-	49
13 - Access King Room 07.17		-	221	-	64
13 - King Room 07.16		-	225	-	48
13 - Twin Room 07.15		-	221	-	55
13 - Twin Room 07.14		-	221	-	55
13 - King Room 07.12		-	223	-	53
13 - King Room 07.13		-	225	-	48
13 - King Room 07.02		-	223	-	55
13 - Twin Room 07.09		-	238	-	49
13 - Access King Room 07.03		-	221	-	64
13 - King Room 07.04		-	225	-	48
13 - Twin Room 07.05		-	221	-	55
13 - Twin Room 07.06		-	221	-	55
13 - King Room 07.08		-	223	-	53
13 - King Room 07.07		-	225	-	48
13 - WS Suite 07.10		-	208	-	124
13 - Stairs		-	126	-	53
13 - Resi Lift Lobby		-	152	-	29
13 - Riser Lobby		-	222	-	13
13 - Corridor 3		-	127	-	222
13 - Stair		-	128	-	49
13 - Lift Lobby		-	176	-	21
13 - Corridor 2		-	123	-	157
13 - Corridor 1		-	123	-	165
14 - King Room 07.01		-	223	-	55
14 - Twin Room 07.11		-	238	-	49
14 - Access King Room 07.17		-	221	-	64
14 - King Room 07.16		-	225	-	48
14 - Twin Room 07.15		-	221	-	55
14 - Twin Room 07.14		-	221	-	55
14 - King Room 07.12		-	223	-	53
14 - King Room 07.13		-	225	-	48
14 - King Room 07.02		-	223	-	55
14 - Twin Room 07.09		-	238	-	49
14 - Access King Room 07.03		-	221	-	64
14 - King Room 07.04		-	225	-	48
14 - Twin Room 07.05		-	221	-	55
14 - Twin Room 07.06		-	221	-	55
14 - King Room 07.08		-	223	-	53
14 - King Room 07.07		-	225	-	48
14 - WS Suite 07.10		-	208	-	124
14 - Stairs		-	126	-	53
14 - Resi Lift Lobby		-	152	-	29

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name		Luminaire	Lamp	Display lamp	
	Standard value	60	60	22	
14 - Riser Lobby		-	222	-	13
14 - Corridor 3		-	127	-	222
14 - Stair		-	128	-	49
14 - Lift Lobby		-	176	-	21
14 - Corridor 2		-	123	-	157
14 - Corridor 1		-	123	-	165
15 - King Room 15.01		-	223	-	55
15 - King Room 15.11		-	221	-	64
15 - King Room 15.11		-	225	-	48
15 - Twin Room 15.10		-	221	-	55
15 - Twin Room 15.09		-	221	-	55
15 - King Room 15.08		-	225	-	48
15 - King Room 15.02		-	223	-	55
15 - Access King Room 15.03		-	221	-	64
15 - Stairs		-	126	-	53
15 - Resi Lift Lobby		-	152	-	29
15 - Riser Lobby		-	222	-	13
15 - Stair		-	128	-	49
15 - Lift Lobby		-	176	-	21
15 - Corridor 2		-	123	-	157
15 - Corridor 1		-	123	-	165
15 - Corridor 3		-	126	-	206
15 - WOW Suite 15.06		-	205	-	168
15 - WOW Suite 15.07		-	205	-	168
15 - W Suite 15.05		-	207	-	102
15 - W Suite 15.04		-	207	-	103
16 - King Room 16.01		-	223	-	55
16 - Access King Room 16.14		-	221	-	64
16 - King Room 16.13		-	225	-	48
16 - Twin Room 16.12		-	221	-	55
16 - Twin Room 16.11		-	221	-	55
16 - King Room 16.10		-	225	-	48
16 - King Room 16.02		-	223	-	55
16 - Access King Room 16.03		-	221	-	64
16 - Stairs		-	126	-	53
16 - Resi Lift Lobby		-	152	-	29
16 - Riser Lobby		-	222	-	13
16 - Stair		-	128	-	49
16 - Lift Lobby		-	176	-	21
16 - Corridor 2		-	123	-	157
16 - Corridor 1		-	123	-	165
16 - W Suite 16.06		-	207	-	102
16 - Corridor 3		-	124	-	188

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name		Luminaire	Lamp	Display lamp	
	Standard value	60	60	22	
16 - King Room 16.07		-	223	-	53
16 - E WOW Suite 16.08		-	200	-	238
16 - King Room 16.09		-	223	-	53
15 - King Room 16.04		-	225	-	48
16 - King Room 16.05		-	221	-	55

Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
B2 - Staff Changing 10	N/A	N/A
B2 - Staff Changing 11	N/A	N/A
B2 - Data Room 01	N/A	N/A
B2 - IT Office 02	N/A	N/A
B2 - Room 1	N/A	N/A
B2 - Gym/Spa	N/A	N/A
B1 - Core 1	N/A	N/A
B1 Core 2	N/A	N/A
B1 - Core 3	N/A	N/A
B1 - Stairs 2	N/A	N/A
B1 - Changing 12	N/A	N/A
B1 - Stairs 1	N/A	N/A
02 - Open Plan Office	NO (-61.3%)	YES
03 - Open Plan Office	NO (-67.4%)	YES
04 - Open Plan Office	NO (-67.4%)	YES
05 - Open Plan Office	NO (-67.4%)	YES
00 - Entrance Lobby	NO (-77.4%)	YES
00 - Conference Facilities 01.06	NO (-51.7%)	YES
00 - Admin/BOH 01.18	N/A	N/A
00 - BOH 01.05	N/A	N/A
01 - Staff Offices 01.03	N/A	N/A
01 - Staff Canteen 01.02	N/A	N/A
01 - Open Plan Office 01.01	NO (-67.1%)	YES
06 - Hotel 06.01	NO (-77.8%)	YES
07 - King Room 07.01	NO (-62.6%)	YES
07 - Twin Room 07.11	NO (-56.3%)	YES
07 - Access King Room 07.17	NO (-62.6%)	YES
07 - King Room 07.16	NO (-62.4%)	YES
07 - Twin Room 07.15	NO (-62.3%)	YES
07 - Twin Room 07.14	NO (-62.5%)	YES
07 - King Room 07.12	NO (-62.6%)	YES
07 - King Room 07.13	NO (-61.6%)	YES
07 - King Room 07.02	NO (-67.2%)	YES
07 - Twin Room 07.09	NO (-59.2%)	YES
07 - Access King Room 07.03	NO (-70.2%)	YES

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
07 - King Room 07.04	NO (-69.8%)	YES
07 - Twin Room 07.05	NO (-68.5%)	YES
07 - Twin Room 07.06	NO (-67.1%)	YES
07 - King Room 07.08	NO (-65.1%)	YES
07 - King Room 07.07	NO (-64.8%)	YES
07 - WS Suite 07.10	NO (-55%)	YES
08 - King Room 07.01	NO (-62.6%)	YES
08 - Twin Room 07.11	NO (-56.3%)	YES
08 - Access King Room 07.17	NO (-62.6%)	YES
08 - King Room 07.16	NO (-62.4%)	YES
08 - Twin Room 07.15	NO (-62.3%)	YES
08 - Twin Room 07.14	NO (-62.5%)	YES
08 - King Room 07.12	NO (-62.6%)	YES
08 - King Room 07.13	NO (-61.6%)	YES
08 - King Room 07.02	NO (-67.2%)	YES
08 - Twin Room 07.09	NO (-59.2%)	YES
08 - Access King Room 07.03	NO (-70.2%)	YES
08 - King Room 07.04	NO (-69.8%)	YES
08 - Twin Room 07.05	NO (-68.5%)	YES
08 - Twin Room 07.06	NO (-67.1%)	YES
08 - King Room 07.08	NO (-65.1%)	YES
08 - King Room 07.07	NO (-64.8%)	YES
08 - WS Suite 07.10	NO (-55%)	YES
09 - King Room 07.01	NO (-62.6%)	YES
09 - Twin Room 07.11	NO (-56.3%)	YES
09 - Access King Room 07.17	NO (-62.6%)	YES
09 - King Room 07.16	NO (-62.4%)	YES
09 - Twin Room 07.15	NO (-62.3%)	YES
09 - Twin Room 07.14	NO (-62.5%)	YES
09 - King Room 07.12	NO (-62.6%)	YES
09 - King Room 07.13	NO (-61.6%)	YES
09 - King Room 07.02	NO (-67.2%)	YES
09 - Twin Room 07.09	NO (-59.2%)	YES
09 - Access King Room 07.03	NO (-70.2%)	YES
09 - King Room 07.04	NO (-69.8%)	YES
09 - Twin Room 07.05	NO (-68.5%)	YES
09 - Twin Room 07.06	NO (-67.1%)	YES
09 - King Room 07.08	NO (-65.1%)	YES
09 - King Room 07.07	NO (-64.8%)	YES
09 - WS Suite 07.10	NO (-55%)	YES
10 - King Room 07.01	NO (-62.6%)	YES
10 - Twin Room 07.11	NO (-56.3%)	YES
10 - Access King Room 07.17	NO (-62.6%)	YES
10 - King Room 07.16	NO (-62.4%)	YES
10 - Twin Room 07.15	NO (-62.3%)	YES
10 - Twin Room 07.14	NO (-62.5%)	YES
10 - King Room 07.12	NO (-62.6%)	YES
10 - King Room 07.13	NO (-61.6%)	YES
10 - King Room 07.02	NO (-67.2%)	YES

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
10 - Twin Room 07.09	NO (-59.2%)	YES
10 - Access King Room 07.03	NO (-70.2%)	YES
10 - King Room 07.04	NO (-69.8%)	YES
10 - Twin Room 07.05	NO (-68.5%)	YES
10 - Twin Room 07.06	NO (-67.1%)	YES
10 - King Room 07.08	NO (-65.1%)	YES
10 - King Room 07.07	NO (-64.8%)	YES
10 - WS Suite 07.10	NO (-55%)	YES
11 - King Room 07.01	NO (-62.6%)	YES
11 - Twin Room 07.11	NO (-56.3%)	YES
11 - Access King Room 07.17	NO (-62.6%)	YES
11 - King Room 07.16	NO (-62.4%)	YES
11 - Twin Room 07.15	NO (-62.3%)	YES
11 - Twin Room 07.14	NO (-62.5%)	YES
11 - King Room 07.12	NO (-62.6%)	YES
11 - King Room 07.13	NO (-61.6%)	YES
11 - King Room 07.02	NO (-67.2%)	YES
11 - Twin Room 07.09	NO (-59.2%)	YES
11 - Access King Room 07.03	NO (-70.2%)	YES
11 - King Room 07.04	NO (-69.8%)	YES
11 - Twin Room 07.05	NO (-68.5%)	YES
11 - Twin Room 07.06	NO (-67.1%)	YES
11 - King Room 07.08	NO (-65.1%)	YES
11 - King Room 07.07	NO (-64.8%)	YES
11 - WS Suite 07.10	NO (-55%)	YES
12 - King Room 07.01	NO (-62.6%)	YES
12 - Twin Room 07.11	NO (-56.3%)	YES
12 - Access King Room 07.17	NO (-62.6%)	YES
12 - King Room 07.16	NO (-62.4%)	YES
12 - Twin Room 07.15	NO (-62.3%)	YES
12 - Twin Room 07.14	NO (-62.5%)	YES
12 - King Room 07.12	NO (-62.6%)	YES
12 - King Room 07.13	NO (-61.6%)	YES
12 - King Room 07.02	NO (-67.2%)	YES
12 - Twin Room 07.09	NO (-59.2%)	YES
12 - Access King Room 07.03	NO (-70.2%)	YES
12 - King Room 07.04	NO (-69.8%)	YES
12 - Twin Room 07.05	NO (-68.5%)	YES
12 - Twin Room 07.06	NO (-67.1%)	YES
12 - King Room 07.08	NO (-65.1%)	YES
12 - King Room 07.07	NO (-64.8%)	YES
12 - WS Suite 07.10	NO (-55%)	YES
13 - King Room 07.01	NO (-62.6%)	YES
13 - Twin Room 07.11	NO (-56.3%)	YES
13 - Access King Room 07.17	NO (-62.6%)	YES
13 - King Room 07.16	NO (-62.4%)	YES
13 - Twin Room 07.15	NO (-62.3%)	YES
13 - Twin Room 07.14	NO (-62.5%)	YES
13 - King Room 07.12	NO (-62.6%)	YES

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
13 - King Room 07.13	NO (-61.6%)	YES
13 - King Room 07.02	NO (-67.2%)	YES
13 - Twin Room 07.09	NO (-59.2%)	YES
13 - Access King Room 07.03	NO (-70.2%)	YES
13 - King Room 07.04	NO (-69.8%)	YES
13 - Twin Room 07.05	NO (-68.5%)	YES
13 - Twin Room 07.06	NO (-67.1%)	YES
13 - King Room 07.08	NO (-65.1%)	YES
13 - King Room 07.07	NO (-64.8%)	YES
13 - WS Suite 07.10	NO (-55%)	YES
14 - King Room 07.01	NO (-62.6%)	YES
14 - Twin Room 07.11	NO (-56.3%)	YES
14 - Access King Room 07.17	NO (-62.6%)	YES
14 - King Room 07.16	NO (-62.4%)	YES
14 - Twin Room 07.15	NO (-62.3%)	YES
14 - Twin Room 07.14	NO (-62.5%)	YES
14 - King Room 07.12	NO (-62.6%)	YES
14 - King Room 07.13	NO (-61.6%)	YES
14 - King Room 07.02	NO (-67.2%)	YES
14 - Twin Room 07.09	NO (-59.2%)	YES
14 - Access King Room 07.03	NO (-70.2%)	YES
14 - King Room 07.04	NO (-69.8%)	YES
14 - Twin Room 07.05	NO (-68.5%)	YES
14 - Twin Room 07.06	NO (-67.1%)	YES
14 - King Room 07.08	NO (-65.1%)	YES
14 - King Room 07.07	NO (-64.8%)	YES
14 - WS Suite 07.10	NO (-55%)	YES
15 - King Room 15.01	NO (-62.6%)	YES
15 - King Room 15.11	NO (-62.6%)	YES
15 - King Room 15.11	NO (-62.4%)	YES
15 - Twin Room 15.10	NO (-62.3%)	YES
15 - Twin Room 15.09	NO (-62.5%)	YES
15 - King Room 15.08	NO (-61.6%)	YES
15 - King Room 15.02	NO (-67.2%)	YES
15 - Access King Room 15.03	NO (-70.2%)	YES
15 - WOW Suite 15.06	NO (-60%)	YES
15 - WOW Suite 15.07	NO (-57.8%)	YES
15 - W Suite 15.05	NO (-66%)	YES
15 - W Suite 15.04	NO (-69.2%)	YES
16 - King Room 16.01	NO (-62.6%)	YES
16 - Access King Room 16.14	NO (-62.6%)	YES
16 - King Room 16.13	NO (-62.4%)	YES
16 - Twin Room 16.12	NO (-62.3%)	YES
16 - Twin Room 16.11	NO (-62.5%)	YES
16 - King Room 16.10	NO (-61.6%)	YES
16 - King Room 16.02	NO (-67.2%)	YES
16 - Access King Room 16.03	NO (-70.2%)	YES
16 - W Suite 16.06	NO (-66%)	YES
16 - King Room 16.07	NO (-65.1%)	YES

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
16 - E WOW Suite 16.08	NO (-55.8%)	YES
16 - King Room 16.09	NO (-62.7%)	YES
15 - King Room 16.04	NO (-69.8%)	YES
16 - King Room 16.05	NO (-68.5%)	YES

Criterion 4: The performance of the building, as built, should be consistent with the calculated BER

Separate submission

Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

EPBD (Recast): Consideration of alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	YES
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m ²]	26183.4	26183.4
External area [m ²]	13873.1	15316.9
Weather	MAN	MAN
Infiltration [m ³ /hm ² @ 50Pa]	5	3
Average conductance [W/K]	6847.49	8469.08
Average U-value [W/m ² K]	0.49	0.55
Alpha value* [%]	10.03	10

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area	Building Type
	A1/A2 Retail/Financial and Professional services
	A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
40	B1 Offices and Workshop businesses
	B2 to B7 General Industrial and Special Industrial Groups
	B8 Storage or Distribution
60	C1 Hotels
	C2 Residential Institutions: Hospitals and Care Homes
	C2 Residential Institutions: Residential schools
	C2 Residential Institutions: Universities and colleges
	C2A Secure Residential Institutions
	Residential spaces
	D1 Non-residential Institutions: Community/Day Centre
	D1 Non-residential Institutions: Libraries, Museums, and Galleries
	D1 Non-residential Institutions: Education
	D1 Non-residential Institutions: Primary Health Care Building
	D1 Non-residential Institutions: Crown and County Courts
	D2 General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger terminals
	Others: Emergency services
	Others: Miscellaneous 24hr activities
	Others: Car Parks 24 hrs
	Others: Stand alone utility block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	7.38	7.44
Cooling	1.95	3.05
Auxiliary	3.61	2.51
Lighting	7.66	11.91
Hot water	35.03	42.49
Equipment*	51.07	51.07
TOTAL**	55.64	67.4

* Energy used by equipment does not count towards the total for consumption or calculating emissions.

** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	74.88	78.5
Primary energy* [kWh/m ²]	166.56	160.05
Total emissions [kg/m ²]	28.2	30

* Primary energy is net of any electrical energy displaced by CHP generators, if applicable.

HVAC Systems Performance									
System Type	Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEFF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity									
Actual	13.5	45.7	0.8	2.6	4.6	4.46	4.83	4.79	6.8
Notional	9.6	84.8	1	6.2	2	2.56	3.79	----	----
[ST] Other local room heater - unfanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity									
Actual	0	0	0	0	3.6	0.8	0	1	0
Notional	0	0	0	0	3.4	0.86	0	----	----
[ST] Other local room heater - unfanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity									
Actual	66.9	0	23.2	0	0.1	0.8	0	1	0
Notional	63.5	0	20.5	0	0.2	0.86	0	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity									
Actual	77.1	5.2	4.8	0.3	4.3	4.46	4.83	4.79	6.8
Notional	68	18.4	7.4	1.3	4.6	2.56	3.79	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity									
Actual	0	444.7	0	25.6	21.3	4.46	4.83	4.79	6.8
Notional	0	260.3	0	19.1	15	2.56	3.79	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity									
Actual	39.1	96.6	2.4	5.6	0.7	4.46	4.83	4.79	6.8
Notional	48.6	66.7	5.3	4.9	0.3	2.56	3.79	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity									
Actual	6.7	26.8	0.4	1.5	9.5	4.46	4.83	4.79	6.8
Notional	4.8	41.5	0.5	3	4.2	2.56	3.79	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity									
Actual	0	886.5	0	51	0	4.46	4.83	4.79	6.8
Notional	0	615.9	0	45.1	0	2.56	3.79	----	----
[ST] No Heating or Cooling									
Actual	0	0	0	0	0	0	0	0	0
Notional	0	0	0	0	0	0	0	----	----

Key to terms

Heat dem [MJ/m2]	= Heating energy demand
Cool dem [MJ/m2]	= Cooling energy demand
Heat con [kWh/m2]	= Heating energy consumption
Cool con [kWh/m2]	= Cooling energy consumption
Aux con [kWh/m2]	= Auxiliary energy consumption
Heat SSEFF	= Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER	= Cooling system seasonal energy efficiency ratio
Heat gen SSEFF	= Heating generator seasonal efficiency
Cool gen SSEER	= Cooling generator seasonal energy efficiency ratio
ST	= System type
HS	= Heat source
HFT	= Heating fuel type
CFT	= Cooling fuel type

Key Features

The Building Control Body is advised to give particular attention to items whose specifications are better than typically expected.

Building fabric

Element	U _{i-Typ}	U _{i-Min}	Surface where the minimum value occurs*
Wall	0.23	0.08	B1000005:Surf[3]
Floor	0.2	0.05	00000017:Surf[6]
Roof	0.15	0.15	B1000011:Surf[4]
Windows, roof windows, and rooflights	1.5	1	SP00001A:Surf[1]
Personnel doors	1.5	2.2	00000015:Surf[1]
Vehicle access & similar large doors	1.5	-	No Vehicle access doors in building
High usage entrance doors	1.5	-	No High usage entrance doors in building
U _{i-Typ} = Typical individual element U-values [W/(m²K)]			U _{i-Min} = Minimum individual element U-values [W/(m²K)]
* There might be more than one surface where the minimum U-value occurs.			

Air Permeability	Typical value	This building
m³/(h.m²) at 50 Pa	5	5