



Building Energy Performance Ltd

SAP Report Submission for Building Regulations Compliance

Client: Emtrek Ltd

Project: Plot 9, Troed Y Rhiw
Ystrad Mynach

Contact: Michael O'Donnell
Michael O'Donnell
michael@bep ltd.co.uk

Report Issue Date: 09/07/2019

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)



Property Reference	plot9troedyrhiw				Issued on Date	09/07/2019
Assessment Reference	001			Prop Type Ref	Detached House	
Property	Plot 9, Troed Y Rhiw, Ystrad Mynach					
SAP Rating	84 B	DER	16.45	TER	16.51	
Environmental	84 B	% DER<TER	0.38			
CO ₂ Emissions (t/year)	2.32	FEE	60.13	TFEE	N/A	
General Requirements Compliance	Pass	% DFEE<TFEE	N/A			
Assessor Details	Mr. Kevin O'Donnell, Building Energy Performance Limited, Tel: 029 2085 1111, kevin@bepltd.co.uk				Assessor ID	P634-0001
Client						

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Criteria 1 – The DER must be no greater than the TER

1a TER and DER

Fuel for main heating	Mains gas		
Fuel factor	1.00 (mains gas)		
Target Carbon Dioxide Emission Rate (TER)	16.51	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	16.45	kgCO ₂ /m ²	Pass
	-0.06 (-0.4%)	kgCO ₂ /m ²	

Criteria 2 – Limits on design flexibility

Building Fabric

2 Fabric U-values

Element	Average	Highest	
External wall	0.21 (max. 0.21)	0.21 (max. 0.70)	Pass
Floor	0.17 (max. 0.18)	0.17 (max. 0.70)	Pass
Roof	0.10 (max. 0.15)	0.10 (max. 0.35)	Pass
Openings	1.40 (max. 1.60)	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	10.00 (design value)	
Maximum	10.0	Pass

Fixed Building Services

4 Heating efficiency

Main heating system	Boiler system with radiators or underfloor - Mains gas Data from database Ideal LOGIC COMBI ESP1 35 Combi boiler Efficiency: 89.6% SEDBUK2009 Minimum: 88.0%	Pass
Secondary heating system	None	

5 Cylinder insulation

Hot water storage	No cylinder	
-------------------	-------------	--

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)



6 Controls

Space heating controls	Time and temperature zone control	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

Not applicable

Criterion 3 – Limiting overheating due to solar and other gains

9 Summertime temperature

Overheating risk (Severn (Wales))	Slight	Pass
Based on:		
Overshading	Average	
Windows facing North	4.35 m ² , No overhang	
Windows facing East	15.26 m ² , No overhang	
Windows facing South	4.35 m ² , No overhang	
Windows facing West	13.57 m ² , No overhang	
Air change rate	4.00 ach	
Blinds/curtains	None	

Criterion 4 – Building performance consistent with DER

Air-pressure testing

3 Air permeability

Air permeability at 50 pascals	10.00 (design value)	
Maximum	10.0	Pass

10 Key features

Roof U-value	0.10	W/m ² K
--------------	------	--------------------

This report has not been submitted through the Elmhurst Energy members' portal, therefore results are subject to change when the dwelling is completed.

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Designed)



Property Reference	plot9troedyrhiw	Issued on Date	09/07/2019
Assessment Reference	001	Prop Type Ref	Detached House
Property	Plot 9, Troed Y Rhiw, Ystrad Mynach		
SAP Rating	84 B	DER	16.45
Environmental	84 B	TER	16.51
CO ₂ Emissions (t/year)	2.32	% DER<TER	0.38
General Requirements Compliance	Pass	FEE	60.13
		TFEE	N/A
		% DFEE<TFEE	N/A
Assessor Details	Mr. Kevin O'Donnell, Building Energy Performance Limited, Tel: 029 2085 1111, kevin@bepltd.co.uk		Assessor ID
			P634-0001
Client			

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, Detached					
2.0 Number of Storeys	2					
3.0 Date Built	2019					
4.0 Sheltered Sides	2					
5.0 Sunlight/Shade	Average or unknown					
6.0 Measurements						
			Heat Loss Perimeter	Internal Floor Area	Average Storey Height	
		Ground Floor:	43.97 m	76.76 m ²	2.40 m	
		1st Storey:	37.21 m	78.80 m ²	2.60 m	
7.0 Living Area	19.80			m ²		
8.0 Thermal Mass Parameter	Precise calculation					
Thermal Mass	81.83			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 1	Timber Frame	Timber framed wall (one layer of plasterboard)		0.21	9.00	183.00
Garage	Timber Frame	Timber framed wall (one layer of plasterboard)		0.21	9.00	20.87
9.2 Internal Walls						
Description	Construction				Kappa (kJ/m ² K)	Area (m ²)
Internal Wall 1	Plasterboard on timber frame				9.00	246.48
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 1	External Plane Roof	Plasterboard, insulated at ceiling level		0.10	9.00	78.80
10.2 Internal Ceilings						
Description	Construction				Kappa (kJ/m ² K)	Area (m ²)
Internal Ceiling 1	Plasterboard ceiling, carpeted chipboard floor				9.00	62.91
11.0 Heat Loss Floors						

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Designed)



Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)
Heat Loss Floor 1	Ground Floor - Solid	Suspended concrete floor, carpeted	0.17	75.00	76.76
Garage	Exposed Floor - Timber	Timber exposed floor, insulation between joists	0.19	20.00	15.86

11.2 Internal Floors

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Floor 1	Plasterboard ceiling, carpeted chipboard floor	18.00	62.91

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Half Glazed Door	Manufacturer	Half Glazed Door	Double Low-E Soft 0.05			0.63		0.70	1.40
Window	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 (m²)	Curtain Closed
Front	Half Glazed Door	[1] External Wall 1	West							1.91	
Front	Window	[1] External Wall 1	West	None	0.00					13.57	
Rear	Half Glazed Door	[1] External Wall 1	East							1.91	
Rear	Window	[1] External Wall 1	East	None	0.00					15.26	
Side	Window	[1] External Wall 1	North	None	0.00					4.35	
Side	Window	[1] External Wall 1	South	None	0.00					4.35	

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
Table K1 - Approved	E1 Steel lintel with perforated steel base plate	29.73	0.500	No
Table K1 - Approved	E3 Sill	27.91	0.040	No
Table K1 - Approved	E4 Jamb	55.50	0.050	No
Table K1 - Approved	E5 Ground floor (normal)	55.50	0.160	No
Table K1 - Default	E21 Exposed floor (inverted)	8.03	0.320	No
Table K1 - Approved	E6 Intermediate floor within a dwelling	43.97	0.070	No
Table K1 - Approved	E10 Eaves (insulation at ceiling level)	43.97	0.060	No
Table K1 - Approved	E16 Corner (normal)	22.60	0.090	No
Table K1 - Approved	E17 Corner (inverted – internal area greater than external area)	15.00	-0.090	No

Y-value	0.098	W/m²K
---------	------------------------------------	-------

18.0 Pressure Testing

Designed AP ₅₀	10.00	m³/(h.m²) @ 50 Pa
---------------------------	------------------------------------	-------------------

Property Tested ?	
-------------------	----------------------

As Built AP ₅₀		m³/(h.m²) @ 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
-----------------	-----------------------------------

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Designed)



Mechanical Ventilation

Mechanical Ventilation System Present

No

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				5
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	14	
Total number of L.E.L. fittings	14	
Percentage of L.E.L. fittings	100.00	%

External

External lights fitted	No
------------------------	----

23.0 Electricity Tariff

Standard

24.0 Main Heating 1

Percentage of Heat	100	%
Database Ref. No.	17929	
Fuel Type	Mains gas	
Main Heating	BGW	
SAP Code	104	
In Winter	90.5	
In Summer	87.3	
Controls	CBI Time and temperature zone control	
PCDF Controls	0	
Delayed Start Stat	No	
Sap Code	2110	
Boiler Compensator	Ideal Boilers, Ideal, PRT3	
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	

25.0 Main Heating 2

None

Community Heating	None
-------------------	------

28.0 Water Heating

Water Heating	HWP From main heating 1
Flue Gas Heat Recovery System	Main Heating 1
Waste Water Heat Recovery	No
	No

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Designed)



Instantaneous System 1

Waste Water Heat Recovery

No

Instantaneous System 2

Waste Water Heat Recovery

No

Storage System

Solar Panel

No

Water use <= 125 litres/person/day

Yes

SAP Code

901

29.0 Hot Water Cylinder

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 photovoltaic panels, 2.5 kWp	£3,500 - £5,500	£320	B 91	

THERMAL BRIDGING

Calculation Type: New Build (As Designed)



Property Reference	plot9troedyrhiw	Issued on Date	09/07/2019
Assessment Reference	001	Prop Type Ref	Detached House
Property	Plot 9, Troed Y Rhiw, Ystrad Mynach		

SAP Rating	84 B	DER	16.45	TER	16.51
Environmental	84 B	% DER<TER	0.38		
CO ₂ Emissions (t/year)	2.32	FEE	60.13	TFEE	N/A
General Requirements Compliance	Pass	% DFEE<TFEE	N/A		

Assessor Details	Mr. Kevin O'Donnell, Building Energy Performance Limited, Tel: 029 2085 1111, kevin@bepltd.co.uk	Assessor ID	P634-0001
------------------	--	-------------	-----------

Client	
--------	--

	Junction detail	Source Type	Psi (W/mK)	Length (m)	Result	Reference
External wall	E1 Steel lintel with perforated steel base plate	Table K1 - Approved	0.500	29.73	14.87	
External wall	E3 Sill	Table K1 - Approved	0.040	27.91	1.12	
External wall	E4 Jamb	Table K1 - Approved	0.050	55.50	2.78	
External wall	E5 Ground floor (normal)	Table K1 - Approved	0.160	55.50	8.88	
External wall	E21 Exposed floor (inverted)	Table K1 - Default	0.320	8.03	2.57	
External wall	E6 Intermediate floor within a dwelling	Table K1 - Approved	0.070	43.97	3.08	
External wall	E10 Eaves (insulation at ceiling level)	Table K1 - Approved	0.060	43.97	2.64	
External wall	E16 Corner (normal)	Table K1 - Approved	0.090	22.60	2.03	
External wall	E17 Corner (inverted – internal area greater than external area)	Table K1 - Approved	-0.090	15.00	-1.35	

Total:	36.61	W/mK:
Y-Value:	0.098	W/m²K:

U-VALUE CALCULATOR REPORT



Property Reference	plot9troedyrhiw	Issued on Date	09/07/2019
Assessment Reference	001	Prop Type Ref	Detached House
Project	Plot 9, Troed Y Rhiw, Ystrad Mynach		
Calculation Type	New Build (As Designed)		

SAP Rating	84 B	DER	16.45	TER	16.51
Environmental	84 B	% DER<TER	0.38		
CO ₂ Emissions (t/year)	2.32	FEE	60.13	TFEE	N/A
General Requirements Compliance	Pass	% DFEE<TFEE	N/A		

Assessor Details	Mr. Kevin O'Donnell, Building Energy Performance Limited, Tel: 029 2085 1111, kevin@bepltd.co.uk	Assessor ID	P634-0001
Client			

Building Elements

Roof 000001

Roof Type: Pitched Roof, insulated flat ceiling

Layer	Description	Thickness (mm)	Conductivity (W/m ² K)	Resistance (m ² K/W)	Fraction (%)
Ext surface				0.0346	
Layer 1	Tiling, concrete				
	Main construction	20	1.5000	0.0115	100.00
Layer 2	airspace/timber battens				
	Main construction	25	0.0000	0.0000	89.63
	Main construction	25	0.1563	0.1386	10.37
	Corrections - Cavity Ventilated, Emissivity: Normal				
Layer 3	Sarking felt				
	Main construction	1	0.2300	0.0038	100.00
Layer 4	Loft Space				
	Main construction	0	0.2000	0.2000	100.00
Layer 5	Glassfibre				
	Main construction	150	0.0400	3.7500	100.00
	Corrections - Air Gap: Level 1, Fasteners: None or plastic				
Layer 6	Glassfibre				
	Main construction	150	0.0400	3.7500	100.00
	Corrections - Air Gap: Level 1, Fasteners: None or plastic				
Layer 7	Glassfibre				
	Main construction	100	0.0400	2.5000	93.67
	Main construction	100	0.1300	0.7692	6.33
	Corrections - Air Gap: Level 1, Fasteners: None or plastic				
Layer 8	Gyproc Wallboard (12.5mm)				
	Main construction	12.5	0.1900	0.0658	100.00
	Corrections - Air Gap: Level 1, Fasteners: None or plastic				
Layer 9	Plaster, standard				
	Main construction	3	0.4000	0.0075	100.00
Int surface				0.1000	

Total resistance:	Upper limit = 10.308 m ² K/W	Lower limit = 11.447 m ² K/W	Average = 10.877 m ² K/W
	Total correction = 0.0058 m ² K/W	U-value (unrounded) = 0.1 W/m ² K	

U-VALUE CALCULATOR REPORT



Unheated space: None

Total
thickness: 462 mm

U-value: 0.10 W/m² K

Kappa: n/a

U-VALUE CALCULATOR REPORT



Property Reference	plot9troedyrhiw	Issued on Date	09/07/2019
Assessment Reference	001	Prop Type Ref	Detached House
Project	Plot 9, Troed Y Rhiw, Ystrad Mynach		
Calculation Type	New Build (As Designed)		

SAP Rating	84 B	DER	16.45	TER	16.51
Environmental	84 B	% DER<TER	0.38		
CO ₂ Emissions (t/year)	2.32	FEE	60.13	TFEE	N/A
General Requirements Compliance	Pass	% DFEE<TFEE	N/A		

Assessor Details	Mr. Kevin O'Donnell, Building Energy Performance Limited, Tel: 029 2085 1111, kevin@bepltd.co.uk	Assessor ID	P634-0001
------------------	--	-------------	-----------

Client	
--------	--

Building Elements

Floor 000002

Floor Type: Suspended Floor

Area = 39.96 m², Perimeter = 18.20 m, Wall thickness = 328.00 mm, Soil: Unknown

Depth of underfloor space below ground: 0.200 m Floor wind shielding: Average (suburban)

Floor height above ground: h = 0.200 m

U-value of walls above ground: U_w = 0.210 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	Concrete, dense				
	Main construction	100	2.0000	0.0500	100.00
Layer 2	Kingspan K103				
	Main construction	75	0.0180	4.1667	100.00
	Corrections - Air Gap: Level 1, Fasteners: None or plastic				
Layer 3	Screed				
	Main construction	65	1.1500	0.0565	100.00
Int surface				0.1700	

Total resistance: Upper limit = 4.613 m² K/W Lower limit = 4.613 m² K/W Average = 4.613 m² K/W

Total correction = 0.0082 m² K/W

U-value (unrounded) = 0.17 W/m² K

Unheated space:	None				
Total thickness:	240 mm	U-value:	0.17 W/m ² K	Kappa:	n/a

U-VALUE CALCULATOR REPORT



Property Reference	plot9troedyrhiw	Issued on Date	09/07/2019
Assessment Reference	001	Prop Type Ref	Detached House
Project	Plot 9, Troed Y Rhiw, Ystrad Mynach		
Calculation Type	New Build (As Designed)		

SAP Rating	84 B	DER	16.45	TER	16.51
Environmental	84 B	% DER<TER	0.38		
CO ₂ Emissions (t/year)	2.32	FEE	60.13	TFEE	N/A
General Requirements Compliance	Pass	% DFEE<TFEE	N/A		

Assessor Details	Mr. Kevin O'Donnell, Building Energy Performance Limited, Tel: 029 2085 1111, kevin@bepltd.co.uk	Assessor ID	P634-0001
------------------	--	-------------	-----------

Client	
--------	--

Building Elements

Floor 000003

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	Plaster, standard				
	Main construction	3	0.4000	0.0075	100.00
Layer 2	Plasterboard, standard				
	Main construction	12.5	0.2100	0.0595	100.00
Layer 3	Plasterboard, standard				
	Main construction	12.5	0.2100	0.0595	100.00
Layer 4	Glassfibre				
	Main construction	250	0.0400	6.2500	89.00
	Main construction	250	0.1300	1.9231	11.00
	Corrections - Air Gap: Level 1, Fasteners: None or plastic				
Layer 5	Orientated Strand Board				
	Main construction	18	0.1300	0.1385	100.00
Int surface				0.1700	

Total resistance:	Upper limit = 5.611 m ² K/W	Lower limit = 5.485 m ² K/W	Average = 5.548 m ² K/W
	Total correction = 0.0082 m ² K/W	U-value (unrounded) = 0.19 W/m ² K	

Unheated space: None			
Total thickness:	296 mm	U-value: 0.19 W/m² K	Kappa: n/a