

## A Summary Guide to Thermal Elements (U-values) Under Building Regulations Part L1B 'Conservation of Fuel and Power In Existing Dwellings' <sup>\*(1)</sup>

The following table is a summary only of the minimum U-values required for specific thermal elements under Part L1B of the Building Regulations 2000, as updated in 2006.

	<b>A) U-value for new extensions and thermal elements (W/m<sup>2</sup>.K)</b>	<b>B) U-value for upgrade of existing thermal elements (W/m<sup>2</sup>.K) <sup>**</sup>(2) below</b>	<b>C) Threshold U-value for existing thermal elements (W/m<sup>2</sup>.k) <sup>***</sup>(3)</b>
Cavity Wall	<b>0.3</b>	<b>0.55/0.35 <sup>****</sup>(4) below</b>	<b>0.7</b>
Other Wall	<b>0.3</b>	<b>0.35</b>	<b>0.7</b>
Pitched roof (insulation at ceiling level)	<b>0.16</b>	<b>0.16</b>	<b>0.35</b>
Pitched roof (insulation at rafter level)	<b>0.2</b>	<b>0.2</b>	<b>0.35</b>
Flat roof or roof with integral insulation	<b>0.2</b>	<b>0.25</b>	<b>0.35</b>
Floors	<b>0.22</b>	<b>0.25</b>	<b>0.7</b>
Window, Roof Window and Rooflight	<b>1.8 (whole unit) or D rated or 1.2 (centre-pane)</b>	<b>2.0 (whole unit) or E rated or 1.2 (centre-pane)</b>	<b>3.3 <sup>*****</sup>(5)</b> (see schedule 2A/12 below)
Doors with more than 50% of their internal face area glazed	<b>2.2 (whole unit) or 1.2 (centre-pane)</b>	<b>2.2 (whole unit) or 1.2 (centre-pane)</b>	<b>3.3 <sup>*****</sup>(5)</b> (see schedule 2A/12 below)
Other doors	<b>3.0</b>	<b>3.0</b>	<b>3.3</b>

<sup>\*(1)</sup> Under the Building Regulations a dwelling is defined as a self-contained unit designed to be used separately to contain a single household.

<sup>\*\*</sup>(2) Where the work applies to less than 25% of the surface area of a replacement element, there is no current requirement to improve energy performance. Where an upgrade to the U-value above is not technically or functionally feasible, where an upgrade would not achieve a simple payback of 15 years or less or where the upgrade would take up more than 5% of the floor area, a greater U-value may be permitted.

<sup>\*\*\*</sup>(3) Where an existing thermal element is to become part of the thermal envelope and is to be upgraded or where it is part of a building subject to a change of use, its U-value should be upgraded to the U-value shown in column B if it's current U-value is more than the threshold U-value (column C)

<sup>\*\*\*\*</sup>(4) In this instance, whereas filling an existing cavity wall only requires a U-value of 0.55, where an existing wall is being replaced, this will need to be upgraded to a U-value of 0.35.

\*\*\*\*\*<sup>(5)</sup> Schedule 2A/12

Installation refers to a replacement, of a window, roof light, roof, window or door (being a door which together with its frame has more than 50% of its internal face area glazed) in an existing building.

If you are unsure whether the unit complies with the U-value or rating stated in the table earlier, consult a person registered under the Fenestration Self-Assessment Scheme by FENSA Ltd, or by CERTASS Limited or the British Standards Institute in respect of that type of work.

Please refer to the Building Regulations Part L1B in full or a qualified building consultant for further information concerning the above.

**The information in this Guide refers to the minimum standard required by Part L1B of the Building Regulations as updated in 2006. For Best Practice, please refer to the appropriate Energy Saving Trust Best Practice Guide at <http://www.energysavingtrust.org.uk/aboutest/publications/>**

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### **Historic Buildings**

Special considerations apply if the building on which the work is to be carried out has special historical or architectural value and compliance with the energy efficiency requirements would unacceptably alter the character or appearance.

When undertaking work on or in connection with buildings with special historic or architectural value, the aim should be to improve energy efficiency where and to the extent that it is practically possible. This is provided that the work does not prejudice the character of the host building or increase the risk of long-term deterioration to the building fabric or fittings. The guidance given in the English Heritage publication "Building Regulations and Historic Buildings" (revised 2004) should be taken into account in determining appropriate energy performance standards for such building works. Particular issues relating to work in historic buildings that warrant sympathetic treatment and where advice from others could therefore be beneficial include:

- a. restoring the historic character of a building that has been subject to previous inappropriate alteration, eg replacement windows, doors and roof lights.
- b. Rebuilding a former building (eg following a fire or filling a gap site in a terrace).
- c. Making provisions enabling the fabric of historic buildings to "breathe" to control moisture and potential long term decay problems.

### **Guidance on thermal elements**

**New thermal** elements must comply with the requirements of the Building Regulations part L1A(i). Work on existing elements is covered by Regulation 4A which states:

4A.-(1) Where a person intends to **renovate a thermal element**, such work shall be carried out as is necessary to ensure that the **whole thermal element** complies with the requirements of paragraph L1A (i) of schedule 1.

4A.-(2) **Where a thermal element** is replaced, the new thermal element shall comply with the requirements of paragraph L1A (i) of Schedule 1.

**Part L1A "Conservation of Fuel and Power in New Dwellings" can be downloaded at: [http://www.planningportal.gov.uk/uploads/br/BR\\_PDF\\_ADL1A\\_2006.pdf](http://www.planningportal.gov.uk/uploads/br/BR_PDF_ADL1A_2006.pdf)**

## **Continuity of insulation and airtightness**

The building fabric should be constructed so that there are no reasonably avoided thermal bridges in the insulation layers caused by gaps within the various elements, at the joints between elements and at the edges of elements such as those around window and door openings. Reasonable provision should also be made to reduce unwanted air leakage through the new envelope parts.

A suitable approach to showing the requirement has been achieved would be to submit a report signed by a suitably qualified person confirming that appropriate design details and building techniques have been specified, and that the work has been carried out in ways that can be expected to achieve reasonable conformity to the specifications. Reasonable provision would be to:

- adopt design details such as those set out in the TSO Robust Details catalogue <sup>\*\*\*\*\*<sup>(6)</sup></sup>.
- b. to demonstrate that the specified details deliver an equivalent level of performance using the guidance of BRE IP 1/06<sup>22\*\*</sup>

<sup>\*\*\*\*\*<sup>(6)</sup></sup> see <http://www.planningportal.gov.uk/england/professionals/en/1115314255826.html>

## **Providing Information**

On completion of the work, in accordance with requirement L1(c), the owner of the dwelling, should be provided with sufficient information about the building, the fixed building services and their maintenance requirements so that the building can be operated in such a manner as to use no more fuel and power than is reasonable in the circumstances.

A way of complying would be to provide a suitable set of operating and maintenance instructions aimed at achieving economy in the use of fuel in terms that householders can understand in a durable format that can be kept and referred to over the service life of the system(s) installed as part of the work that has been carried out.

Regulation (61/1) applies where a new dwelling is created by building work or by a material change of use in connection with which building work is carried out.

Where regulation (61/2) applies, the person carrying out the building work shall calculate the energy rating of the dwelling by means of a procedure approved by the Secretary of State and give notice of that rating to the local authority.

Where regulation (61/4) applies, the person carrying out the building work shall affix, as soon as practicable, in a conspicuous place in the dwelling, a notice stating the energy rating of the dwelling.

The notice referred to in paragraph (61/4) shall be affixed not later than the date on which the notice required by

## **Useful Links**

<http://www.bre.co.uk/>

<http://www.defra.gov.uk/>

<http://www.energysavingtrust.org.uk/housingbuildings/professionals/standards/>

<http://www.english-heritage.org.uk/>

<http://www.timsa.org.uk/>

You may also find it useful to visit the websites of insulation manufacturers, as these often include technical guides on how to use their products.

Produced by Leeds Bradford & Hull Energy Efficiency Advice Centre, Freephone 0800 512012 or [www.leeds.gov.uk/fuelsavers](http://www.leeds.gov.uk/fuelsavers)

## Worked Examples:

**To upgrade a 220mm solid brick wall** to the U-value of **0.35** as required by the Building Regulations under column B, the following methods could be used:

- 1) Directly applied internal wall insulation using 60mm of phenolic insulation.
- 2) Directly applied internal wall insulation using 80mm of extruded polystyrene.
- 3) Studwork internal wall insulation using 100mm of mineral wool slabs.

*(methods 1 and 2 assume 12.5mm plasterboard, insulation, plaster dabs/adhesive and 15mm airspace (Bridging Fraction = 0.20), insulation with 2 fixings per m<sup>2</sup> (fixings are 10mm<sup>2</sup> 50W/mK), 220mm brick. Method 3 assumes 12.5mm plasterboard, insulation, 25mm non-ventilated airspace, 47mm studs at 600mm centres plus top and bottom rails (Bridging Fraction = 0.118), 220mm brick)*

**To upgrade a suspended timber floor** to the U-value of **0.25** required by the Building Regulations under column B, the following methods could be used:

- 1) Suspended timber floor insulation using 100mm of phenolic insulation.
- 2) Suspended timber floor insulation using 150mm of expanded polystyrene insulation.
- 3) Suspended timber floor insulation using 150mm of sheeps wool and hemp insulation.

*(Assumes 50mm timbers (Bridging fraction = 0.14), 225mm depth of underfloor below ground, 300mm floor height above ground, 250mm walls, no edge insulation.)*

**To insulate the pitched roof of an existing property or a new build extension** at ceiling level to the U-value of **0.16** required by the Building Regulations, the following methods could be used (assumes joist depth of 100mm filled with insulation):

- 1) 250mm of cellulose insulation.
- 2) 250mm of sheeps wool and hemp insulation.
- 3) 275mm of quilt mineral wool insulation.

*(Assumes 12.5mm plasterboard, timber joists (Bridging Fraction = 0.09), loft hatch with 50mm insulation)*

**To upgrade a pitched roof below and between the rafters** to the U-value of **0.2** required by the Building Regulations under column B, the following methods could be used:

- 1) 130mm of phenolic insulation plus 50mm air cavity (Assuming 50mm of insulation between the rafter with 80mm of insulation on top).
- 2) 175mm of mineral wool slab insulation plus 50mm air cavity (Assuming 75mm of insulation between the rafter with 100mm of insulation on top).
- 3) 200mm of expanded polystyrene insulation plus 50mm air cavity (Assuming 100mm of insulation between the rafters with 100mm of insulation on top).

*(Assumes 12.5mm plasterboard, insulation with 4 fixings per m<sup>2</sup> (fixings of 7.5mm<sup>2</sup> with 17W/mK), insulation between rafters, 50mm ventilated cavity (Bridging Fraction = 0.08), sarkingfelt, 25mm cavity, 15mm clay tiles)*

The worked examples have been taken from Good Practice Guide CE184 “Practical Refurbishment of Solid Walled Properties” and are only applicable to the exact construction as described in that publication. Contact a qualified building consultant or insulation manufacturer to discuss your specific technical requirements and to assess the risk of interstitial condensation. **Please note that the depths of insulation quoted are required to meet the current Building Regulations. To meet Best Practice standard, a greater thickness of insulation may be required.**

**Required U-values For An Existing Dwelling**

\* 2.2 for doors more than 50% glazed.  
 \*\* 0.55 where an existing cavity wall is being filled.

