

# BUILDING REGULATION COMPLIANCE

## Calculation Type: New Build (As Designed)



|                                    |  |                |            |             |           |
|------------------------------------|--|----------------|------------|-------------|-----------|
| Property Reference                 | 19037 Plot 052   | Issued on Date | 21/04/2019 |             |           |
| Assessment Reference               | 52   | Prop Type Ref  | Epworth    |             |           |
| Property                           | 52, The Paddocks, Green Man Road, Navenby, Lincoln, LN5                                  |                |            |             |           |
| SAP Rating                         | 82 B   | DER            | 20.69      | TER         | 20.72     |
| Environmental                      | 86 B   | % DER<TER      | 0.15       |             |           |
| CO <sub>2</sub> Emissions (t/year) | 1.07   | DFEE           | 51.37      | TFEE        | 55.86     |
| General Requirements Compliance    | Pass   | % DFEE<TFEE    | 8.05       |             |           |
| Assessor Details                   | Mr. Robert Atherton, Low Carbon Box Limited, Tel: 07540977134, robert@lowcarbonbox.co.uk |                |            | Assessor ID | F291-0001 |
| Client                             |  |                |            |             |           |

### SUMMARY FOR INPUT DATA FOR New Build (As Designed)

#### Criterion 1 – Achieving the TER and TFEE rate

##### 1a TER and DER

|   |                  |                                   |      |
|---|------------------|-----------------------------------|------|
| Fuel for main heating                       | Mains gas        |                                   |      |
| Fuel factor                                 | 1.00 (mains gas) |                                   |      |
| Target Carbon Dioxide Emission Rate (TER)   | 20.72            | kgCO <sub>2</sub> /m <sup>2</sup> |      |
| Dwelling Carbon Dioxide Emission Rate (DER) | 20.69            | kgCO <sub>2</sub> /m <sup>2</sup> | Pass |
|   | -0.03 (-0.1%)    | kgCO <sub>2</sub> /m <sup>2</sup> |      |

##### 1b TFEE and DFEE

|  |              |                        |      |
|--|--------------|------------------------|------|
| Target Fabric Energy Efficiency (TFEE)   | 55.86        | kWh/m <sup>2</sup> /yr |      |
| Dwelling Fabric Energy Efficiency (DFEE) | 51.37        | kWh/m <sup>2</sup> /yr |      |
|  | -4.5 (-8.1%) | kWh/m <sup>2</sup> /yr | Pass |

#### Criterion 2 – Limits on design flexibility

##### Limiting Fabric Standards

##### 2 Fabric U-values

| Element       | Average          | Highest          |      |
|---------------|------------------|------------------|------|
| External wall | 0.19 (max. 0.30) | 0.19 (max. 0.70) | Pass |
| Party wall    | 0.00 (max. 0.20) | -                | Pass |
| Floor         | 0.16 (max. 0.25) | 0.16 (max. 0.70) | Pass |
| Roof          | 0.11 (max. 0.20) | 0.11 (max. 0.35) | Pass |
| Openings      | 1.36 (max. 2.00) | 1.40 (max. 3.30) | Pass |

##### 2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

##### 3 Air permeability

|                                |                     |   |      |
|--------------------------------|---------------------|---|------|
| Air permeability at 50 pascals | 6.85 (design value) | m <sup>3</sup> /(h.m <sup>2</sup> ) @ 50 Pa |      |
| Maximum                        | 10.0                | m <sup>3</sup> /(h.m <sup>2</sup> ) @ 50 Pa | Pass |

##### Limiting System Efficiencies

##### 4 Heating efficiency

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Main heating system

Boiler system with radiators or underfloor - Mains gas  
Data from database  
Vaillant ecoFIT sustain 825 VUW 256/6-3 (H-GB)  
Combi boiler  
Efficiency: 89.3% SEDBUK2009  
Minimum: 88.0%

Pass

Secondary heating system

None

### 5 Cylinder insulation

Hot water storage

No cylinder

### 6 Controls

Space heating controls

Programmer, room thermostat and TRVs

Pass

Hot water controls

No cylinder

Boiler interlock

Yes

Pass

### 7 Low energy lights

Percentage of fixed lights with low-energy fittings

100 %

Minimum

75 %

Pass

### 8 Mechanical ventilation

Continuous extract system (decentralised)

Specific fan power

0.0900 0.0900 0.1100

Maximum

0.7

Pass

## Criterion 3 – Limiting the effects of heat gains in summer

### 9 Summertime temperature

Overheating risk (East Pennines)

Not significant

Pass

Based on:

Overshading

Average

Windows facing East

5.79 m<sup>2</sup>, No overhang

Windows facing West

3.54 m<sup>2</sup>, No overhang

Air change rate

4.00 ach

Blinds/curtains

None

## Criterion 4 – Building performance consistent with DER and DFEE rate

### Party Walls

Type

U-value

Filled Cavity with Edge Sealing

0.00

W/m<sup>2</sup>K

Pass

### Air permeability and pressure testing

#### 3 Air permeability

Air permeability at 50 pascals

6.85 (design value)

m<sup>3</sup>/(h.m<sup>2</sup>) @ 50 Pa

Maximum

10.0

m<sup>3</sup>/(h.m<sup>2</sup>) @ 50 Pa

Pass

### 10 Key features

Party wall U-value

0.00

W/m<sup>2</sup>K

Roof U-value

0.11

W/m<sup>2</sup>K

Door U-value

0.91

W/m<sup>2</sup>K

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### SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

|                       |                      |
|-----------------------|----------------------|
| Orientation           | West                 |
| Property Tenure       | Unknown              |
| Transaction Type      | New dwelling         |
| Terrain Type          | Suburban             |
| 1.0 Property Type     | House, Semi-Detached |
| 2.0 Number of Storeys | 2                    |
| 3.0 Date Built        | 2019                 |
| 4.0 Sheltered Sides   | 3                    |
| 5.0 Sunlight/Shade    | Average or unknown   |

#### 6.0 Measurements

|               | Heat Loss Perimeter | Internal Floor Area  | Average Storey Height |
|---------------|---------------------|----------------------|-----------------------|
| Ground Floor: | 15.30 m             | 28.81 m <sup>2</sup> | 2.39 m                |
| 1st Storey:   | 15.30 m             | 28.81 m <sup>2</sup> | 2.68 m                |

|                 |       |                |
|-----------------|-------|----------------|
| 7.0 Living Area | 26.90 | m <sup>2</sup> |
|-----------------|-------|----------------|

|                            |                     |                     |
|----------------------------|---------------------|---------------------|
| 8.0 Thermal Mass Parameter | Precise calculation |                     |
| Thermal Mass               | 223.59              | kJ/m <sup>2</sup> K |

#### 9.0 External Walls

| Description   | Type        | Construction | U-Value (W/m <sup>2</sup> K) | Kappa (kJ/m <sup>2</sup> K) | Gross Area (m <sup>2</sup> ) | Nett Area (m <sup>2</sup> ) |
|---------------|-------------|--------------|------------------------------|-----------------------------|------------------------------|-----------------------------|
| External Wall | Cavity Wall | Other        | 0.19                         | 72.24                       | 77.57                        | 66.09                       |

#### 9.1 Party Walls

| Description  | Type                            | Construction  | U-Value (W/m <sup>2</sup> K) | Kappa (kJ/m <sup>2</sup> K) | Area (m <sup>2</sup> ) |
|--------------|---------------------------------|---|------------------------------|-----------------------------|------------------------|
| Party Wall 1 | Filled Cavity with Edge Sealing | Single plasterboard on dabs both sides, lightweight aggregate blocks, cavity or cavity fill | 0.00                         | 110.00                      | 34.02                  |

#### 9.2 Internal Walls

| Description          | Construction                 | Kappa (kJ/m <sup>2</sup> K) | Area (m <sup>2</sup> ) |
|----------------------|------------------------------|-----------------------------|------------------------|
| Internal Partition 2 | Plasterboard on timber frame | 9.00                        | 62.78                  |
| Internal Wall HW     | Other                        | 18.44                       | 18.69                  |

#### 10.0 External Roofs

| Description   | Type                | Construction                             | U-Value (W/m <sup>2</sup> K) | Kappa (kJ/m <sup>2</sup> K) | Gross Area (m <sup>2</sup> ) | Nett Area (m <sup>2</sup> ) |
|---------------|---------------------|--|------------------------------|-----------------------------|------------------------------|-----------------------------|
| External Roof | External Plane Roof | Plasterboard, insulated at ceiling level | 0.11                         | 9.00                        | 28.81                        | 28.81                       |

# SUMMARY FOR INPUT DATA

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### 10.2 Internal Ceilings

| Description        | Construction                                   | Kappa (kJ/m <sup>2</sup> K) | Area (m <sup>2</sup> ) |
|--------------------|--|-----------------------------|------------------------|
| Internal Ceiling 1 | Plasterboard ceiling, carpeted chipboard floor | 9.00                        | 28.81                  |

### 11.0 Heat Loss Floors

| Description  | Type                 | Construction                       | U-Value (W/m <sup>2</sup> K) | Kappa (kJ/m <sup>2</sup> K) | Area (m <sup>2</sup> ) |
|--------------|----------------------|------------------------------------|------------------------------|-----------------------------|------------------------|
| Ground Floor | Ground Floor - Solid | Suspended concrete floor, carpeted | 0.16                         | 75.00                       | 28.81                  |

### 11.2 Internal Floors

| Description      | Construction                                   | Kappa (kJ/m <sup>2</sup> K) | Area (m <sup>2</sup> ) |
|------------------|--|-----------------------------|------------------------|
| Internal Floor 1 | Plasterboard ceiling, carpeted chipboard floor | 18.00                       | 28.81                  |

### 12.0 Opening Types

| Description | Data Source  | Type             | Glazing                | Glazing Gap | Argon Filled | G-value | Frame Type | Frame Factor | U Value (W/m <sup>2</sup> K) |
|-------------|--------------|------------------|------------------------|-------------|--------------|---------|------------|--------------|------------------------------|
| Front Door  | Manufacturer | Solid Door       |                        |             |              |         |            |              | 1.20                         |
| Windows     | Manufacturer | Window           | Double Low-E Soft 0.1  |             |              | 0.71    |            | 0.70         | 1.40                         |
| HG Door     | Manufacturer | Half Glazed Door | Double Low-E Soft 0.1  |             |              | 0.71    |            | 0.70         | 1.50                         |
| Garage door | Manufacturer | Door to Corridor |                        |             |              |         |            |              | 0.91                         |
| Patio Doors | Manufacturer | Window           | Double Low-E Soft 0.05 |             |              | 0.63    |            | 0.70         | 1.40                         |

### 13.0 Openings

| Name          | Opening Type | Location          | Orientation | Curtain Type | Overhang Ratio | Wide Overhang | Width (m) | Height (m) | Count | Area (m <sup>2</sup> ) | Curtain Closed |
|---------------|--------------|-------------------|-------------|--------------|----------------|---------------|-----------|------------|-------|------------------------|----------------|
| Front Door    | Solid Door   | [1] External Wall | West        |              |                |               |           |            |       | 2.15                   |                |
| Front Windows | Window       | [1] External Wall | West        | None         | 0.00           |               |           |            |       | 3.54                   |                |
| Rear Windows  | Window       | [1] External Wall | East        | None         | 0.00           |               |           |            |       | 5.79                   |                |

### 14.0 Conservatory

### 15.0 Draught Proofing

 %

### 16.0 Draught Lobby

### 17.0 Thermal Bridging

### 17.1 List of Bridges

| Source Type            | Bridge Type  | Length | Psi   | Imported | Reference: |
|------------------------|--|--------|-------|----------|------------|
| Independently assessed | E1 Steel lintel with perforated steel base plate     | 7.95   | 0.358 | No       | CBA-312    |
| Independently assessed | E3 Sill  | 5.56   | 0.020 | No       | CBA-314    |
| Independently assessed | E4 Jamb  | 19.80  | 0.016 | No       | CBA-315    |
| Independently assessed | E5 Ground floor (normal)                             | 15.30  | 0.094 | No       | CBA-301    |
| Independently assessed | E6 Intermediate floor within a dwelling              | 15.30  | 0.000 | No       | CBA-303    |
| Independently assessed | E10 Eaves (insulation at ceiling level)              | 8.59   | 0.036 | No       | Plasmor    |
| Independently assessed | E12 Gable (insulation at ceiling level)              | 6.71   | 0.077 | No       | CBA-310    |
| Independently assessed | E16 Corner (normal)                                  | 10.14  | 0.051 | No       | CBA-316    |
| Independently assessed | E18 Party wall between dwellings                     | 10.14  | 0.018 | No       |            |
| Table K1 - Default     | P1 Party wall - Ground floor                         | 6.71   | 0.160 | No       |            |
| Table K1 - Default     | P2 Party wall - Intermediate floor within a dwelling | 6.71   | 0.000 | No       |            |
| Table K1 - Default     | P4 Party wall - Roof (insulation at ceiling level)   | 6.71   | 0.240 | No       |            |

Y-value  W/m<sup>2</sup>K

### 18.0 Pressure Testing

Designed AP<sub>50</sub>  m<sup>3</sup>/(h.m<sup>2</sup>) @ 50 Pa

Property Tested ?

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As Built AP<sub>50</sub>

m<sup>3</sup>/(h.m<sup>2</sup>) @ 50 Pa

### 19.0 Mechanical Ventilation

#### Summer Overheating

|                             |                   |
|-----------------------------|-------------------|
| Windows open in hot weather | Windows half open |
| Cross ventilation possible  | Yes               |
| Night Ventilation           | No                |
| Air change rate             | 4.00              |

#### Mechanical Ventilation

|                                       |  |
|---------------------------------------|--|
| Mechanical Ventilation System Present | Yes  |
| Approved Installation                 | No   |
| Mechanical Ventilation data Type      | Database                                       |
| Type                                  | Mechanical extract ventilation - decentralised |
| MV Reference Number                   | 500425   |
| Duct Type                             | Rigid  |

### 19.1 Mechanical extract ventilation - Decentralised

| SFP  | Fan/Room Type                   | Count |
|------|---------------------------------|-------|
| 0.09 | Through Wall Fan Kitchen        | 1     |
| 0.09 | Through Wall Fan Other Wet Room | 1     |
| 0.11 | In Room Fan Other Wet Room      | 1     |

### 20.0 Fans, Open Fireplaces, Flues

|                              | MHS | SHS | Other | Total |
|------------------------------|-----|-----|-------|-------|
| Number of Chimneys           | 0   |     | 0     | 0     |
| Number of open flues         | 0   |     | 0     | 0     |
| Number of intermittent fans  |     |     |       | 0     |
| Number of passive vents      |     |     |       | 0     |
| Number of flueless gas fires |     |     |       | 0     |

### 21.0 Fixed Cooling System

### 22.0 Lighting

#### Internal

|                                 |        |   |
|---------------------------------|--------|---|
| Total number of light fittings  | 12     |   |
| Total number of L.E.L. fittings | 12     |   |
| Percentage of L.E.L. fittings   | 100.00 | % |

#### External

|                         |     |
|-------------------------|-----|
| External lights fitted  | Yes |
| Light and motion sensor | Yes |

### 23.0 Electricity Tariff

### 24.0 Main Heating 1

|                    |           |   |
|--------------------|-----------|---|
| Description        | Database  |   |
| Description        | Combi     |   |
| Percentage of Heat | 100       | % |
| Database Ref. No.  | 17958     |   |
| Fuel Type          | Mains gas |   |

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|                     |  |
|---------------------|--|
| Main Heating        | BGW                                      |
| SAP Code            | 104                                      |
| In Winter           | 90.2                                     |
| In Summer           | 87.3                                     |
| Controls            | CBE Programmer, room thermostat and TRVs |
| PCDF Controls       | 0  |
| Delayed Start Stat  | No                                       |
| Sap Code            | 2106                                     |
| Flue Type           | Balanced                                 |
| Fan Assisted Flue   | Yes                                      |
| Is MHS Pumped       | Pump in heated space                     |
| Heat Emitter        | Radiators                                |
| Flow Temperature    | Normal (> 45°C)                          |
| Combi boiler type   | Standard Combi                           |
| Combi keep hot type | None                                     |

|                            |      |
|----------------------------|------|
| <b>25.0 Main Heating 2</b> | None |
|----------------------------|------|

|  |                         |
|--|-------------------------|
| Community Heating                                | None                    |
| <b>28.0 Water Heating</b>                        | HWP From main heating 1 |
| Water Heating                                    | Main Heating 1          |
| Flue Gas Heat Recovery System                    | No                      |
| Waste Water Heat Recovery Instantaneous System 1 | No                      |
| Waste Water Heat Recovery Instantaneous System 2 | No                      |
| Waste Water Heat Recovery Storage System         | No                      |
| Solar Panel                                      | No                      |
| Water use <= 125 litres/person/day               | Yes                     |
| SAP Code   | 901                     |

|                                |      |
|--------------------------------|------|
| <b>29.0 Hot Water Cylinder</b> | None |
|--------------------------------|------|

### Recommendations

#### Lower cost measures

None

#### Further measures to achieve even higher standards

|                                    | Typical Cost    | Typical savings per year | Ratings after improvement |                      |
|------------------------------------|-----------------|--------------------------|---------------------------|----------------------|
|                                    |                 |                          | SAP rating                | Environmental Impact |
| Solar water heating                | £4,000 - £6,000 | £27                      | B 84                      |                      |
|                                    | Typical Cost    | Typical savings per year | Ratings after improvement |                      |
|                                    |                 |                          | SAP rating                | Environmental Impact |
| Solar photovoltaic panels, 2.5 kWp | £5,000 - £8,000 | £310                     | A 97                      |                      |

# ASSESSMENT NOTES

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**ASSESSMENT NOTES - Last time updated on: 21.04.2019**

# U-VALUE CALCULATOR REPORT



|                      |   |               |                |            |
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## Building Elements

### Floor 000001 - Floor - b&b

Floor Type: Suspended Floor  
 Area = 28.81 m<sup>2</sup>, Perimeter = 15.30 m, Wall thickness = 300.00 mm, Soil: Clay  
 Depth of underfloor space below ground: 0.200 m Floor wind shielding: Average (suburban)  
 Floor height above ground: h = 0.000 m  
 U-value of walls above ground: U<sub>w</sub> = 1.500 m  
 Ventilation openings per perimeter length: e = 0.0015 %  
 Mean wind speed: v = 5.000 m/s  
 Resistance on solum: R<sub>g</sub> = 0.000 m<sup>2</sup>K/W

| Layer       | Description  | Thickness (mm) | Conductivity (W/m <sup>2</sup> K) | Resistance (m <sup>2</sup> K/W) | Fraction (%) |
|-------------|--|----------------|-----------------------------------|---------------------------------|--------------|
| Ext surface |  |                |                                   | 0.1700                          |              |
| Layer 1     | <b>AAC (600 kg/m<sup>3</sup>)/ concrete</b>                |                |                                   |                                 |              |
|             | Main construction  | 100            | 0.1800                            | 0.5556                          | 86.30        |
|             | Main construction  | 100            | 1.3500                            | 0.0741                          | 13.70        |
| Layer 2     | <b>Jabfloor 100</b>  |                |                                   |                                 |              |
|             | Main construction  | 150            | 0.0360                            | 4.1667                          | 100.00       |
|             | Corrections - Air Gap: Level 1, Fasteners: None or plastic |                |                                   |                                 |              |
| Layer 3     | <b>Screed</b>  |                |                                   |                                 |              |
|             | Main construction  | 75             | 1.1500                            | 0.0652                          | 100.00       |
| Int surface |  |                |                                   | 0.1700                          |              |

Total resistance: **Upper limit** = 5.056 m<sup>2</sup> K/W      **Lower limit** = 4.866 m<sup>2</sup> K/W      **Average** = 4.961 m<sup>2</sup> K/W  
 Total correction = 0.0071 m<sup>2</sup> K/W      **U-value (unrounded)** = 0.16 W/m<sup>2</sup> K

|                         |               |                 |                               |
|-------------------------|---------------|-----------------|-------------------------------|
| Unheated space:         | None          |                 |                               |
| <b>Total thickness:</b> | <b>325 mm</b> | <b>U-value:</b> | <b>0.16 W/m<sup>2</sup> K</b> |
|                         |               | <b>Kappa:</b>   | <b>n/a</b>                    |



# THERMAL BRIDGING

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|                                    |  |               |                |             |           |
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|               | Junction detail                                      | Source Type            | Psi (W/mK) | Length (m) | Result | Reference |
|---------------|--|------------------------|------------|------------|--------|-----------|
| External wall | E1 Steel lintel with perforated steel base plate     | Independently assessed | 0.358      | 7.95       | 2.85   | CBA-312   |
| External wall | E3 Sill  | Independently assessed | 0.020      | 5.56       | 0.11   | CBA-314   |
| External wall | E4 Jamb  | Independently assessed | 0.016      | 19.80      | 0.32   | CBA-315   |
| External wall | E5 Ground floor (normal)                             | Independently assessed | 0.094      | 15.30      | 1.44   | CBA-301   |
| External wall | E6 Intermediate floor within a dwelling              | Independently assessed | 0.000      | 15.30      | 0.00   | CBA-303   |
| External wall | E10 Eaves (insulation at ceiling level)              | Independently assessed | 0.036      | 8.59       | 0.31   | Plasmor   |
| External wall | E12 Gable (insulation at ceiling level)              | Independently assessed | 0.077      | 6.71       | 0.52   | CBA-310   |
| External wall | E16 Corner (normal)                                  | Independently assessed | 0.051      | 10.14      | 0.52   | CBA-316   |
| External wall | E18 Party wall between dwellings                     | Independently assessed | 0.018      | 10.14      | 0.18   |           |
| Party wall    | P1 Party wall - Ground floor                         | Table K1 - Default     | 0.160      | 6.71       | 1.07   |           |
| Party wall    | P2 Party wall - Intermediate floor within a dwelling | Table K1 - Default     | 0.000      | 6.71       | 0.00   |           |
| Party wall    | P4 Party wall - Roof (insulation at ceiling level)   | Table K1 - Default     | 0.240      | 6.71       | 1.61   |           |

Total: **8.92** W/mK:  
 Y-Value: **0.066** W/m<sup>2</sup>K: