

The logo for the Concrete Block Association (CBA) features the letters 'C', 'B', and 'A' in white, each enclosed within a separate orange square. These three squares are arranged horizontally and are separated by thin white vertical lines. The entire logo is set against a dark blue background that features a complex, white line-art pattern of architectural drawings, including floor plans, elevations, and structural details.

CONCRETE BLOCK  
ASSOCIATION

February 2007

## Aggregate Concrete Blocks

The Building (Scotland) Regulations 2004

# SECTION 6 ENERGY

Guidance for Designers and Users

## Introduction

This booklet gives guidance for the specification of blocks in conjunction with insulation materials for external walls which are required to resist the passage of heat.

To ensure compliance with respect to regulatory requirements for thermal performance, specifiers may adopt any of the procedures described in section 6 of the Building (Scotland) Regulations 2007.

Accredited Construction Details are to be found on the Scottish Building Standards Agency website [www.sbsa.gov.uk](http://www.sbsa.gov.uk).

High levels of thermal insulation can be achieved in a number of different ways using aggregate concrete blocks.

## Insulation options

There are several basic options which may be considered to enhance thermal performance.

### Cavity insulation

- Full fill cavity batts or full fill cavity injected systems.
- Partial fill cavity wall boards.

### External insulation

- External insulation protected by render or other applied finish.

### Internal insulation

- Insulated dry lining.

A range of cavity insulation solutions is given in this booklet but manufacturers should be consulted for design specific options.

## Building regulations

New measures to improve the energy efficiency of buildings have been announced.

The aim of the changes is to implement part of the Energy Performance of Buildings Directive (EPBD) which aims to combat climate change and control the energy performance of buildings.

## Compliance

The use of a SAP 2005 calculation will result in the determination of CO<sub>2</sub> emissions for dwellings.

For buildings other than dwellings SBEM (or other approved software) should be used.

The target CO<sub>2</sub> emissions are calculated according to a notional building and the type of heating fuel used.

The CO<sub>2</sub> emissions for the proposed building must not exceed the target CO<sub>2</sub> emissions. If a SAP calculation requires that a lower airtightness than 10m<sup>3</sup>/m<sup>2</sup>/h is needed then site airtightness testing will be necessary. Alternatively a simplified elemental approach can be followed whereby a dwelling is designed to the notional building parameters set out in Section 6. These parameters assume an air change rate of 10m<sup>3</sup>/m<sup>2</sup>/h and no airtightness testing is required when Accredited Construction Details are used.

## Limits on design flexibility

For design purposes the limiting U values shown should not be exceeded. In practice the envelope standards generally would need to be better than the limiting values. Typically for walls design U values would be expected to be between 0.25 and 0.30 W/m<sup>2</sup>K.

Element	Area weighed average U value for all element of the same type	Worst individual sub-element
Wall	0.30	0.70
Floor	0.25	0.70
Roof	0.20	0.35
Windows, roof windows, roof lights & doors	2.2	3.3

## Limiting the effects of solar gains in summer

Designers need to check that the dwelling will not be prone to summertime overheating. High mass structures perform well in this area by being able to store heat during the daytime and releasing heat as the dwelling cools down overnight. Maximum advantage will result from the use of aggregate blocks in external and internal walls as well as ground and intermediate beam and block flooring. Lighter forms of construction do not possess the potential for high thermal mass.

Other steps could include an appropriate combination of window size and orientation, solar protection through shading, ventilation etc. reference should be made to 'CE 129 Reducing overheating - a designer's guide' published by The Energy Saving Trust for more information.

## Quality of construction

For the opaque building fabric, insulation must be continuous. This is primarily a workmanship issue and supervision should ensure there are no gaps in the insulation and that appropriate building details are followed to avoid thermal bridging around openings and at junctions. Insulation should be applied in accordance with Accredited Construction Details or other approved details or approved calculations should be carried out.

To ensure that the design airtightness is achieved gaps around service entries and drylining should be effectively sealed.

## Aggregate block solutions

Although the performance values of the building envelope will depend on factors such as air permeability values, fuel type and heating efficiency it is likely that wall U values of between 0.25 and 0.30 Wm<sup>2</sup>K will be required. The following aggregate block solutions are applicable to any type of building.

## Calculating U values

Generally all the U values should be calculated using BS EN ISO 6946 'Building Components and building elements - Thermal resistance and thermal transmittance - calculation methods', so as to take account of any thermal bridging and effect for mortar joints and where necessary, wall ties. However, the bridging effect for mortar joints needs only be considered when the difference in thermal resistance between block and mortar is greater than 0.1m<sup>2</sup>KW, and for many aggregate blocks the use of the full BS EN ISO 6946 method would not be necessary.

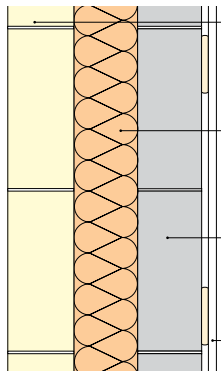
BS EN ISO 6946 can also be used to calculate the thermal resistance R of voided (cellular and hollow) blocks by omitting the surface resistance values. Values of R for blocks for direct use in U value calculations are normally published by CBA members.

Guidance on calculating U values to BS EN ISO 6946 can be found in BR 443 'Conventions for U value calculations' published by BRE. Software has been developed by BRE for calculating U values to the new regulations. The BRE software can be purchased at <http://projects.bre.co.uk/values> or the CBA online software may be used.

Note: to meet Building Regulation structural requirements the inner leaf blockwork should be at least 90mm thick.

### Solution 1 - U value = 0.27

### Full Fill Solutions



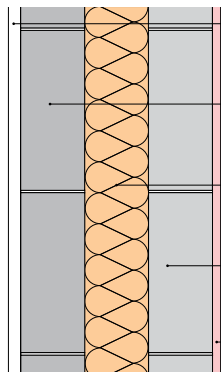
**Outer leaf**  
100mm Architectural masonry block

**Insulation**  
100mm Dritherm 32

**Inner leaf**  
100mm Medium density block

**Finish**  
Plasterboard on dabs

### Solution 2 - U value = 0.27



**Outer finish**  
19mm Render

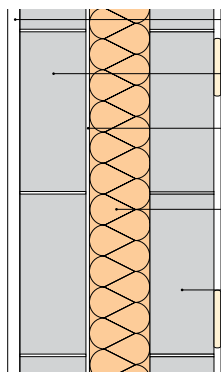
**Outer leaf**  
100mm Dense block

**Insulation**  
100mm Dritherm 32

**Inner leaf**  
100mm Medium density block

**Finish**  
13mm Lightweight plaster

### Solution 3 - U value = 0.25



**Outer finish**  
19mm Render

**Outer leaf**  
100mm Medium density block

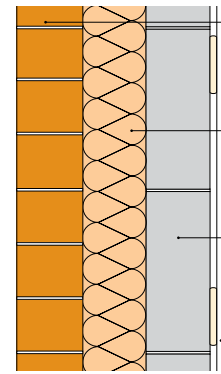
**Cavity**  
5mm

**Insulation**  
95mm Springvale Platinum

**Inner leaf**  
100mm Medium density block

**Finish**  
13mm Plasterboard on dabs

### Solution 4 - U value = 0.26



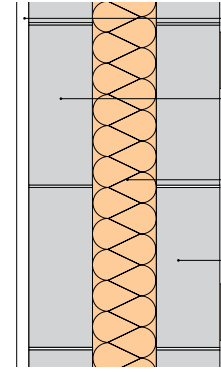
**Outer leaf**  
Brick

**Insulation**  
100mm Dritherm 32

**Inner leaf**  
100mm Medium density block

**Finish**  
Plasterboard on dabs

### Solution 5 - U value = 0.25



**Outer finish**  
19mm Render

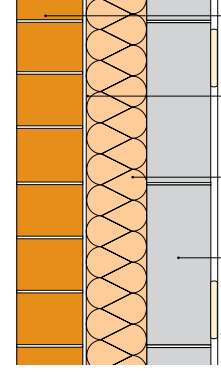
**Outer leaf**  
100mm Medium density block

**Insulation**  
100mm Dritherm 32

**Inner leaf**  
100mm Medium density block

**Finish**  
13mm Plasterboard on dabs

### Solution 6 - U value = 0.27



**Outer leaf**  
Brick

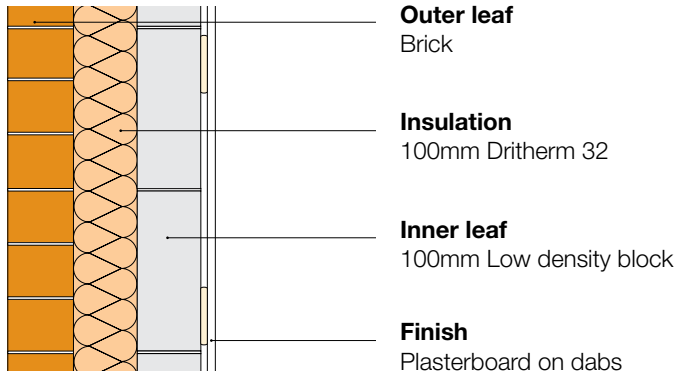
**Cavity**  
5mm

**Insulation**  
95mm Springvale Platinum

**Inner leaf**  
100mm Medium density block

**Finish**  
Plasterboard on dabs

### Solution 7 - U value = 0.25



**Outer leaf**

Brick

**Insulation**

100mm Dritherm 32

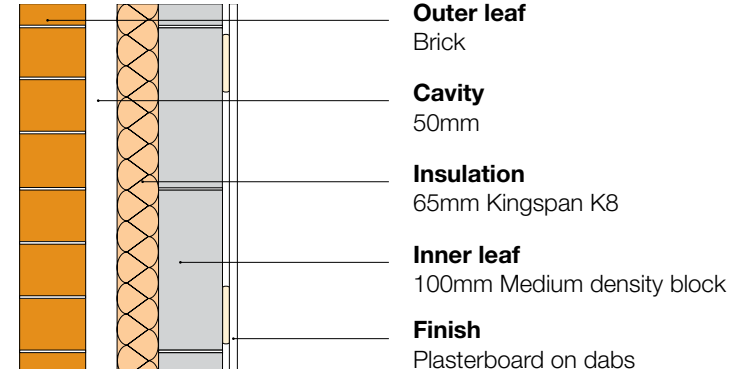
**Inner leaf**

100mm Low density block

**Finish**

Plasterboard on dabs

### Solution 10 - U value = 0.24



**Outer leaf**

Brick

**Cavity**

50mm

**Insulation**

65mm Kingspan K8

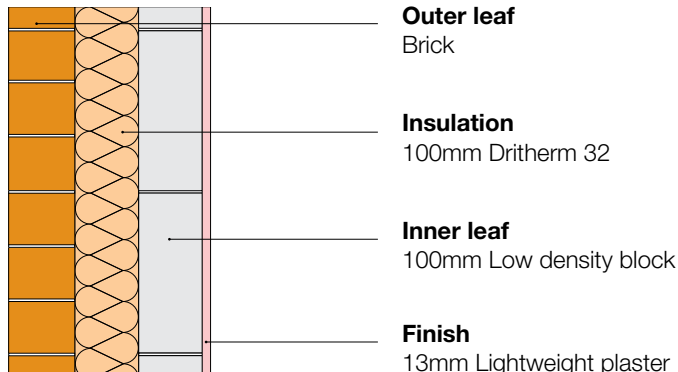
**Inner leaf**

100mm Medium density block

**Finish**

Plasterboard on dabs

### Solution 8 - U value = 0.26



**Outer leaf**

Brick

**Insulation**

100mm Dritherm 32

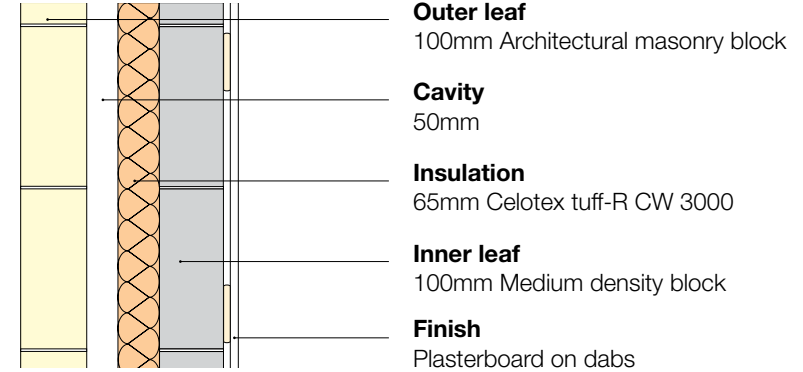
**Inner leaf**

100mm Low density block

**Finish**

13mm Lightweight plaster

### Solution 11 - U value = 0.26



**Outer leaf**

100mm Architectural masonry block

**Cavity**

50mm

**Insulation**

65mm Celotex tuff-R CW 3000

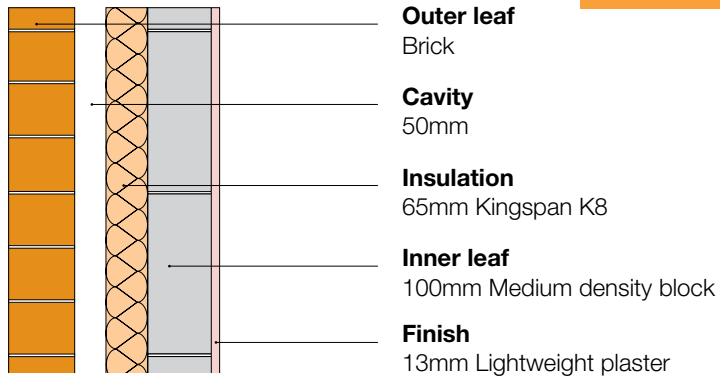
**Inner leaf**

100mm Medium density block

**Finish**

Plasterboard on dabs

### Solution 9 - U value = 0.25



**Outer leaf**

Brick

**Cavity**

50mm

**Insulation**

65mm Kingspan K8

**Inner leaf**

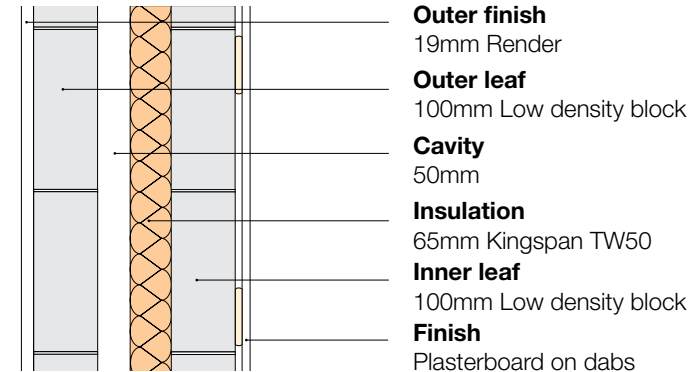
100mm Medium density block

**Finish**

13mm Lightweight plaster

### Partial Fill Solutions

### Solution 12 - U value = 0.24



**Outer finish**

19mm Render

**Outer leaf**

100mm Low density block

**Cavity**

50mm

**Insulation**

65mm Kingspan TW50

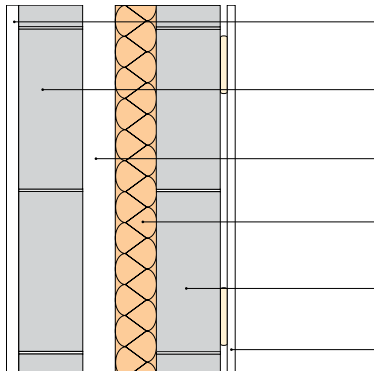
**Inner leaf**

100mm Low density block

**Finish**

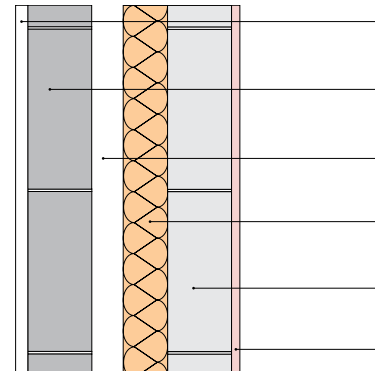
Plasterboard on dabs

**Solution 13 - U value = 0.25**



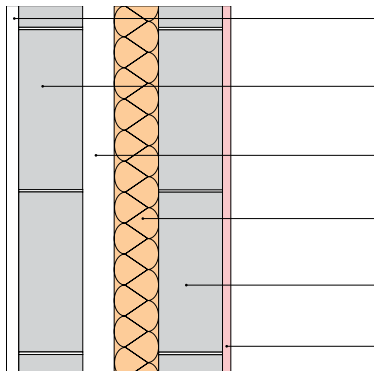
- Outer finish**  
19mm Render
- Outer leaf**  
100mm Medium density block
- Cavity**  
50mm
- Insulation**  
65mm Celotex tuff-R CW 3000
- Inner leaf**  
100mm Medium density block
- Finish**  
Plasterboard on dabs

**Solution 16 - U value = 0.26**



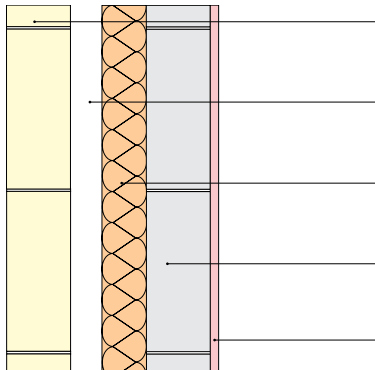
- Outer finish**  
19mm Render
- Outer leaf**  
100mm Dense block
- Cavity**  
50mm
- Insulation**  
70mm Celotex tuff-R CW 3000
- Inner leaf**  
100mm Dense block
- Finish**  
Lightweight plaster

**Solution 14 - U value = 0.25**



- Outer finish**  
19mm Render
- Outer leaf**  
100mm Medium density block
- Cavity**  
50mm
- Insulation**  
70mm Celotex tuff-R CW 3000
- Inner leaf**  
100mm Medium density block
- Finish**  
13mm Lightweight plaster

**Solution 15 - U value = 0.25**



- Outer leaf**  
100mm Architectural masonry block
- Cavity**  
50mm
- Insulation**  
70mm Celotex tuff-R CW 3000
- Inner leaf**  
100mm Low density block
- Finish**  
Lightweight plaster

The U-values given in this brochure are correct at the time of going to press and are based on manufacturers' details available at that time. Air gap correction level 1 has been used in the U value calculations. Details of insulation products featured in the construction solutions can be obtained as follows:

Drittherm 32	Knauf Insulation	Tel. 01744 766 666	<a href="http://www.knaufinsulation.co.uk">www.knaufinsulation.co.uk</a>
Kingspan	Kingspan Insulation	Tel. 0870 733 8333	<a href="http://www.insulation.kingspan.com">www.insulation.kingspan.com</a>
Springvale Platinum	The Springvale Group	Tel. 01457 863 211	<a href="http://www.springvale.com">www.springvale.com</a>
Celotex	Celotex Limited	Tel. 01473 822 093	<a href="http://www.celotex.co.uk">www.celotex.co.uk</a>

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**Email:** [enquiries@cba-blocks.org.uk](mailto:enquiries@cba-blocks.org.uk)

**Technical Helpline:** 0116 222 1507

[www.cba-blocks.org.uk](http://www.cba-blocks.org.uk)



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masonry  
ALLIANCE

BRITISH  
PRECAST

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## CBA Members - Scotland

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e. [masonry@aggregate.com](mailto:masonry@aggregate.com)  
w. [www.aggregate.com](http://www.aggregate.com)

### Brand & Rae

t. 01334 652 828  
e. [ian@brandandrae.co.uk](mailto:ian@brandandrae.co.uk)  
w. [www.brandandrae.co.uk](http://www.brandandrae.co.uk)

### Bodychell S and G

t. 01346 541 799  
f. 01346 541 463  
e. [info@bodychell.co.uk](mailto:info@bodychell.co.uk)

### Cemex

t. 01236 822 461  
e. [sarah.kirkham@cemex.co.uk](mailto:sarah.kirkham@cemex.co.uk)  
w. [www.cemex.co.uk](http://www.cemex.co.uk)

### Forticrete

t. 01429 838 001  
e. [masonry@forticrete.com](mailto:masonry@forticrete.com)  
e. [www.forticrete.co.uk](http://www.forticrete.co.uk)

### John Gunn & Son

t. 01593 721 236  
f. 01593 721 525  
e. [info@igunn.co.uk](mailto:info@igunn.co.uk)

### Hoddam Contracting Ltd

t. 01576 300 279  
f. 01576 300 798  
e. [peter@hoddacrete.co.uk](mailto:peter@hoddacrete.co.uk)

### Patersons Precon Blocks

t. 01236 433 351  
e. [sales@patersonsquarries.co.uk](mailto:sales@patersonsquarries.co.uk)  
w. [www.patersonsquarries.co.uk](http://www.patersonsquarries.co.uk)

### Premium Concrete Products Ltd

t. 01463 772 100  
f. 01463 772 600  
e. [scott.dick@pcp-inverness.co.uk](mailto:scott.dick@pcp-inverness.co.uk)

### Skene Group Concrete Products

t. 01383 510 248  
e. [skene-group@sol.co.uk](mailto:skene-group@sol.co.uk)  
w. [www.skene-group.co.uk](http://www.skene-group.co.uk)

### Tarmac (David Gordon)

t. 01224 742 408  
f. 01224 744 353  
w. [www.tarmac.co.uk](http://www.tarmac.co.uk)

### Tarmac Northern

t. 01343 547 144  
f. 01343 549 921  
w. [www.tarmac.co.uk](http://www.tarmac.co.uk)