



Designed SAP Calculation

Carbon Emissions Calculation - Part L1A

Mr & Mrs S Bartlett, High Ridge, Upper Warren Avenue,
Caversham

25th October 2021

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They are members of CIBSE Low Carbon Consultants.

Melin Consultants fully check all work prior to completion and a robust audit trail exists to demonstrate accountability.

All information within this document is based on evidence provided in the form of drawings and specifications.

CPD (Continual Professional Development) records are kept and all technical staff are required to complete a minimum 20 hours per year in training activities.

Low Carbon Consultants have the expertise and necessary qualifications to offer advice in a professional capacity on matters relating to Part L of the Building Regulations and sustainability within the construction sector.

This document contains the following information:

1. U Values used
2. DER and TER, DFEE and TFEE comparison
3. Building Regulations Reports
4. U' value calculations
5. Overview

Project Ref: 709258

Report Date: 25/10/2021

Report author: David Anslow

Function: Technical Consultant

Authorised by: Darren Baker

Function: Senior Consultant

1. U Values

The table below outlines the Part L1A threshold or 'back-stop' U values alongside the proposed dwelling U values that have been used to run the calculation.

Building Element	Part L1A Threshold U Value	Proposed U Values*
Wall	0.30	0.18
Floor	0.25	0.11
Roof	0.20	0.13
Window	2.00	1.40

*Please note that these U Values are based on the element's component parts listed in section 3 of this report. If the element construction changes the U value may also change.

2. DER-TER and DFEE-TFEE Comparison

The table below highlights the proposed dwelling emission rate and the target dwelling emission rate.

	Result
DER (Dwelling Emission Rate)	16.59
TER (Target Emission Rate)	21.42
Overall Result	Pass with 24.2% reduction

	Result
DFEE (Dwelling Fabric Emission Rate)	62.50
TFEE (Target Fabric Emission Rate)	63.50
Overall Result	Pass

As outlined in the tables above Criterion 1 of Part L1A has been achieved.

Appendix 1: SAP Calculation Outputs

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.50
 Printed on 25 October 2021 at 18:39:30

Project Information:

Assessed By: David Anslow (STRO034414) **Building Type:** Detached House

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 445.41m²

Site Reference : 709258

Plot Reference: 709258

Address : High Ridge, Upper Warren Avenue, Caversham, READING, RG4 7ED

Client Details:

Name: Shaun Tanner Architects

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity

Fuel factor: 1.55 (electricity)

Target Carbon Dioxide Emission Rate (TER) 21.42 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 16.24 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 63.5 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 62.5 kWh/m²

OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.18 (max. 0.30)	0.21 (max. 0.70)	OK
Floor	0.11 (max. 0.25)	0.11 (max. 0.70)	OK
Roof	0.13 (max. 0.20)	0.13 (max. 0.35)	OK
Openings	1.41 (max. 2.00)	1.60 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals 5.00 (design value)
 Maximum 10.0

OK

4 Heating efficiency

Main Heating system: Heat pumps with radiators or underfloor heating - electric
 Air source heat pump with flow temperature <= 35°C

Secondary heating system: Room heaters - wood
 Data from manufacturer -
 Closed room heater
 Efficiency 65.0 %
 Minimum 65.0 %

OK

5 Cylinder insulation

Hot water Storage: Measured cylinder loss: 1.79 kWh/day
 Permitted by DBSCG: 2.30 kWh/day

OK

Regulations Compliance Report

Primary pipework insulated: Yes OK

Solar water heating

Dedicated solar storage volume: 210 litres

Minimum: 90 litres OK

6 Controls

Space heating controls Time and temperature zone control by device in database OK

Hot water controls: Cylinderstat OK

Independent timer for DHW OK

7 Low energy lights

Percentage of fixed lights with low-energy fittings 100.0% OK

Minimum 75.0% OK

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (South England): Not significant OK

Based on:

Overshading: Very Little

Windows facing: North 57.67m²

Windows facing: East 15.75m²

Windows facing: South 40.41m²

Windows facing: West 1.7m²

Roof windows facing: North 2.76m²

Roof windows facing: East 0.92m²

Roof windows facing: North 2.65m²

Ventilation rate: 8.00

Blinds/curtains: None

10 Key features

Floors U-value 0.11 W/m²K

Photovoltaic array

Solar water heating

Secondary heating (wood logs)

Secondary heating fuel wood logs

Project Information

Client : Mel Best, Melin consultants

Date : 25 October 2021

Address : Melin Consultants, Llanelli, SA14 8LQ

Project : 709258, 709258

Construction Type : Pitched Roofs > Ventilated - Insulation Between & Under Rafters > Conventional Insulation Options - Mechanical Fix

	Thickness (mm)	Thermal conductivity (W/mK)	Thermal resistance (m²K/W)	Bridge details air gaps
Outside surface resistance	0.0	0.0000	0.1000	–
Tiling including batten space	–	–	–	–
Sarking Felt	–	–	–	–
Well Ventilated Cavity - minimum 50mm	–	–	–	–
Insulation between rafters <i>Celotex GA4000 100.0mm</i>	100.0	0.0220	4.5455	0.8820
Timber rafter spacing	100.0	0.1300	0.7692	0.1180
Insulation below rafters, taped joints as VCL <i>Celotex GA4000 75.0mm</i>	75.0	0.0220	3.4091	–
25 x 47mm service void fixing batten	25.0	0.1300	0.1923	0.1180
25mm service void air space	25.0	–	0.4538	0.8820
12.5mm Gyproc Wallboard	12.5	0.1900	0.0658	–
Inside surface resistance	0.0	0.0000	0.1000	–

U-value = 0.13 W/m².K (combined method : 0.135 W/m².K, upper limit : 7.917m²K/W, lower limit : 6.944m²K/W)

Correction Factors

Mechanical Fasteners : N/A

Air Gap Corrections : Delta Ug = 0.0027 W/m².K

(Based on the combined method for determining U-values of structures containing repeating thermal bridges)

Project Information

Client : Mel Best, Melin consultants

Date : 25 October 2021

Address : Melin Consultants, Llanelli, SA14 8LQ

Project : 709258, 709258

Construction Type : Ground Floors > Solid - Insulation over slab

	Thickness (mm)	Thermal conductivity (W/mK)	Thermal resistance (m²K/W)	Bridge details air gaps
Inside surface resistance	0.0	0.0000	0.1700	–
P/A Ratio (Exposed internal perimeter divided by area) <i>P/A Ratio : 0.34</i>	–	–	–	–
Floor Screed	65.0	1.1500	0.0565	–
Polythene, 500 gauge separating layer	–	–	–	–
Insulation <i>Celotex XR4000 150.0mm</i>	150.0	0.0220	6.8182	–
DPM - Polythene 1200 gauge	–	–	–	–
Concrete oversite	–	–	–	–
Sand Blinded Hardcore	–	–	–	–
Ground	–	–	0.0400	–

U-value = 0.11 W/m².K (combined method : 0.110 W/m².K, upper limit : 7.085m²K/W, lower limit : 7.085m²K/W)

Correction Factors

Mechanical Fasteners : N/A

Air Gap Corrections : N/A

(Based on the combined method for determining U-values of structures containing repeating thermal bridges)

Project Information

Client : Mel Best, Melin consultants
Date : 25 October 2021

Address : Melin Consultants, Llanelli, SA14 8LQ

Project : 709258, 709258

Construction Type : Ceilings > Insulation between & above joists for domestic storage

	Thickness (mm)	Thermal conductivity (W/mK)	Thermal resistance (m²K/W)	Bridge details air gaps
Outside surface resistance	0.0	0.0000	0.0400	–
Tiling including batten space	–	–	0.1200	–
Loft space	–	–	0.2000	–
Decking Plywood	12.0	0.1700	0.0706	–
Insulation above joists <i>Celotex GA4000 75.0mm</i>	75.0	0.0220	3.4091	–
Decking Plywood	12.0	0.1700	0.0706	–
Insulation between joists <i>Celotex GA4000 100.0mm</i>	100.0	0.0220	4.5455	0.8820
Timber joist depth (mm)	100.0	0.1300	0.7692	0.1180
Cavity	100.0	0.0000	0.4542	0.8820
Timber joist depth (mm)	100.0	0.1300	0.7692	0.1180
VCL & Air leakage barrier	–	–	–	–
12.5mm Gyproc Wallboard	12.5	0.1900	0.0658	–
Inside surface resistance	0.0	0.0000	0.1000	–

U-value = 0.13 W/m².K (combined method : 0.126 W/m².K, upper limit : 8.460m²K/W, lower limit : 7.432m²K/W)

Correction Factors

Mechanical Fasteners : N/A

Air Gap Corrections : Delta Ug = 0.0025 W/m².K

(Based on the combined method for determining U-values of structures containing repeating thermal bridges)

Project Information

Client : Mel Best, Melin consultants

Date : 25 October 2021

Address : Melin Consultants, Llanelli, SA14 8LQ

Project : 709258, 709258

Construction Type : Walls > Timber Frame Wall > Insulation between and inside the studs > Plasterboard Thermal Laminates - Mechanical Fix

	Thickness (mm)	Thermal conductivity (W/mK)	Thermal resistance (m²K/W)	Bridge details air gaps
Outside surface resistance	0.0	0.0000	0.1300	–
External Finish	–	–	–	–
Attic Walls				
Battens	–	–	–	–
Drained and vented cavity between battens	–	–	–	–
Breather membrane	–	–	–	–
Cementitious board	12.5	0.2300	0.0543	–
Insulation between studs	100.0	0.0220	4.5455	0.8500
Celotex GA4000 100.0mm				
Timber stud depth (mm)	100.0	0.1300	0.7692	0.1500
Cavity	40.0	0.0000	0.6654	0.8500
Timber stud depth (mm)	40.0	0.1300	0.3077	0.1500
Insulation inside studs	37.5	0.0220	1.2022	–
Celotex PL4025 (25 + 12.5mm) (37.5mm)				
AVCL (taped plasterboard)	–	–	–	–
Taping & jointing	3.0	0.1800	0.0167	–
Inside surface resistance	0.0	0.0000	0.1300	–

U-value = 0.20 W/m².K (combined method : 0.197 W/m².K, upper limit : 5.449m²K/W, lower limit : 4.718m²K/W)

Correction Factors

Mechanical Fasteners : N/A

Air Gap Corrections : N/A

(Based on the combined method for determining U-values of structures containing repeating thermal bridges)

Celotex products should not be used in the external walls of buildings over 18 metres in height (England and Wales) or 11 metres in height (Scotland). Recent changes to Building Regulations mean that only non-combustible insulation or insulation of limited combustibility can be used in buildings of that height.

Project Information

Client : Mel Best, Melin consultants

Date : 25 October 2021

Address : Melin Consultants, Llanelli, SA14 8LQ

Project : 709258, 709258

Construction Type : Walls > Cavity Wall – Partial Fill Insulation Only

	Thickness (mm)	Thermal conductivity (W/mK)	Thermal resistance (m²K/W)	Bridge details air gaps
Outside surface resistance	0.0	0.0000	0.0400	–
External Finish <i>Render</i>	20.0	0.8000	0.0250	–
Outer Leaf <i>Blockwork Dense (lambda = 1.13)</i>	100.0	1.1300	0.0885	–
Cavity 50mm	50.0	–	0.6651	–
Insulation <i>Celotex CW4000 100.0mm</i>	100.0	0.0220	4.5455	–
Inner Leaf <i>Blockwork Dense (lambda = 1.13)</i>	100.0	1.1300	0.0885	–
Internal Finish <i>Wet Plaster</i>	13.0	0.2200	0.0591	–
Inside surface resistance	0.0	0.0000	0.1300	–

U-value = 0.18 W/m².K (combined method : 0.177 W/m².K, upper limit : 5.642m²K/W, lower limit : 5.642m²K/W, dUf : 0.0019)

Correction Factors

Mechanical Fasteners : (nf = fasteners per m², Af = fasteners cross-sectional area)

1. Delta Uf for Celotex CW4000 100.0mm Insulation : 0.0019

Alpha : 0.8 per m, lambda f : 17.0000 W/mK, nf : 0.00002500 per m², Af : 8.6000mm²

Air Gap Corrections : N/A

(Based on the combined method for determining U-values of structures containing repeating thermal bridges)

Celotex products should not be used in the external walls of buildings over 18 metres in height (England and Wales) or 11 metres in height (Scotland). Recent changes to Building Regulations mean that only non-combustible insulation or insulation of limited combustibility can be used in buildings of that height.

Overview 709258

Development at High Ridge, Upper Warren
Avenue, Caversham



Building Element	Construction	U Value
Main Wall	See attached u' value calculation	0.18
Secondary Wall	See attached u' value calculation	0.21
Plane Roof	See attached u' value calculation	0.13
Sloping Roof	See attached u' value calculation	0.13
Window	Triple Glazed Metal Frames	1.40
Door	Triple Glazed Metal Frames	1.40
System		Efficiency/Details
Primary heating	Air Source Heat Pump	170%
Additional heating	Woodburner in living space	65%
Water Heating	210lt cylinder from main heating system	
Heating controls	Time and temperature zone control	
Ventilation	Natural throughout	
Renewables	2kWp photovoltaic panels 4m2 Solar Thermal panels	
Others		
	A design air permeability of $5\text{m}^3/(\text{h.m}^2)$ at 50Pa has been allowed for.	
Thermal Bridging	Accredited Construction Details (ACD's) have been adopted.	
Lighting	100% L.E.L fittings have been allowed for.	

Upon completion, to enable Melin to issue the as built SAP and EPC please provide/confirm the following (please allow 5 working days from Melin receiving the information below to complete the as built SAP and EPC):

I confirm that the building has been built in accordance with the specification provided.

Confirm exact make and model of boiler.

Confirm full postal address.

Provide manufacture literature of windows, external doors and roof lights confirming unit u-values and g-values.

To enable the as-built SAP reports and EPCs to be issued please ensure that this form is signed and dated below

Client/contractor Signature:

Date: