

# BUILDING REGULATION COMPLIANCE

## Calculation Type: New Build (As Designed)



Property Reference	19037 Plot 090	Issued on Date	21/04/2019
Assessment Reference	90	Prop Type Ref	Amersham h
Property	90, The Paddocks, Green Man Road, Navenby, Lincoln, LN5		

SAP Rating	84 B	DER	16.80	TER	16.81
Environmental	85 B	% DER<TER	0.04		
CO <sub>2</sub> Emissions (t/year)	1.90	DFEE	49.16	TFEE	56.17
General Requirements Compliance	Pass	% DFEE<TFEE	12.48		

Assessor Details	Mr. Robert Atherton, Low Carbon Box Limited, Tel: 07540977134, robert@lowcarbonbox.co.uk	Assessor ID	F291-0001
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### 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)	16.81	kgCO <sub>2</sub> /m <sup>2</sup>	
Dwelling Carbon Dioxide Emission Rate (DER)	16.80	kgCO <sub>2</sub> /m <sup>2</sup>	Pass
	-0.01 (-0.1%)	kgCO <sub>2</sub> /m <sup>2</sup>	

##### 1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	56.17	kWh/m <sup>2</sup> /yr	
Dwelling Fabric Energy Efficiency (DFEE)	49.16	kWh/m <sup>2</sup> /yr	
	-7.0 (-12.5%)	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
Floor	0.16 (max. 0.25)	0.16 (max. 0.70)	Pass
Roof	0.11 (max. 0.20)	0.25 (max. 0.35)	Pass
Openings	1.39 (max. 2.00)	1.50 (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	6.90 (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 615 VU 156/6-3 (H-GB)  Efficiency: 89.8% SEDBUK2009 Minimum: 88.0%	Pass
Secondary heating system	None	

### 5 Cylinder insulation

Hot water storage	Measured cylinder loss: 1.31 kWh/day Permitted by DBSCG 2.10	Pass
Primary pipework insulated	Yes	Pass

### 6 Controls

Space heating controls	Time and temperature zone control	Pass
Hot water controls	Cylinderstat	Pass
	Independent timer for DHW	Pass
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	
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 North	6.84 m <sup>2</sup> , No overhang	
Windows facing North East	1.48 m <sup>2</sup> , No overhang	
Windows facing South	8.66 m <sup>2</sup> , No overhang	
Windows facing North West	1.48 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

### Air permeability and pressure testing

#### 3 Air permeability

Air permeability at 50 pascals	6.90 (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

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	North
Property Tenure	Unknown
Transaction Type	New dwelling
Terrain Type	Suburban
1.0 Property Type	House, 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:	32.40 m	62.45 m <sup>2</sup>	2.40 m
1st Storey:	31.60 m	61.01 m <sup>2</sup>	2.67 m

7.0 Living Area	25.18	m <sup>2</sup>
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8.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	164.74	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	162.13	139.61

9.2 Internal Walls	Description	Construction	Kappa (kJ/m <sup>2</sup> K)	Area (m <sup>2</sup> )
	Internal Partition 1	Other	18.44	74.11
	Internal Partition 2	Plasterboard on timber frame	9.00	160.56

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	61.01	61.01
	Bay roofs	External Plane Roof	Plasterboard, insulated at ceiling level	0.25	9.00	1.44	1.44

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	61.01

# SUMMARY FOR INPUT DATA

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### 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	62.45

### 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	61.01

### 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	North							2.15	
Front Windows	Window	[1] External Wall	North	None	0.00					6.84	
Rear Windows	Window	[1] External Wall	South	None	0.00					8.66	
HG door	Half Glazed Door	[1] External Wall	South							1.91	
SE win	Window	[1] External Wall	North West	None	0.00					1.48	
SW win	Window	[1] External Wall	North East	None	0.00					1.48	

### 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	16.12	0.358	No	CBA-312
Independently assessed	E3 Sill	16.12	0.020	No	CBA-314
Independently assessed	E4 Jamb	44.70	0.016	No	CBA-315
Independently assessed	E5 Ground floor (normal)	32.40	0.094	No	CBA-301
Independently assessed	E6 Intermediate floor within a dwelling	31.60	0.000	No	CBA-303
Independently assessed	E10 Eaves (insulation at ceiling level)	22.94	0.036	No	Plasmor
Table K1 - Default	E24 Eaves (insulation at ceiling level - inverted)	3.96	0.240	No	
Independently assessed	E12 Gable (insulation at ceiling level)	13.42	0.077	No	CBA-310
Independently assessed	E16 Corner (normal)	29.88	0.051	No	CBA-316
Table K1 - Approved	E17 Corner (inverted – internal area greater than external area)	9.60	-0.090	No	ACD

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 ?

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

### 19.0 Mechanical Ventilation

#### Summer Overheating

# SUMMARY FOR INPUT DATA

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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	2
0.09	Through Wall Fan Other Wet Room	3

### 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

No

### 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

Standard

### 24.0 Main Heating 1

Description	Database System
Percentage of Heat	100 %
Database Ref. No.	18403
Fuel Type	Mains gas
Main Heating	BGB
SAP Code	102
In Winter	90.8
In Summer	80.1
Controls	CBI Time and temperature zone control
PCDF Controls	0

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Delayed Start Stat	No
Sap Code	2110
Flue Type	Balanced
Fan Assisted Flue	Yes
Is MHS Pumped	Pump in heated space
Heat Emitter	Radiators
Flow Temperature	Normal (> 45°C)
<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>	Hot Water Cylinder
Cylinder Stat	Yes
Cylinder In Heated Space	Yes
Independent Time Control	Yes
Insulation Type	Measured Loss
Cylinder Volume	180.00
Loss	1.31
Pipes insulation	Fully insulated primary pipework

L  
kWh/day

<b>31.0 Thermal Store</b>	None
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### 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	£43	B 86	
	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 93	

# ASSESSMENT NOTES

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ASSESSMENT NOTES - Last time updated on: 21.04.2019

# U-VALUE CALCULATOR REPORT



Property Reference	19037 Plot 090		Issued on Date	21/04/2019
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## Building Elements

### Floor 000001 - Floor - b&b

Floor Type: Suspended Floor

Area = 62.45 m<sup>2</sup>, Perimeter = 32.40 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	AAC (600 kg/m <sup>3</sup> )/ concrete				
	Main construction	100	0.1800	0.5556	86.30
	Main construction	100	1.3500	0.0741	13.70
Layer 2	Jabfloor 100				
	Main construction	150	0.0360	4.1667	100.00
	Corrections - Air Gap: Level 1, Fasteners: None or plastic				
Layer 3	Screed				
	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

Total thickness: 325 mm

U-value: 0.16 W/m<sup>2</sup> K

Kappa: n/a



# THERMAL BRIDGING

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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	16.12	5.77	CBA-312
External wall	E3 Sill	Independently assessed	0.020	16.12	0.32	CBA-314
External wall	E4 Jamb	Independently assessed	0.016	44.70	0.72	CBA-315
External wall	E5 Ground floor (normal)	Independently assessed	0.094	32.40	3.05	CBA-301
External wall	E6 Intermediate floor within a dwelling	Independently assessed	0.000	31.60	0.00	CBA-303
External wall	E10 Eaves (insulation at ceiling level)	Independently assessed	0.036	22.94	0.83	Plasmor
External wall	E24 Eaves (insulation at ceiling level - inverted)	Table K1 - Default	0.240	3.96	0.95	
External wall	E12 Gable (insulation at ceiling level)	Independently assessed	0.077	13.42	1.03	CBA-310
External wall	E16 Corner (normal)	Independently assessed	0.051	29.88	1.52	CBA-316
External wall	E17 Corner (inverted – internal area greater than external area)	Table K1 - Approved	-0.090	9.60	-0.86	ACD

Total: **13.32** W/mK:  
Y-Value: **0.046** W/m<sup>2</sup>K: