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# Regulations Compliance Report

Approved Document L1A 2010 edition assessed by Stroma FSAP 2009 program, Version: 1.4.0.39
*Printed on 01 November 2011 at 16:42:31*

## Project Information:

| | | | |
|---|---|---|---|
| **Assessed By:** | Gary Nicholls (STRO003305) | **Building Type:** | End-terrace Flat |

## Dwelling Details:

**NEW DWELLING DESIGN STAGE**

| | | | |
|---|---|---|---|
| **Site Reference :** | Flat 5 139-147 Camden Road | **Plot Reference:** | BEC/SV/CAMDEN/0005 |
| **Address :** | Flat 5, 139-147 Camden Road, London, NW1 9HA | | |

## Client Details:

**Name:** Studio V Architects
**Address :** 224 West Hendon Broadway, Hendon, London, NW9 7ED

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

## 1 TER and DER

| | | |
|---|---|---|
| Fuel for main heating system: Natural gas | | |
| Target Carbon Dioxide Emission Rate (TER) | 17.58 kg/m² | |
| Dwelling Carbon Dioxide Emission Rate (DER) | 11.54 kg/m² | OK |

## 2 Fabric U-values

| Element | Average | Highest | |
|---|---|---|---|
| External wall | 0.20 (max. 0.30) | 0.20 (max. 0.70) | OK |
| Party wall | 0.00 (max. 0.20) | - | OK |
| Floor | (no floor) | | |
| Roof | 0.13 (max. 0.20) | 0.13 (max. 0.35) | OK |
| Openings | 1.47 (max. 2.00) | 1.50 (max. 3.30) | OK |

## 3 Design air permeability

| | | |
|---|---|---|
| Design air permeability at 50 pascals | 3.00 | |
| Maximum | 10.0 | OK |

## 4 Heating efficiency

| | | |
|---|---|---|
| Main Heating system: | Database: (rev 315, product index 016669):<br>Boiler system with radiators or underfloor - mains gas<br>Brand name: Alpha<br>Model: InTec 28X<br>Model qualifier:<br>(Combi boiler)<br>Efficiency 88.2 % SEDBUK2009<br>Minimum 88.0 % | OK |
| Secondary heating system: | None | |

## 5 Cylinder insulation

| | | |
|---|---|---|
| Hot water Storage: | No cylinder | N/A |
| Solar water heating | | |
| Dedicated solar storage volume: | 90 litres | |
| Minimum: | 62 litres | OK |

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# Regulations Compliance Report

## 6 Controls

| | | |
|---|---|---|
| Space heating controls | Time and temperature zone control | **OK** |
| Hot water controls: | No cylinder | |
| Boiler interlock: | Yes | **OK** |

## 7 Low energy lights

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

## 8 Mechanical ventilation

Not applicable

## 9 Summertime temperature

| | | |
|---|---|---|
| Overheating risk (South East England): | Medium | **OK** |

Based on:

| | |
|---|---|
| Overshading: | Average or unknown |
| Windows facing: South East | 16.8m², Overhang twice as wide as window, ratio NaN |
| Windows facing: North East | 6.56m², Overhang twice as wide as window, ratio NaN |
| Ventilation rate: | 4.00 |
| Blinds/curtains: | |
| | shutter closed 100% of daylight hours |

## 10 Key features

| | |
|---|---|
| Design air permeablility | 3.0 m³/m²h |
| Doors U-value | 1 W/m²K |
| External Walls U-value | 0.17 W/m²K |
| Solar water heating | |

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# SAP Input

## Property Details: Flat 5 139-147 Camden Road

| | |
|---|---|
| Address: | Flat 5, 139-147 Camden Road, London, NW1 9HA |
| Located in: | England |
| Region: | South East England |
| UPRN: | na |
| RRN: | 0000-0000-0000-0000-0000 |
| Date of assessment: | 01 November 2011 |
| Date of certificate: | 01 November 2011 |
| Assessment type: | New dwelling design stage |
| Transaction type: | New dwelling |
| Related party disclosure: | No related party |
| Thermal Mass Parameter: | Indicative Value |
| Dwelling designed to use less: than 125 litres per day | True |

## Property description:

| | |
|---|---|
| Dwelling type: | Flat |
| Detachment: | End-terrace |
| Year Completed: | 2011 |

| Floor Location: | Floor area: | Storey height: |
|---|---|---|
| Floor 0 | 78.43 m² | 2.8 m |

| | |
|---|---|
| Living area: | 38.85 m² (fraction 0.495) |
| Front of dwelling faces: | South East |

## Opening types:

| Name: | Source: | Type: | Glazing: | Argon: | Frame: |
|---|---|---|---|---|---|
| front door | Manufacturer | Solid | | | Metal |
| SE | Manufacturer | Windows | low-E, En = 0.1, soft coat | Yes | PVC-U |
| NE | Manufacturer | Windows | low-E, En = 0.1, soft coat | Yes | PVC-U |

| Name: | Gap: | Frame Factor: | g-value: | U-value: | No. of Openings: |
|---|---|---|---|---|---|
| front door | mm | 0.8 | 0 | 1 | 1 |
| SE | 16mm or more | 0.8 | 0.8 | 1.5 | 1 |
| NE | 16mm or more | 0.8 | 0.8 | 1.5 | 1 |

| Name: | Type-Name: | Location: | Orient: | Width: | Height: |
|---|---|---|---|---|---|
| front door | | to common area | North West | 0 | 0 |
| SE | | external wall | South East | 0 | 0 |
| NE | | external wall | North East | 0 | 0 |

Overshading: Average or unknown

## Opaque Elements:

| Type: | Gross area: | Openings: | Net area: | U-value: | Ru value: | Curtain wall: | Kappa: |
|---|---|---|---|---|---|---|---|
| External Elements | | | | | | | |
| external wall | 94.08 | 23.36 | 70.72 | 0.2 | 0 | False | N/A |
| to common area | 3.08 | 1.68 | 1.4 | 0.2 | 0.82 | False | N/A |
| flat roof | 2.52 | 0 | 2.52 | 0.13 | 0 | | N/A |
| Internal Elements | | | | | | | |
| Party Elements | | | | | | | |
| party wall | 20.86 | | | | | | N/A |

## Thermal bridges:

Thermal bridges: User-defined y-value
y =0.04
Reference: ACD

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# SAP Input

## Ventilation:

| | |
|---|---|
| Pressure test: | Yes (As designed) |
| Ventilation: | Natural ventilation (extract fans) |
| Number of chimneys: | 0 |
| Number of open flues: | 0 |
| Number of fans: | 2 |
| Number of sides sheltered: | 2 |
| Design q50: | 3 |

## Main heating system:

| | |
|---|---|
| Main heating system: | Central heating systems with radiators or underfloor heating<br>Gas boilers and oil boilers<br>Fuel: mains gas<br>Info Source: Boiler Database<br>Database: (rev 315, product index 016669) SEDBUK2009 90.0%<br>Brand name: Alpha<br>Model: InTec 28X<br>Model qualifier:<br>(Combi boiler)<br>Systems with radiators<br>Pump in heat space: Yes |

## Main heating Control:

| | |
|---|---|
| Main heating Control: | Time and temperature zone control<br>Control code: 2110<br>Boiler interlock: Yes |

## Secondary heating system:

| | |
|---|---|
| Secondary heating system: | None |

## Water heating:

| | |
|---|---|
| Water heating: | From main heating system<br>Water code: 901<br>Fuel :mains gas<br>No hot water cylinder<br>Flue Gas Heat Recovery System:<br>Database (rev 315, product index 060002)<br>Brand name: Zenex<br>Model: GasSaver<br>Model qualifier: GS-1<br>Solar panel: True<br>aperture area: 2.5<br>Flat plate, glazed<br>default values: False<br>collector zero-loss efficiency: 0.8<br>collector heat loss coefficient: 3.175<br>orientation: South, 30° pitch<br>overshading: None or Very Little (<20%)<br>dedicated solar store volume: 90 litres (seperate store)<br>solar powered pump: False |

## Others:

| | |
|---|---|
| Electricity tariff: | standard tariff |
| In Smoke Control Area: | Unknown |
| Conservatory: | No conservatory |
| Low energy lights: | 100% |
| Terrain type: | Dense urban |
| EPC language: | English |
| Wind turbine: | No |
| Photovoltaics: | None |

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# SAP Input

Assess Zero Carbon Home: No

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# DER WorkSheet: New dwelling design stage

## User Details:

| | | | |
|---|---|---|---|
| **Assessor Name:** | Gary Nicholls | **Stroma Number:** | STRO003305 |
| **Software Name:** | Stroma FSAP 2009 | **Software Version:** | Version: 1.4.0.39 |

## Property Address: Flat 5 139-147 Camden Road

**Address :** Flat 5, 139-147 Camden Road, London, NW1 9HA

## 1. Overall dwelling dimensions:

| | Area(m²) | | Ave Height(m) | | Volume(m³) | |
|---|---|---|---|---|---|---|
| Ground floor | 78.43 | (1a) x | 2.8 | (2a) = | 219.6 | (3a) |
| Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+.....(1n) | 78.43 | (4) | | | | |
| Dwelling volume | | | | (3a)+(3b)+(3c)+(3d)+(3e)+.....(3n) = | 219.6 | (5) |

## 2. Ventilation rate:

| | main heating | | Secondary heating | | other | | total | | m³ per hour | |
|---|---|---|---|---|---|---|---|---|---|---|
| Number of chimneys | 0 | + | 0 | + | 0 | = | 0 | x 40 = | 0 | (6a) |
| Number of open flues | 0 | + | 0 | + | 0 | = | 0 | x 20 = | 0 | (6b) |
| Number of intermittent fans | | | | | | | 2 | x 10 = | 20 | (7a) |
| Number of passive vents | | | | | | | 0 | x 10 = | 0 | (7b) |
| Number of flueless gas fires | | | | | | | 0 | x 40 = | 0 | (7c) |

**Air changes per hour**

| | | | | |
|---|---|---|---|---|
| Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) = | 20 | ÷ (5) = | 0.09 | (8) |

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

| | | | |
|---|---|---|---|
| Number of storeys in the dwelling (ns) | | 0 | (9) |
| Additional infiltration | [(9)-1]x0.1 = | 0 | (10) |
| Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction | | 0 | (11) |

*if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35*

| | | | |
|---|---|---|---|
| If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0 | | 0 | (12) |
| If no draught lobby, enter 0.05, else enter 0 | | 0 | (13) |
| Percentage of windows and doors draught stripped | | 0 | (14) |
| Window infiltration | 0.25 - [0.2 x (14) ÷ 100] = | 0 | (15) |
| Infiltration rate | (8) + (10) + (11) + (12) + (13) + (15) = | 0 | (16) |
| Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area | | 3 | (17) |
| If based on air permeability value, then | (18) = [(17) ÷ 20]+(8), otherwise (18) = (16) | 0.24 | (18) |

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

| | | | |
|---|---|---|---|
| Number of sides on which sheltered | | 2 | (19) |
| Shelter factor | (20) = 1 - [0.075 x (19)] = | 0.85 | (20) |
| Infiltration rate incorporating shelter factor | (21) = (18) x (20) = | 0.2 | (21) |

Infiltration rate modified for monthly wind speed

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

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# DER WorkSheet: New dwelling design stage

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

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.28 | 0.26 | 0.26 | 0.23 | 0.21 | 0.2 | 0.19 | 0.19 | 0.22 | 0.23 | 0.25 | 0.26 |

*Calculate effective air change rate for the applicable case*

If mechanical ventilation: 0 (23a)

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

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

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

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (24a)m= | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | (24a) |

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

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (24b)m= | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | (24b) |

c) If whole house extract ventilation or positive input ventilation from outside
if (22b)m < 0.5 × (23b), then (24c) = (23b); otherwise (24c) = (22b) m + 0.5 × (23b)

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (24c)m= | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | (24c) |

d) If natural ventilation or whole house positive input ventilation from loft
if (22b)m = 1, then (24d)m = (22b)m otherwise (24d)m = 0.5 + [(22b)m² x 0.5]

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (24d)m= | 0.54 | 0.53 | 0.53 | 0.53 | 0.52 | 0.52 | 0.52 | 0.52 | 0.52 | 0.53 | 0.53 | 0.53 | (24d) |

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

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (25)m= | 0.54 | 0.53 | 0.53 | 0.53 | 0.52 | 0.52 | 0.52 | 0.52 | 0.52 | 0.53 | 0.53 | 0.53 | (25) |

## 3. Heat losses and heat loss parameter:

| ELEMENT | Gross area (m²) | Openings m² | Net Area A ,m² | | U-value W/m2K | | A X U (W/K) | k-value kJ/m²·K | A X k kJ/K | |
|---|---|---|---|---|---|---|---|---|---|---|
| Doors | | | 1.68 | x | 1 | = | 1.68 | | | (26) |
| Windows Type 1 | | | 16.8 | x1/[1/( 1.5 )+ 0.04] | | = | 23.77 | | | (27) |
| Windows Type 2 | | | 6.56 | x1/[1/( 1.5 )+ 0.04] | | = | 9.28 | | | (27) |
| Walls Type1 | 94.08 | 23.36 | 70.72 | x | 0.2 | = | 14.14 | | | (29) |
| Walls Type2 | 3.08 | 1.68 | 1.4 | x | 0.17 | = | 0.24 | | | (29) |
| Roof | 2.52 | 0 | 2.52 | x | 0.13 | = | 0.33 | | | (30) |
| Total area of elements, m² | | | 99.68 | | | | | | | (31) |
| Party wall | | | 20.86 | x | 0 | = | 0 | | | (32) |

** 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) = 49.45 (33)

Heat capacity Cm = S(A x k ) ((28)…(30) + (32) + (32a)…(32e) = 14664.18 (34)

Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K Indicative Value: Medium 250 (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 3.99 (36)

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

Total fabric heat loss (33) + (36) = 53.44 (37)

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

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (38)m= | 39.01 | 38.71 | 38.71 | 38.16 | 37.83 | 37.68 | 37.54 | 37.54 | 37.91 | 38.16 | 38.43 | 38.71 | (38) |

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

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (39)m= | 92.44 | 92.14 | 92.14 | 91.6 | 91.27 | 91.12 | 90.97 | 90.97 | 91.35 | 91.6 | 91.86 | 92.14 | |

Average = Sum(39)$_{1…12}$ /12= 91.63 (39)

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# DER WorkSheet: New dwelling design stage

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

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (40)m= | 1.18 | 1.17 | 1.17 | 1.17 | 1.16 | 1.16 | 1.16 | 1.16 | 1.16 | 1.17 | 1.17 | 1.17 |

Average = Sum(40)1…12 /12= 1.17 (40)

Number of days in month (Table 1a)

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

## 4. Water heating energy requirement: kWh/year:

Assumed occupancy, N 2.43 (42)
if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9)
if TFA £ 13.9, N = 1

Annual average hot water usage in litres per day Vd,average = (25 x N) + 36 91.97 (43)

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

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Hot water usage in litres per day for each month Vd,m = factor from Table 1c x (43)* | | | | | | | | | | | | | |
| (44)m= | 101.17 | 97.49 | 93.81 | 90.13 | 86.45 | 82.77 | 82.77 | 86.45 | 90.13 | 93.81 | 97.49 | 101.17 | |
| | | | | | | | | | Total = Sum(44)1…12 = | | | 1103.63 | (44) |
| *Energy content of hot water used - calculated monthly = 4.190 x Vd,m x nm x DTm / 3600 kWh/month (see Tables 1b, 1c, 1d)* | | | | | | | | | | | | | |
| (45)m= | 150.39 | 131.53 | 135.73 | 118.33 | 113.54 | 97.98 | 90.79 | 104.18 | 105.43 | 122.86 | 134.12 | 145.64 | |
| | | | | | | | | | Total = Sum(45)1…12 = | | | 1450.5 | (45) |
| *If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61)* | | | | | | | | | | | | | |
| (46)m= | 22.56 | 19.73 | 20.36 | 17.75 | 17.03 | 14.7 | 13.62 | 15.63 | 15.81 | 18.43 | 20.12 | 21.85 | (46) |

Water storage loss:

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

Temperature factor from Table 2b 0 (48)

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

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

Cylinder volume (litres) including any solar storage within same 0 (50)

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

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

Hot water storage loss factor from Table 2 (kWh/litre/day) 0 (51)

Volume factor from Table 2a 0 (52)

Temperature factor from Table 2b 0 (53)

Energy lost from water storage, kWh/year ((50) x (51) x (52) x (53) = 0 (54)

Enter (49) or (54) in (55) 0 (55)

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

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (56)m= | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | (56) |

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

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (57)m= | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | (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= | 22.37 | 20.21 | 22.37 | 21.65 | 22.37 | 21.65 | 22.37 | 22.37 | 21.65 | 22.37 | 21.65 | 22.37 | (61) |

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# DER WorkSheet: New dwelling design stage

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= | 172.76 | 151.73 | 158.1 | 139.98 | 135.91 | 119.62 | 113.16 | 126.55 | 127.08 | 145.23 | 155.76 | 168.01 | (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= | -26.02 | -42.3 | -68.39 | -93.53 | -117.46 | -120.86 | -120.43 | -103.33 | -77.7 | -55.01 | -30.94 | -21.56 | (63) |

Output from water heater

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (64)m= | 111.23 | 85.04 | 74.21 | 42.81 | 18.45 | 0 | 0 | 23.14 | 46.67 | 79.64 | 98.36 | 110.64 | |

Output from water heater (annual)1…12 | 690.18 | (64)

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

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (65)m= | 55.6 | 48.78 | 50.72 | 44.76 | 43.34 | 37.99 | 35.78 | 40.23 | 40.47 | 46.44 | 50.01 | 54.02 | (65) |

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

## 5. Internal gains (see Table 5 and 5a):

Metabolic gains (Table 5), Watts

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (66)m= | 121.62 | 121.62 | 121.62 | 121.62 | 121.62 | 121.62 | 121.62 | 121.62 | 121.62 | 121.62 | 121.62 | 121.62 | (66) |
| Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5 | | | | | | | | | | | | | |
| (67)m= | 19.27 | 17.11 | 13.92 | 10.54 | 7.88 | 6.65 | 7.18 | 9.34 | 12.54 | 15.92 | 18.58 | 19.8 | (67) |
| Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5 | | | | | | | | | | | | | |
| (68)m= | 216.13 | 218.37 | 212.72 | 200.69 | 185.5 | 171.23 | 161.69 | 159.45 | 165.1 | 177.13 | 192.32 | 206.59 | (68) |
| Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5 | | | | | | | | | | | | | |
| (69)m= | 35.16 | 35.16 | 35.16 | 35.16 | 35.16 | 35.16 | 35.16 | 35.16 | 35.16 | 35.16 | 35.16 | 35.16 | (69) |
| Pumps and fans gains (Table 5a) | | | | | | | | | | | | | |
| (70)m= | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | (70) |
| Losses e.g. evaporation (negative values) (Table 5) | | | | | | | | | | | | | |
| (71)m= | -97.3 | -97.3 | -97.3 | -97.3 | -97.3 | -97.3 | -97.3 | -97.3 | -97.3 | -97.3 | -97.3 | -97.3 | (71) |
| Water heating gains (Table 5) | | | | | | | | | | | | | |
| (72)m= | 74.73 | 72.6 | 68.17 | 62.16 | 58.26 | 52.76 | 48.09 | 54.08 | 56.2 | 62.43 | 69.45 | 72.61 | (72) |
| **Total internal gains =** (66)m + (67)m + (68)m + (69)m + (70)m + (71)m + (72)m | | | | | | | | | | | | | |
| (73)m= | 379.61 | 377.57 | 364.3 | 342.87 | 321.12 | 300.12 | 286.45 | 292.35 | 303.32 | 324.96 | 349.83 | 368.49 | (73) |

## 6. Solar gains:

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

| Orientation: | Access Factor Table 6d | | Area m² | | Flux Table 6a | | g_ Table 6b | | FF Table 6c | | Gains (W) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Northeast 0.9x | 0.77 | x | 6.56 | x | 11.51 | x | 0.8 | x | 0.8 | = | 33.49 | (75) |
| Northeast 0.9x | 0.77 | x | 6.56 | x | 23.55 | x | 0.8 | x | 0.8 | = | 68.53 | (75) |
| Northeast 0.9x | 0.77 | x | 6.56 | x | 41.13 | x | 0.8 | x | 0.8 | = | 119.66 | (75) |
| Northeast 0.9x | 0.77 | x | 6.56 | x | 67.8 | x | 0.8 | x | 0.8 | = | 197.26 | (75) |
| Northeast 0.9x | 0.77 | x | 6.56 | x | 89.77 | x | 0.8 | x | 0.8 | = | 261.17 | (75) |
| Northeast 0.9x | 0.77 | x | 6.56 | x | 97.5 | x | 0.8 | x | 0.8 | = | 283.68 | (75) |
| Northeast 0.9x | 0.77 | x | 6.56 | x | 92.98 | x | 0.8 | x | 0.8 | = | 270.52 | (75) |
| Northeast 0.9x | 0.77 | x | 6.56 | x | 75.42 | x | 0.8 | x | 0.8 | = | 219.43 | (75) |

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| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Northeast 0.9x | 0.77 | x | 6.56 | x | 51.24 | x | 0.8 | x | 0.8 | = | 149.1 | (75) |
| Northeast 0.9x | 0.77 | x | 6.56 | x | 29.6 | x | 0.8 | x | 0.8 | = | 86.12 | (75) |
| Northeast 0.9x | 0.77 | x | 6.56 | x | 14.52 | x | 0.8 | x | 0.8 | = | 42.26 | (75) |
| Northeast 0.9x | 0.77 | x | 6.56 | x | 9.36 | x | 0.8 | x | 0.8 | = | 27.23 | (75) |
| Southeast 0.9x | 0.77 | x | 16.8 | x | 37.39 | x | 0.8 | x | 0.8 | = | 278.58 | (77) |
| Southeast 0.9x | 0.77 | x | 16.8 | x | 63.74 | x | 0.8 | x | 0.8 | = | 474.9 | (77) |
| Southeast 0.9x | 0.77 | x | 16.8 | x | 84.22 | x | 0.8 | x | 0.8 | = | 627.5 | (77) |
| Southeast 0.9x | 0.77 | x | 16.8 | x | 103.49 | x | 0.8 | x | 0.8 | = | 771.11 | (77) |
| Southeast 0.9x | 0.77 | x | 16.8 | x | 113.34 | x | 0.8 | x | 0.8 | = | 844.49 | (77) |
| Southeast 0.9x | 0.77 | x | 16.8 | x | 115.04 | x | 0.8 | x | 0.8 | = | 857.21 | (77) |
| Southeast 0.9x | 0.77 | x | 16.8 | x | 112.79 | x | 0.8 | x | 0.8 | = | 840.42 | (77) |
| Southeast 0.9x | 0.77 | x | 16.8 | x | 105.34 | x | 0.8 | x | 0.8 | = | 784.91 | (77) |
| Southeast 0.9x | 0.77 | x | 16.8 | x | 92.9 | x | 0.8 | x | 0.8 | = | 692.19 | (77) |
| Southeast 0.9x | 0.77 | x | 16.8 | x | 72.36 | x | 0.8 | x | 0.8 | = | 539.19 | (77) |
| Southeast 0.9x | 0.77 | x | 16.8 | x | 44.83 | x | 0.8 | x | 0.8 | = | 334 | (77) |
| Southeast 0.9x | 0.77 | x | 16.8 | x | 31.95 | x | 0.8 | x | 0.8 | = | 238.06 | (77) |

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

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (83)m= | 312.07 | 543.43 | 747.16 | 968.37 | 1105.66 | 1140.89 | 1110.94 | 1004.33 | 841.29 | 625.3 | 376.26 | 265.3 | (83) |

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

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (84)m= | 691.68 | 921 | 1111.46 | 1311.24 | 1426.78 | 1441.01 | 1397.39 | 1296.68 | 1144.61 | 950.26 | 726.09 | 633.78 | (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= | 0.99 | 0.96 | 0.89 | 0.76 | 0.58 | 0.4 | 0.27 | 0.29 | 0.52 | 0.83 | 0.97 | 0.99 | (86) |

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

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (87)m= | 20 | 20.3 | 20.62 | 20.85 | 20.97 | 21 | 21 | 21 | 20.98 | 20.82 | 20.31 | 19.98 | (87) |

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

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (88)m= | 19.94 | 19.94 | 19.94 | 19.95 | 19.95 | 19.95 | 19.95 | 19.95 | 19.95 | 19.95 | 19.95 | 19.94 | (88) |

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

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (89)m= | 0.99 | 0.95 | 0.87 | 0.72 | 0.52 | 0.34 | 0.2 | 0.21 | 0.45 | 0.78 | 0.96 | 0.99 | (89) |

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

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (90)m= | 18.64 | 19.07 | 19.51 | 19.8 | 19.92 | 19.95 | 19.95 | 19.95 | 19.94 | 19.77 | 19.09 | 18.62 | (90) |

fLA = Living area ÷ (4) = 0.5 (91)

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

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (92)m= | 19.31 | 19.68 | 20.06 | 20.32 | 20.44 | 20.47 | 20.47 | 20.47 | 20.46 | 20.29 | 19.69 | 19.29 | (92) |

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

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (93)m= | 19.16 | 19.53 | 19.91 | 20.17 | 20.29 | 20.32 | 20.32 | 20.32 | 20.31 | 20.14 | 19.54 | 19.14 | (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 |
|---|---|---|---|---|---|---|---|---|---|---|---|

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Utilisation factor for gains, hm:

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (94)m= | 0.98 | 0.94 | 0.86 | 0.73 | 0.54 | 0.36 | 0.22 | 0.24 | 0.47 | 0.79 | 0.96 | 0.99 | (94) |

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

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (95)m= | 679.14 | 870.18 | 960.63 | 955.7 | 765.68 | 518.92 | 311.18 | 311.11 | 541.35 | 746.81 | 696.96 | 624.67 | (95) |

Monthly average external temperature from Table 8

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (96)m= | 4.5 | 5 | 6.8 | 8.7 | 11.7 | 14.6 | 16.9 | 16.9 | 14.3 | 10.8 | 7 | 4.9 | (96) |

Heat loss rate for mean internal temperature, Lm , W =[(39)m x [(93)m– (96)m ]

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (97)m= | 1355.37 | 1338.49 | 1207.93 | 1050.41 | 784.13 | 521.01 | 311.31 | 311.3 | 548.81 | 855.66 | 1152.34 | 1312.32 | (97) |

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

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (98)m= | 503.12 | 314.71 | 183.99 | 68.19 | 13.73 | 0 | 0 | 0 | 0 | 80.99 | 327.87 | 511.61 |

Total per year (kWh/year) = $\text{Sum}(98)_{1...5,9...12}$ = 2004.22 (98)

Space heating requirement in kWh/m²/year 25.55 (99)

## 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) × [1 – (203)] = | 1 | (204) |
| Efficiency of main space heating system 1 | | 89.1 | (206) |
| Efficiency of secondary/supplementary heating system, % | | 0 | (208) |

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | kWh/year | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Space heating requirement (calculated above) | 503.12 | 314.71 | 183.99 | 68.19 | 13.73 | 0 | 0 | 0 | 0 | 80.99 | 327.87 | 511.61 | | |
| (211)m = {[(98)m x (204)] + (210)m } x 100 ÷ (206) | 564.67 | 353.21 | 206.5 | 76.53 | 15.41 | 0 | 0 | 0 | 0 | 90.9 | 367.98 | 574.2 | | (211) |
| Total (kWh/year) =$\text{Sum}(211)_{1...5,10....12}$= | | | | | | | | | | | | | 2249.4 | (211) |
| Space heating fuel (secondary), kWh/month = {[(98)m x (201)] + (214) m } x 100 ÷ (208) | | | | | | | | | | | | | | |
| (215)m= | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| Total (kWh/year) =$\text{Sum}(215)_{1...5,10....12}$= | | | | | | | | | | | | | 0 | (215) |

**Water heating**

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Output from water heater (calculated above) | 111.23 | 85.04 | 74.21 | 42.81 | 18.45 | 0 | 0 | 23.14 | 46.67 | 79.64 | 98.36 | 110.64 | | |
| Efficiency of water heater | | | | | | | | | | | | | 86.9 | (216) |
| (217)m= | 88.69 | 88.62 | 88.46 | 88.24 | 87.83 | 0 | 0 | 86.9 | 86.9 | 88 | 88.58 | 88.7 | | (217) |
| Fuel for water heating, kWh/month (219)m = (64)m x 100 ÷ (217)m | | | | | | | | | | | | | | |
| (219)m= | 125.4 | 95.95 | 83.89 | 48.52 | 21.01 | 0 | 0 | 26.62 | 53.71 | 90.51 | 111.04 | 124.73 | | |
| Total = $\text{Sum}(219a)_{1...12}$ = | | | | | | | | | | | | | 781.39 | (219) |

| **Annual totals** | **kWh/year** | **kWh/year** |
|---|---|---|
| Space heating fuel used, main system 1 | | 2249.4 |
| Water heating fuel used | | 781.39 |
| Electricity for pumps, fans and electric keep-hot | | |

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| | | | | |
|---|---|---|---|---|
| central heating pump: | | 130 | | (230c) |
| boiler with a fan-assisted flue | | 45 | | (230e) |
| pump for solar water heating | | 75 | | (230g) |
| Total electricity for the above, kWh/year | sum of (230a)…(230g) = | | 250 | (231) |
| Electricity for lighting | | | 340.28 | (232) |

## 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 | 0.198 | = | 445.38 | (261) |
| Space heating (secondary) | (215) | x | 0 | = | 0 | (263) |
| Water heating | (219) | x | 0.198 | = | 154.72 | (264) |
| Space and water heating | (261) + (262) + (263) + (264) = | | | | 600.1 | (265) |
| Electricity for pumps, fans and electric keep-hot | (231) | x | 0.517 | = | 129.25 | (267) |
| Electricity for lighting | (232) | x | 0.517 | = | 175.92 | (268) |
| Total CO2, kg/year | | | sum of (265)…(271) = | | 905.27 | (272) |
| **Dwelling CO2 Emission Rate** | | | (272) ÷ (4) = | | 11.54 | (273) |
| EI rating (section 14) | | | | | 90 | (274) |

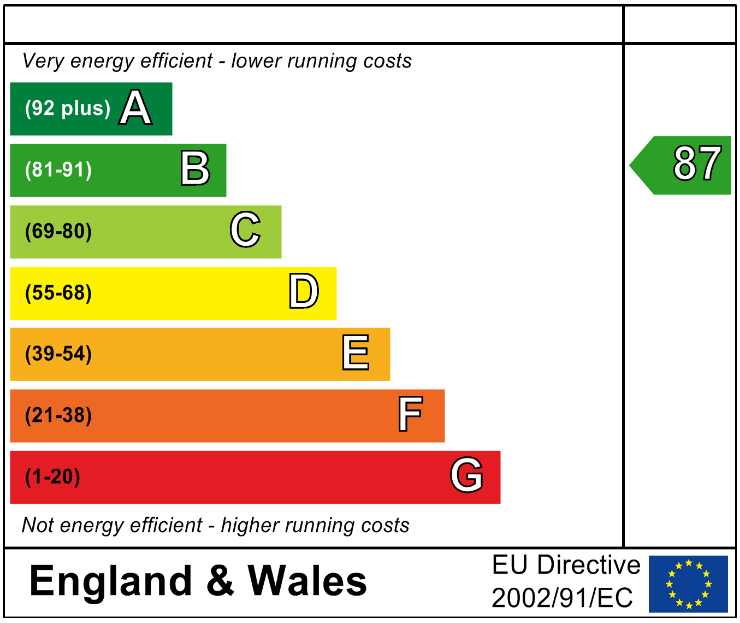
# Predicted Energy Assessment

| | | | |
|---|---|---|---|
| Flat 5 | | Dwelling type: | End-terrace Mid floor Flat |
| 139-147 Camden Road | | Date of assessment: | 01 November 2011 |
| London | | Produced by: | Gary Nicholls |
| NW1 9HA | | Total floor area: | 78.43 m² |

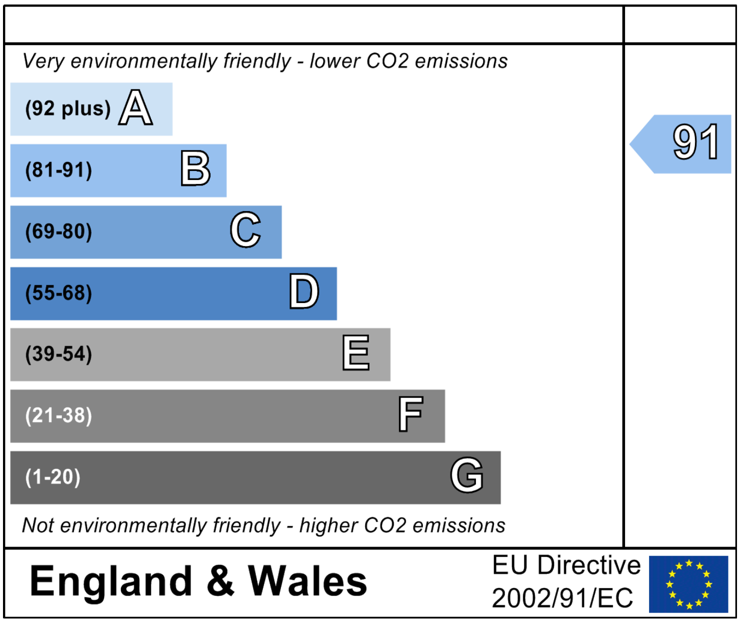
This is a Predicted Energy Assessment for a property which is not yet complete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, an Energy Performance Certificate is required providing information about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

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

## Energy Efficiency Rating




## Environmental Impact ($CO_2$) Rating




The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.

The environmental impact rating is a measure of a home's impact on the environment in terms of carbonn dioxide (CO2) emissions. The higher the rating the less impact it has on the environment.