

Reading Borough Council
Council Office, Bridge Street
Bridge Street Plaza West, Bridge Street
Reading
RG1 2LU



25th May 2021

Dear Sirs,

Re: 190040 - Gardeners Arms Ph 48 Surley Row Emmer Green Reading RG4 8NA Condition 4

Please find attached our thermal details report. Section 3 covers building regulation compliance. All dwellings have been assessed using SAP 2012 which is used to demonstrate compliance with part L1a 2013.

As plots 2 as well as plots 5 & 6 are attached they have been assessed using block compliance. The other plots have been assessed individually.

Below is a table of the results showing the percentage improvement of part L1a 2013

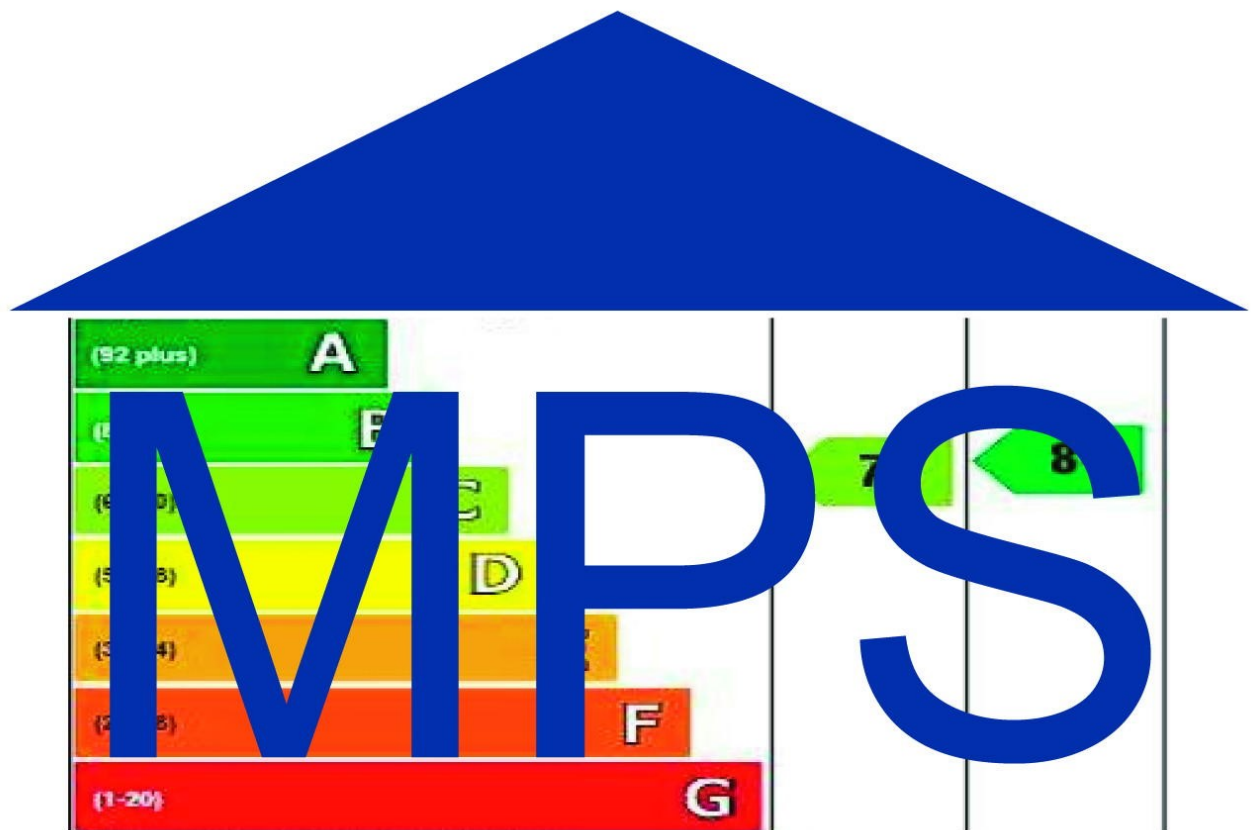
Plot no/no.s	TER (target emission rate)	DER (dwelling emission rate)	Percentage improvement
1 & 2	18.18	13.52	25.63
5 & 6	17.54	13.33	24.00
3	17.06	13.09	23.25
4	16.23	12.66	21.99
7	16.07	11.94	25.72

We hope the above meets with your approval, but should you require any further details, please don't hesitate to contact us.

Yours Sincerely

Keith Grace





Merlin Property Services

Thermal Efficiency Details
For
Gardeners Arms
Reading
RG4 8NA

Contents

1. Important notes
2. Construction Summary
3. Building Regulation compliance
4. Details for Thermal Bridging
5. U value calculations

IMPORTANT: Details of the block strength used should always be checked with a structural engineer

AMENDMENTS: None

Documents required on completion

It is imperative that the following documents are provided upon completion. They will be required before an EPC can be issued.

- The final as built construction drawings
- We often specify BFRC approved windows. This is the only standard for fenestration the SAP recognises and greatly improve the DER and the DFEE figure. If we've done this for your project and you don't want to fit them, please let us know and we'll alter the specification to make it up elsewhere.
- The air pressure test certificate with an air permeability rate lower than the specified figure is required. We provide air pressure tests as a service and can provide this for you.
- Any renewable's specified must have certification, for example an MCS certificate for the photovoltaic panels details how much KWP has been installed.

It is important to let us know before you make any changes to this specification as it will affect your EPC rating and your building control compliance figures.

Construction Summary

Our Reference: RG4 8NA –Gardeners Arms

Date: Thursday, 20 May 2021



Drawings used		6816 04E & 23A & 24A & 25 & 26 & 27 & 28 & 29 & 32
Element	Description	U Value (W/m ² K)
Brick External Walls	Brick outer leaf + 100mm cavity with Knauf Dritherm 32 insulation & Celcon Standard Block inner leaf	0.25
Redner external walls	Render, Celcon Standard Block outer leaf+ 100mm cavity with Knauf Dritherm 32 insulation & Celcon Standard Block inner leaf	0.22
Ground Floor	Beam and Block, 150mm Celotex XR4150, 75mm Screed	0.11
Plane Roof	200mm Mineral wool between joists & 100mm on top	0.14
Sloping Roof	225mm rafters with Knauf rafter roll 32 between, breather membrane, counter battens, tile battens	0.18
Windows/ Doors/Roof Glazing	Windows—max. U value 1.4 min. G value 0.48 , Solid Doors—max. U value 3.0, Roof windows—max. U value 1.4 ALL FROM A BFRC APPROVED SUPPLIER	
Heating & Ventilation		
Main System	Vaillant Eco Tec pro 24 combi boiler or equivalent. Radiators	
Secondary	N/A	
Water Storage	N/A	
Controls	Time and temperature zone control	
Ventilation	Natural	
Other		
Constr. Details	As per attached list	
Lighting	100% low energy lighting	
Air tightness	Plot 1-2 & 5-6 Design Air Tightness 5 m3/m2 @ 50 pascals Plot 3,4 & 7 Design Air Tightness 6.55 m3/m2 @ 50 pascals	
Renewables	Plot 3-4 2.5kwp on rear elevation Plot 1, 2, 5, 6 & 7 2kwp on rear elevation	



BLOCK COMPLIANCE

Calculation Type: New Build (As Designed)



Block Reference	RG4 8NA - BLOCK A	Issued on Date	
Block Name	Plot 1 & 2		
Assessor Details	Mr. Samuel Green, Samuel Green, Tel: 01753889551, sam@merlinpropertyservices.com	Assessor ID	P744-0001
Client			

Block Compliance Report - DER

Block Reference: RG4 8NA - BLOCK A		Block Name: Plot 1 & 2			
Property-Assessment Reference	Multiplier	Floor Area (m ²)	DER (kgCO ₂ /m ²)	TER (kgCO ₂ /m ²)	% DER/TER
RG4 8NA - Plot 1-001	1	84	13.65	18.19	24.96 %
RG4 8NA - Plot 2-001	1	80	13.39	18.17	26.31 %
Totals:	2	164	27.04	36.36	
Average DER = 13.52 kgCO ₂ /m ²		% DER/TER	PASS		
Average TER = 18.18 kgCO ₂ /m ²		25.63 %			

Block Compliance Report - DFEE

Block Reference: RG4 8NA - BLOCK A		Block Name: Plot 1 & 2			
Property-Assessment Reference	Multiplier	Floor Area (m ²)	DFEE (kWh/m ² /yr)	TFEE (kWh/m ² /yr)	% DFEE/TFEE
RG4 8NA - Plot 1-001	1	84	50.44	50.54	0.20 %
RG4 8NA - Plot 2-001	1	80	49.50	49.50	0.00 %
Totals:	2	164	99.93	100.03	
Average DFEE = 49.98 kWh/m ² /yr		% DFEE/TFEE	PASS		
Average TFEE = 50.03 kWh/m ² /yr		0.10 %			

BLOCK COMPLIANCE

Calculation Type: New Build (As Designed)



Block Reference	RG4 8NA - BLOCK B	Issued on Date	
Block Name	Plot 5 & 6		
Assessor Details	Mr. Samuel Green, Samuel Green, Tel: 01753889551, sam@merlinpropertyservices.com	Assessor ID	P744-0001
Client			

Block Compliance Report - DER

Block Reference: RG4 8NA - BLOCK B		Block Name: Plot 5 & 6			
Property-Assessment Reference	Multiplier	Floor Area (m ²)	DER (kgCO ₂ /m ²)	TER (kgCO ₂ /m ²)	% DER/TER
RG4 8NA - Plot 5-001	1	90.72	13.41	17.66	24.06 %
RG4 8NA - Plot 6-001	1	90.72	13.24	17.42	23.98 %
Totals:	2	181.44	26.65	35.07	
Average DER = 13.33 kgCO ₂ /m ²		% DER/TER	PASS		
Average TER = 17.54 kgCO ₂ /m ²		24.00 %			

Block Compliance Report - DFEE

Block Reference: RG4 8NA - BLOCK B		Block Name: Plot 5 & 6			
Property-Assessment Reference	Multiplier	Floor Area (m ²)	DFEE (kWh/m ² /yr)	TFEE (kWh/m ² /yr)	% DFEE/TFEE
RG4 8NA - Plot 5-001	1	90.72	49.55	50.26	1.41 %
RG4 8NA - Plot 6-001	1	90.72	48.52	48.70	0.37 %
Totals:	2	181.44	98.08	98.97	
Average DFEE = 49.04 kWh/m ² /yr		% DFEE/TFEE	PASS		
Average TFEE = 49.48 kWh/m ² /yr		0.89 %			

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)



Property Reference	RG4 8NA - Plot 3	Issued on Date	19/05/2021
Assessment Reference	001	Prop Type Ref	Gardeners Arms
Property			

SAP Rating	89 B	DER	13.09	TER	17.06
Environmental	89 B	% DER<TER	23.25		
CO ₂ Emissions (t/year)	1.22	DFEE	54.31	TFEE	57.02
General Requirements Compliance	Pass	% DFEE<TFEE	4.75		

Assessor Details	Mr. Samuel Green, Samuel Green, Tel: 01753889551, sam@merlinpropertyservices.com	Assessor ID	P744-0001
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)	17.06	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	13.09	kgCO ₂ /m ²	Pass
	-3.97 (-23.3%)	kgCO ₂ /m ²	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	57.02	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	54.31	kWh/m ² /yr	
	-2.7 (-4.7%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.24 (max. 0.30)	0.25 (max. 0.70)	Pass
Party wall	0.00 (max. 0.20)	-	Pass
Floor	0.11 (max. 0.25)	0.11 (max. 0.70)	Pass
Roof	0.14 (max. 0.20)	0.14 (max. 0.35)	Pass
Openings	1.55 (max. 2.00)	3.00 (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	6.50 (design value)	
Maximum	10.0	Pass

Limiting System Efficiencies

4 Heating efficiency

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)



Main heating system

Boiler system with radiators or underfloor - Mains gas
Data from database
Vaillant ecoTEC pro 24 VUW 246/5-3 (H-GB) R6
Combi boiler
Efficiency: 89.5% SEDBUK2009
Minimum: 88.0%

Pass

Secondary heating system

None

5 Cylinder insulation

Hot water storage

No cylinder

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 the effects of heat gains in summer

9 Summertime temperature

Overheating risk (Thames Valley)

Not significant

Pass

Based on:

Overshading

Average

Windows facing North

11.32 m², No overhang

Windows facing East

0.50 m², No overhang

Windows facing South

6.64 m², No overhang

Windows facing West

1.80 m², No overhang

Air change rate

8.00 ach

Blinds/curtains

None

Criterion 4 – Building performance consistent with DER and DFEE rate

Party Walls

Type

U-value

W/m²K

Pass

Air permeability and pressure testing

3 Air permeability

Air permeability at 50 pascals

6.50 (design value)

Maximum

10.0

Pass

10 Key features

Party wall U-value

0.00

W/m²K

Floor U-value

0.11

W/m²K

Photovoltaic array

2.50

kW

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

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)



Property Reference	RG4 8NA - Plot 4	Issued on Date	19/05/2021
Assessment Reference	001	Prop Type Ref	Gardeners Arms
Property			

SAP Rating	89 B	DER	12.66	TER	16.23
Environmental	89 B	% DER<TER	21.99		
CO ₂ Emissions (t/year)	1.33	DFEE	52.94	TFEE	55.85
General Requirements Compliance	Pass	% DFEE<TFEE	5.21		

Assessor Details	Mr. Samuel Green, Samuel Green, Tel: 01753889551, sam@merlinpropertyservices.com	Assessor ID	P744-0001
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)	16.23	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	12.66	kgCO ₂ /m ²	Pass
	-3.57 (-22.0%)	kgCO ₂ /m ²	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	55.85	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	52.94	kWh/m ² /yr	
	-3.0 (-5.4%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.25 (max. 0.30)	0.25 (max. 0.70)	Pass
Party wall	0.00 (max. 0.20)	-	Pass
Floor	0.11 (max. 0.25)	0.11 (max. 0.70)	Pass
Roof	0.14 (max. 0.20)	0.14 (max. 0.35)	Pass
Openings	1.50 (max. 2.00)	2.35 (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	6.50 (design value)	
Maximum	10.0	Pass

Limiting System Efficiencies

4 Heating efficiency

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)



Main heating system

Boiler system with radiators or underfloor - Mains gas
Data from database
Vaillant ecoTEC pro 24 VUW 246/5-3 (H-GB) R6
Combi boiler
Efficiency: 89.5% SEDBUK2009
Minimum: 88.0%

Pass

Secondary heating system

None

5 Cylinder insulation

Hot water storage

No cylinder

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 the effects of heat gains in summer

9 Summertime temperature

Overheating risk (Thames Valley)

Not significant

Pass

Based on:

Overshading

Average

Windows facing North

1.60 m², No overhang

Windows facing East

10.38 m², No overhang

Windows facing South

4.41 m², No overhang

Windows facing West

7.44 m², No overhang

Air change rate

8.00 ach

Blinds/curtains

None

Criterion 4 – Building performance consistent with DER and DFEE rate

Party Walls

Type

U-value

W/m²K

Pass

Air permeability and pressure testing

3 Air permeability

Air permeability at 50 pascals

6.50 (design value)

Maximum

10.0

Pass

10 Key features

Party wall U-value

0.00

W/m²K

Floor U-value

0.11

W/m²K

Photovoltaic array

2.50

kW

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BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)



Property Reference	RG4 8NA - Plot 7	Issued on Date	19/05/2021
Assessment Reference	001	Prop Type Ref	Gardeners Arms
Property			

SAP Rating	90 B	DER	11.94	TER	16.07
Environmental	89 B	% DER<TER	25.72		
CO ₂ Emissions (t/year)	1.24	DFEE	52.10	TFEE	54.74
General Requirements Compliance	Pass	% DFEE<TFEE	4.82		

Assessor Details	Mr. Samuel Green, Samuel Green, Tel: 01753889551, sam@merlinpropertyservices.com	Assessor ID	P744-0001
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)	16.07	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	11.94	kgCO ₂ /m ²	Pass
	-4.13 (-25.7%)	kgCO ₂ /m ²	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	54.74	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	52.10	kWh/m ² /yr	
	-2.6 (-4.8%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.25 (max. 0.30)	0.25 (max. 0.70)	Pass
Party wall	0.00 (max. 0.20)	-	Pass
Floor	0.11 (max. 0.25)	0.11 (max. 0.70)	Pass
Roof	0.14 (max. 0.20)	0.18 (max. 0.35)	Pass
Openings	1.51 (max. 2.00)	2.35 (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	6.50 (design value)	
Maximum	10.0	Pass

Limiting System Efficiencies

4 Heating efficiency

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)



Main heating system

Boiler system with radiators or underfloor - Mains gas
Data from database
Vaillant ecoTEC pro 24 VUW 246/5-3 (H-GB) R6
Combi boiler
Efficiency: 89.5% SEDBUK2009
Minimum: 88.0%

Pass

Secondary heating system

None

5 Cylinder insulation

Hot water storage

No cylinder

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 the effects of heat gains in summer

9 Summertime temperature

Overheating risk (Thames Valley)

Not significant

Pass

Based on:

Overshading

Average

Windows facing East

9.87 m², No overhang

Windows facing South

4.41 m², No overhang

Windows facing West

7.20 m², No overhang

Air change rate

8.00 ach

Blinds/curtains

None

Criterion 4 – Building performance consistent with DER and DFEE rate

Party Walls

Type

U-value

W/m²K

Pass

Air permeability and pressure testing

3 Air permeability

Air permeability at 50 pascals

6.50 (design value)

Maximum

10.0

Pass

10 Key features

Party wall U-value

0.00

W/m²K

Floor U-value

0.11

W/m²K

Thermal bridging y-value

0.035

W/m²K

Photovoltaic array

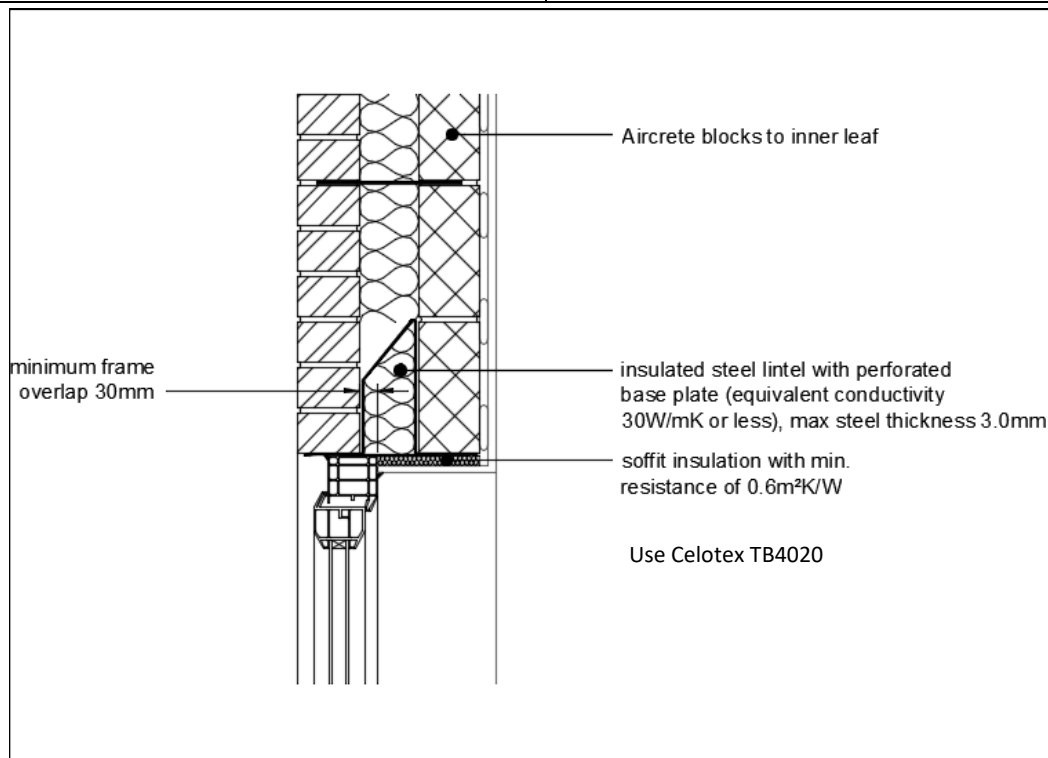
2.00

kW

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Thermal Bridging Detail

Originator	LABC
Registration Number	E1MCFF5/MPS/1.01
Description	Lintel



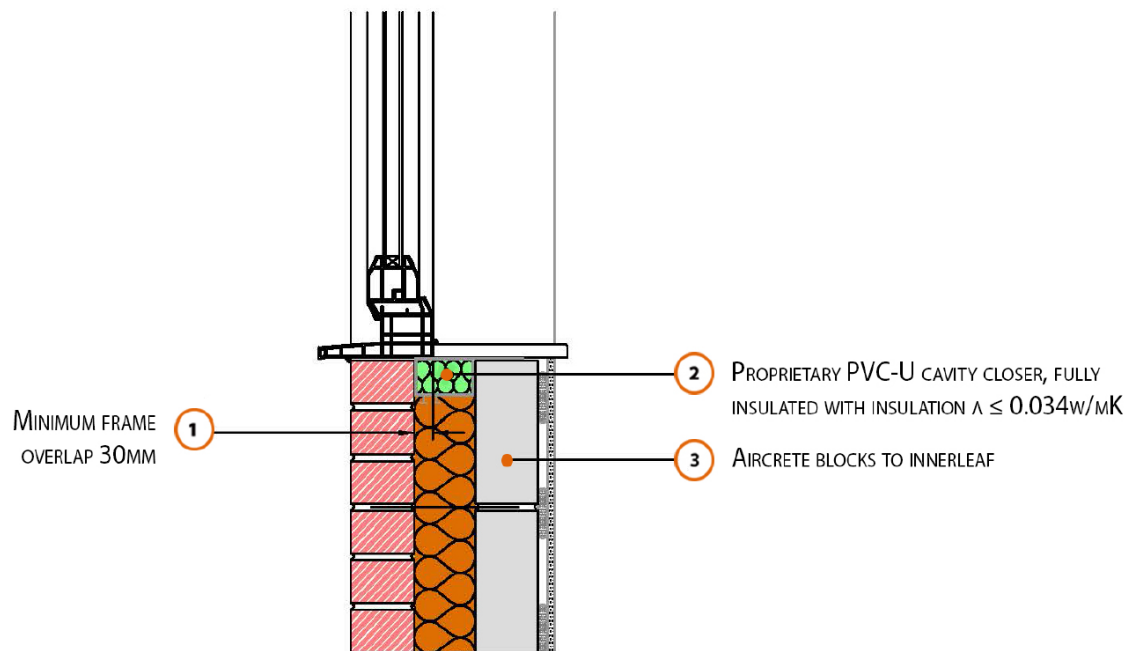
Build up
External Masonry Cavity Wall
Masonry outer leaf ($\lambda = 0.77$)
100mm Aircrete Block Inner Leaf ($\lambda \leq 0.15$)
Full Fill Insulation
3.0mm Steel Lintel with perforated baseplate
Insulated Soffit (Use Celotex TB4020)

Cavity width (mms)	Insulation	Ψ —value W/mK
100	$\lambda = 0.037$	0.360
150	$\lambda = 0.037$	0.373
100	$\lambda = 0.032$	0.367
150	$\lambda = 0.032$	0.378



Thermal Bridging Detail

Originator	LABC
Registration Number	E3MCFF5/MPS/1.01
Description	Sill



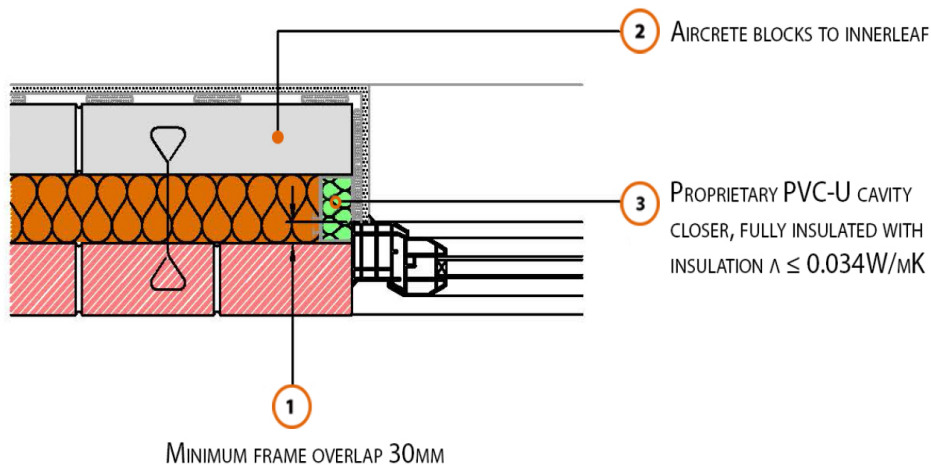
Build up
External Masonry Cavity Wall
Masonry outer leaf ($\lambda = 0.77$)
100mm Aircrete Block Inner Leaf ($\lambda \leq 0.15 \text{ W/mk}$)
Full Fill Insulation
Window Sill

Cavity width (mms)	Insulation	Ψ —value W/mK
100	$\lambda = 0.037$	0.026
150	$\lambda = 0.037$	0.032
100	$\lambda = 0.032$	0.027
150	$\lambda = 0.032$	0.032



Thermal Bridging Detail

Originator	LABC
Registration Number	E4MCFF5/MPS/1.01
Description	Jamb



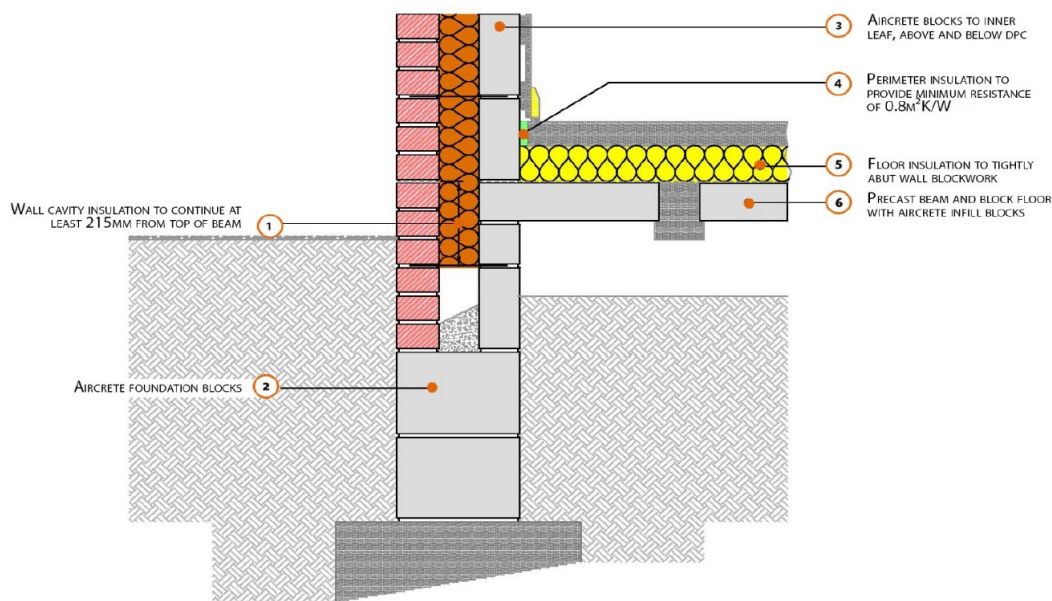
Build up
External Masonry Cavity Wall
Masonry outer leaf
100mm Aircrete Block Inner Leaf ($\lambda \leq 0.15 \text{ W/mK}$)
Full Fill Insulation
Window Jamb

Cavity width (mms)	Insulation	Ψ -value W/mK
100	$\lambda = 0.037$	0.028
150	$\lambda = 0.037$	0.035
100	$\lambda = 0.032$	0.029
150	$\lambda = 0.032$	0.035



Thermal Bridging Detail

Originator	LABC
Registration Number	E5MCFF17/MPS/1.01
Description	Ground Floor



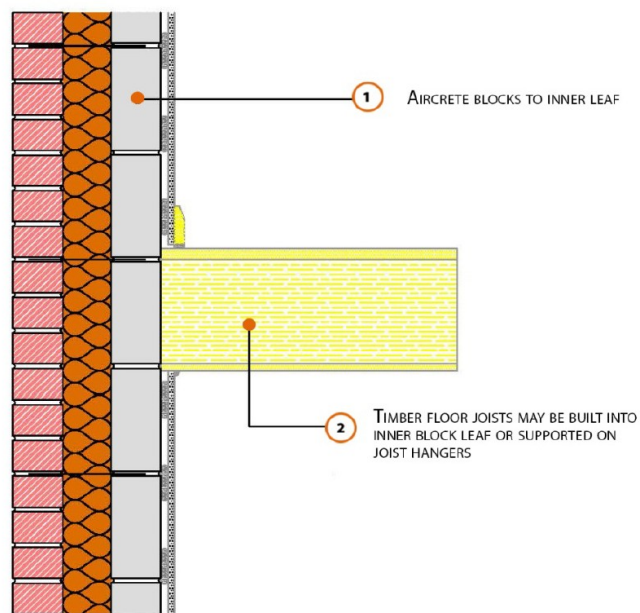
Build up
External Masonry Cavity Wall
Masonry outer leaf ($\lambda = 0.77$)
100mm Aircrete Block Inner Leaf ($\lambda \leq 0.15$ W/mk)
150mm Beam and Aircrete Block Infill
100mm Insulation Above Slab (0.022W/Mk)
75mm Screed

Cavity width (mms)	Insulation	Ψ -value W/mK
100	$\lambda = 0.037$	0.050
150	$\lambda = 0.037$	0.049
100	$\lambda = 0.032$	0.049
150	$\lambda = 0.032$	0.048



Thermal Bridging Detail

Originator	LABC
Registration Number	E6MCF5/MPS/1.01
Description	Intermediate Floor



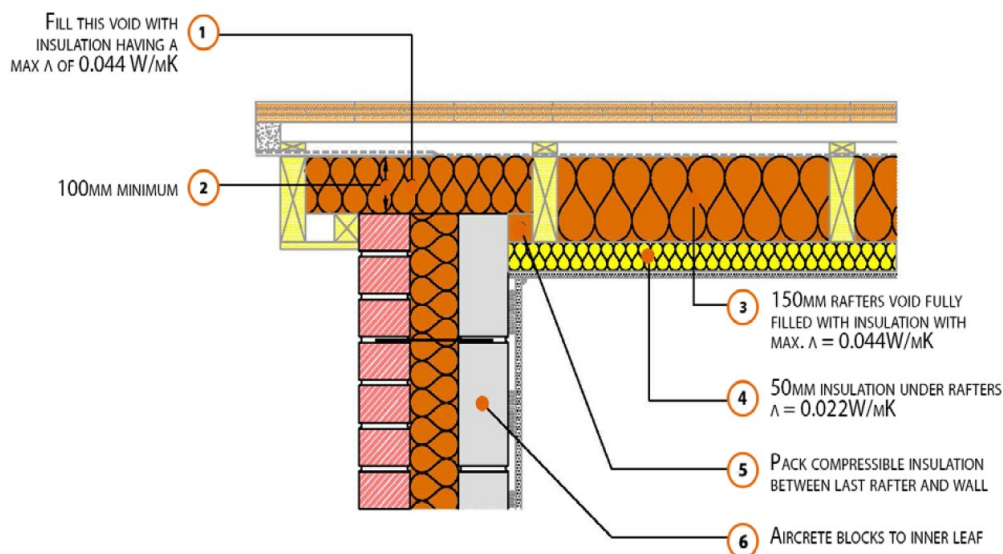
Build up
External Masonry Cavity Wall
Masonry outer leaf ($\lambda = 0.77$)
100mm Aircrete Block Inner Leaf ($\lambda \leq 0.15$ W/mk)
Full Fill Insulation
Intermediate Timber Floor Within Dwelling
240mm Timber I Joist Built In

Cavity width (mms)	Insulation	Ψ -value W/mK
100	$\lambda = 0.037$	0.003
150	$\lambda = 0.037$	0.002
100	$\lambda = 0.032$	0.003
150	$\lambda = 0.032$	0.001



Thermal Bridging Detail

Originator	LABC
Registration Number	E13MCFF5/MPS/1.01
Description	Gable (Insulation at Rafter Level)



Build up
External Masonry Cavity Wall
Masonry Outer Leaf ($\lambda = 0.77$)
100mm Aircrete Block Inner Leaf ($\lambda \leq 0.15$ W/mk)
Full Fill Insulation
Pitched Roof Gable
150mm insulation (0.044W/mK) between rafters
50mm insulation (0.022W/mK) beneath rafters
Unventilated Rafter Void

Cavity width (mms)	Insulation	Ψ -value W/mK
100	$\lambda = 0.037$	0.053
150	$\lambda = 0.037$	0.053
100	$\lambda = 0.032$	0.052
150	$\lambda = 0.032$	0.052



U-value calculation

by BRE U-value Calculator version 2.04g

Printed on 20 May 2021 at 08:53

Filename: Z:\Work in Progress\RG4 8NA - Gardeners Arms\uvalues\Brick Walls.uva (File saved: 20 May 2021 08:53)

Element type: Wall - Masonry - full cavity fill: slabs

Calculation Method: BS EN ISO 6946

external walls

<u>Layer</u>	<u>d (mm)</u>	<u>λ layer</u>	<u>λ bridge</u>	<u>Fraction</u>	<u>Density</u>	<u>Sp. heat</u>	<u>R layer</u>	<u>R bridge</u>	<u>Description</u>
1	13	0.400			1000	1000	0.130		Rsi
kg/m ³)							0.032		Gypsum plaster (1000
2	100	0.150			2000	1000	0.667		3.6N Block
3	100	0.032			30	1030	3.125		Knauf Dritherm 32
4	105	0.770			1700	800	0.136		Brick outer leaf
							<u>0.040</u>		Rse
	<u>318 mm</u>	(total wall thickness)					4.131		

Total resistance: Upper limit: 4.131 Lower limit: 4.131 Ratio: 1.000 Average: 4.131 m²K/W

U-value (uncorrected) 0.242

U-value correctionsAir gaps in layer 3 $\Delta U = 0.0057$ (Level 1)Wall ties in layer 3 $\Delta U = 0.0006$ (2.50 per m², 3.0 mm² cross-section, $\lambda = 17.0$)Total ΔU 0.006

U-value (corrected) 0.248

U-value (rounded) 0.25 W/m²KHeat capacity per m² (κ) 187.0 kJ/m²K

Calculated by:

447821128660

U-value calculation

by BRE U-value Calculator version 2.04g

Printed on 20 May 2021 at 08:54

Filename: Z:\Work in Progress\RG4 8NA - Gardeners Arms\uvalues\ground floor.uva (File saved: 19 May 2021 13:57)

Element type: Floor - Suspended beam-and-block floor

Calculation Method: BS EN ISO 6946, BS EN ISO 13370

ground floor

U-value of floor construction:

Layer	d (mm)	λ layer	λ bridge	Fraction	Density	Sp. heat	R layer	R bridge	Description
1	75	1.150			1800	1000	0.170		Rsi
2	150	R-value			20	1400	0.065		Screed
3	100	0.180	1.350	0.137	600	1000	6.800	0.074	Celotex XR4150
kg/m ³ /concrete beams									
							0.556		AAC (600
							<u>0.170</u>		Rs (underfloor)
	<u>325 mm</u>						7.761		

Total resistance: Upper limit: 7.691 Lower limit: 7.499 Ratio: 1.026 Average: 7.595 m²K/W

U-value of floor construction: 0.132 W/m²K

Ground parameters:

Perimeter P: 18.40 m

Area A: 42.00 m²

P/A: 0.438

Resistance on solum R_g:

Depth of underfloor space below ground:

Floor height above ground:

Mean wind speed:

Wind shielding factor:

Ventilation openings per metre length:

Wall thickness: 300 mm

Ground type: Clay/silt ($\lambda = 1.5$ W/m·K)

R_{se}: 0.04 m²K/W

0.000 m²K/W

0.200 m

0.000 m

5.00 m/s

0.050

0.0015 m²/m

U-value for ground (U_g) 0.640

U-value of floor deck (U_f) 0.132

Ventilation equivalent U-value (U_x) 0.119

U-value overall 0.112

U-value (rounded) 0.11 W/m²K

Heat capacity per m² (κ) 135.0 kJ/m²K

Calculated by:

447821128660

U-value calculation

by BRE U-value Calculator version 2.04g

Printed on 20 May 2021 at 08:55

Filename: Z:\Work in Progress\RG4 8NA - Gardeners Arms\uvalues\plane roof.uva (File saved: 05 Jun 2019 08:10)

Element type: Roof - Pitched roof - insulated ceiling

Calculation Method: BS EN ISO 6946

plane roof

Layer	d (mm)	λ layer	λ bridge	Fraction	Density	Sp. heat	R layer	R bridge	Description
							0.100		Rsi
1	12.5	0.210			700	1000	0.060		Plasterboard
2	100	0.040	0.130	0.0900	12	1030	2.500	0.769	Mineral wool quilt
3	200	0.040			12	1030	5.000		Mineral wool
4		R-value ¹			1	1000	0.200		Roof space
							<u>0.040</u>		Rse
	<u>313 mm</u>						7.900		

¹Roof space - tiled roof, with felt or sarking boards

Total resistance: Upper limit: 7.705 Lower limit: 7.479 Ratio: 1.030 Average: 7.592 m²K/W

U-value (uncorrected) 0.1317

U-value corrections

Air gaps in layer 2 $\Delta U = 0.0000$ (Level 0)

Loft hatch $\Delta U = 0.0035$ (Insulation thickness = 50 mm)

Total ΔU 0.0035

U-value (corrected) 0.135

U-value (rounded) 0.14 W/m²K

Heat capacity per m² (κ) 8.8 kJ/m²K

Calculated by:

447821128660

U-value calculation

by BRE U-value Calculator version 2.04g

Printed on 20 May 2021 at 08:56

Filename: Z:\Work in Progress\RG4 8NA - Gardeners Arms\uvalues\Render Walls.uva (File saved: 20 May 2021 08:56)

Element type: Wall - Masonry - full cavity fill: slabs

Calculation Method: BS EN ISO 6946

rendered walls

<u>Layer</u>	<u>d (mm)</u>	<u>λ layer</u>	<u>λ bridge</u>	<u>Fraction</u>	<u>Density</u>	<u>Sp. heat</u>	<u>R layer</u>	<u>R bridge</u>	<u>Description</u>
1	13	0.400			1000	1000	0.130		Rsi
kg/m ³)							0.032		Gypsum plaster (1000
2	100	0.150			2000	1000	0.667		3.6N Block
3	100	0.032			30	1030	3.125		Knauf Dritherm 32
4	100	0.150			1700	800	0.667		3.6N Block
5	20	1.000			1600	1000	0.020		Render (cement, sand)
							<u>0.040</u>		Rse
	<u>333 mm</u>	(total wall thickness)					4.681		

Total resistance: Upper limit: 4.681 Lower limit: 4.681 Ratio: 1.000 Average: 4.681 m²K/W

U-value (uncorrected) 0.214

U-value correctionsAir gaps in layer 3 $\Delta U = 0.0045$ (Level 1)Wall ties in layer 3 $\Delta U = 0.0005$ (2.50 per m², 3.0 mm² cross-section, $\lambda = 17.0$)Total ΔU 0.005

U-value (corrected) 0.219

U-value (rounded) 0.22 W/m²KHeat capacity per m² (κ) 187.0 kJ/m²K

Calculated by:

447821128660

U-value calculation

by BRE U-value Calculator version 2.04g

Printed on 20 May 2021 at 08:57

Filename: Z:\Work in Progress\RG4 8NA - Gardeners Arms\uvalues\sloping roof.uva (File saved: 05 Jun 2019 08:10)

Element type: Roof - Pitched roof - insulated slope, sloping ceiling

Calculation Method: BS EN ISO 6946

sloping roof

Layer	d (mm)	λ layer	λ bridge	Fraction	Density	Sp. heat	R layer	R bridge	Description
1	12.5	0.210			700	1000	0.100		Rsi
2	225	0.032	0.130	0.0800	20	1030	0.060		Plasterboard
3							7.031	1.731	Knauf rafter roll 32 /
4	25	R-value			1	1000			Breather membrane
5	25	R-value			1	1000			Air layer ventilated
6	15	1.000			2000	800			Air layer ventilated (tile
									battens)
									Tiles (clay)
									Rse
							0.100 #		
							7.291		
	<u>303 mm</u> (total roof thickness)								

this resistance substitutes for Rse and the resistance of layers 4-6 because of the ventilated air layer (layer 4)

Total resistance: Upper limit: 6.010 Lower limit: 5.907 Ratio: 1.017 Average: 5.959 m²K/W

U-value (uncorrected) 0.168

U-value corrections

Air gaps in layer 2 $\Delta U = 0.009$ (Level 1)

No fixings in layer 2

Total ΔU 0.009

U-value (corrected) 0.177

U-value (rounded) 0.18 W/m²K

Heat capacity per m² (κ) 8.8 kJ/m²K

Calculated by:

447821128660