

BUILDING REGULATION COMPLIANCE

Calculation Type: New Build (As Designed)



Property Reference	19037 Plot 091	Issued on Date	21/04/2019
Assessment Reference	91	Prop Type Ref	Shrewsbury
Property	91, The Paddocks, Green Man Road, Navenby, Lincoln, LN5		

SAP Rating	83 B	DER	19.41	TER	19.44
Environmental	84 B	% DER<TER	0.17		
CO ₂ Emissions (t/year)	1.78	DFEE	56.74	TFEE	64.19
General Requirements Compliance	Pass	% DFEE<TFEE	11.61		

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)	19.44	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	19.41	kgCO ₂ /m ²	Pass
	-0.03 (-0.2%)	kgCO ₂ /m ²	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	64.19	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	56.74	kWh/m ² /yr	
	-7.5 (-11.7%)	kWh/m ² /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)	0.22 (max. 0.70)	Pass
Floor	0.17 (max. 0.25)	0.18 (max. 0.70)	Pass
Roof	0.11 (max. 0.20)	0.11 (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 ³ /(h.m ²) @ 50 Pa	
Maximum	10.0	m ³ /(h.m ²) @ 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	4.69 m ² , No overhang	
Windows facing East	0.72 m ² , No overhang	
Windows facing South	7.00 m ² , 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 ³ /(h.m ²) @ 50 Pa	
Maximum	10.0	m ³ /(h.m ²) @ 50 Pa	Pass

10 Key features

Roof U-value	0.11	W/m ² K
Door U-value	0.91	W/m ² K

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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	2018
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:	33.37 m	45.27 m ²	2.38 m
1st Storey:	33.37 m	54.49 m ²	2.68 m

7.0 Living Area	15.08	m ²
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8.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	186.84	kJ/m ² K

9.0 External Walls	Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Gross Area (m ²)	Nett Area (m ²)
	External Wall	Cavity Wall	Other	0.19	72.24	148.91	132.44
	Garage wall	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.26	60.00	19.94	19.94

9.2 Internal Walls	Description	Construction	Kappa (kJ/m ² K)	Area (m ²)
	Internal Partition 1	Other	18.44	59.69
	Internal Partition 2	Plasterboard on timber frame	9.00	124.87

10.0 External Roofs	Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Gross Area (m ²)	Nett Area (m ²)
	External Roof	External Plane Roof	Plasterboard, insulated at ceiling level	0.11	9.00	61.51	61.51

10.2 Internal Ceilings	Description	Construction	Kappa (kJ/m ² K)	Area (m ²)
	Internal Ceiling 1	Plasterboard ceiling, carpeted chipboard floor	9.00	38.25

SUMMARY FOR INPUT DATA

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11.0 Heat Loss Floors

Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Area (m ²)
Ground Floor	Ground Floor - Solid	Suspended concrete floor, carpeted	0.17	75.00	45.27
Exposed floor Garage	Exposed Floor - Timber	Timber exposed floor, insulation between joists	0.21	20.00	16.24

11.2 Internal Floors

Description	Construction	Kappa (kJ/m ² K)	Area (m ²)
Internal Floor 1	Plasterboard ceiling, carpeted chipboard floor	18.00	38.25

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	G-value	Frame Type	Frame Factor	U Value (W/m ² 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 ²)	Curtain Closed
Front Door	Solid Door	[1] External Wall	North							2.15	
Front Windows	Window	[1] External Wall	North	None	0.00					4.69	
Rear Windows	Window	[1] External Wall	South	None	0.00					7.00	
HG door	Half Glazed Door	[1] External Wall	South							1.91	
Side win	Window	[1] External Wall	East	None	0.00					0.72	

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	11.47	0.358	No	CBA-312
Independently assessed	E3 Sill	11.47	0.020	No	CBA-314
Independently assessed	E4 Jamb	30.45	0.016	No	CBA-315
Independently assessed	E5 Ground floor (normal)	33.37	0.094	No	CBA-301
Table K1 - Default	E20 Exposed floor (normal)	8.38	0.320	No	
Table K1 - Default	E21 Exposed floor (inverted)	8.38	0.320	No	
Independently assessed	E6 Intermediate floor within a dwelling	33.37	0.000	No	CBA-303
Independently assessed	E10 Eaves (insulation at ceiling level)	17.70	0.036	No	Plasmor
Table K1 - Default	E24 Eaves (insulation at ceiling level - inverted)	4.45	0.240	No	
Independently assessed	E12 Gable (insulation at ceiling level)	20.13	0.077	No	CBA-310
Independently assessed	E16 Corner (normal)	30.06	0.051	No	CBA-316
Table K1 - Approved	E17 Corner (inverted – internal area greater than external area)	9.82	-0.090	No	ACD

Y-value	<input type="text" value="0.059"/>	W/m ² K
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18.0 Pressure Testing

Designed AP ₅₀	<input type="text" value="6.90"/>	m ³ /(h.m ²) @ 50 Pa
Property Tested ?	<input type="text"/>	
As Built AP ₅₀	<input type="text"/>	m ³ /(h.m ²) @ 50 Pa

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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	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
Percentage of Heat	System
Database Ref. No.	100
Fuel Type	18403
Main Heating	Mains gas
SAP Code	BGB
In Winter	102
In Summer	90.8
	80.1

%

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Controls	CBI Time and temperature zone control
PCDF Controls	0
Delayed Start Stat	Yes
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)
25.0 Main Heating 2	None

Community Heating	None
28.0 Water Heating	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

29.0 Hot Water Cylinder	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

31.0 Thermal Store	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	£42	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 93	

ASSESSMENT NOTES

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ASSESSMENT NOTES - Last time updated on: 21.04.2019

U-VALUE CALCULATOR REPORT



Property Reference	19037 Plot 091		Issued on Date	21/04/2019
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Building Elements

Floor 000001 - Floor - b&b

Floor Type: Suspended Floor
 Area = 45.27 m², Perimeter = 33.37 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_w = 1.500 m
 Ventilation openings per perimeter length: e = 0.0015 %
 Mean wind speed: v = 5.000 m/s
 Resistance on solum: R_g = 0.000 m²K/W

Layer	Description	Thickness (mm)	Conductivity (W/m ² K)	Resistance (m ² K/W)	Fraction (%)
Ext surface				0.1700	
Layer 1	AAC (600 kg/m³)/ 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 m² K/W Lower limit = 4.866 m² K/W Average = 4.961 m² K/W
 Total correction = 0.0071 m² K/W U-value (unrounded) = 0.17 W/m² K

Unheated space:	None		
Total thickness:	325 mm	U-value:	0.17 W/m² K
		Kappa:	n/a

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Building Elements

Floor 000002

Floor Type: Exposed Floor

Layer	Description	Thickness (mm)	Conductivity (W/m ² K)	Resistance (m ² K/W)	Fraction (%)
Ext surface				0.0400	
Layer 1	Gyproc Wallboard (12.5mm)				
	Main construction	12.5	0.1900	0.0658	100.00
	Corrections - Air Gap: Level 1, Fasteners: None or plastic				
Layer 2	Gyproc Wallboard (12.5mm)				
	Main construction	12.5	0.1900	0.0658	100.00
	Corrections - Air Gap: Level 1, Fasteners: None or plastic				
Layer 3	Mineral wool batt				
	Main construction	200	0.0380	5.2632	87.50
	Main construction	200	0.1300	1.5385	12.50
	Corrections - Air Gap: Level 1, Fasteners: None or plastic				
Layer 4	Standard cavity				
	Main construction	25	0.1316	0.1900	87.50
	Main construction	25	0.1300	0.1923	12.50
	Corrections - Cavity Unventilated, Emissivity: Normal				
Layer 5	Chipboard				
	Main construction	22	0.1300	0.1692	100.00
Int surface				0.1700	

Total resistance: Upper limit = 4.938 m² K/W Lower limit = 4.741 m² K/W Average = 4.840 m² K/W
 Total correction = 0.0070 m² K/W U-value (unrounded) = 0.21 W/m² K

Unheated space:	None
Total thickness: 272 mm	U-value: 0.21 W/m² 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	11.47	4.11	CBA-312
External wall	E3 Sill	Independently assessed	0.020	11.47	0.23	CBA-314
External wall	E4 Jamb	Independently assessed	0.016	30.45	0.49	CBA-315
External wall	E5 Ground floor (normal)	Independently assessed	0.094	33.37	3.14	CBA-301
External wall	E20 Exposed floor (normal)	Table K1 - Default	0.320	8.38	2.68	
External wall	E21 Exposed floor (inverted)	Table K1 - Default	0.320	8.38	2.68	
External wall	E6 Intermediate floor within a dwelling	Independently assessed	0.000	33.37	0.00	CBA-303
External wall	E10 Eaves (insulation at ceiling level)	Independently assessed	0.036	17.70	0.64	Plasmor
External wall	E24 Eaves (insulation at ceiling level - inverted)	Table K1 - Default	0.240	4.45	1.07	
External wall	E12 Gable (insulation at ceiling level)	Independently assessed	0.077	20.13	1.55	CBA-310
External wall	E16 Corner (normal)	Independently assessed	0.051	30.06	1.53	CBA-316
External wall	E17 Corner (inverted – internal area greater than external area)	Table K1 - Approved	-0.090	9.82	-0.88	ACD

Total: **17.23** W/mK:
Y-Value: **0.059** W/m²K: