



Part L1B Regulations Compliance Guide



APPROVED DOCUMENT L1B – INTRODUCTION



Knauf Insulation also publish the following:

- Part L1A Regulations
- Part L2A Regulations
- Part L2B Regulations
- The 'Orange Pages'

The *Orange Pages* contains a comprehensive list of construction solutions arranged by element and U-value, making it easy to find a suitable construction to achieve any required U-value– it will be available in early 2006.

The Government has announced amendments to Part L: *Conservation of Fuel and Power* of the Building Regulations (England and Wales) and the implementation of the Energy Performance of Buildings Directive (EPBD).

The new Approved Document L1A – for construction of new dwellings and extensions and new Approved Document L1B – for work in existing dwellings, replace the 2002 edition of Approved Document L1.

The Approved Documents have been published as working drafts, with the changes due to come into effect on 6 April 2006. They are not final documents and may be subject to change. When the final Approved Documents are published, the government will publish a summary of any changes made to the drafts.

In keeping with the European Union's Energy Performance of Buildings Directive (EPBD) and our own Government's Energy White Paper, further changes to Part L should be expected in 2010 and 2015.

Complying with AD L1B

Approved Document L1B sets out guidance on what is considered to be reasonable provision for meeting the Requirements for the conservation of fuel and power.

The Approved Document covers all types of dwelling, but special considerations apply if the building has special historic or architectural value. In this case, the aim should be to improve energy efficiency as much as is practically possible, provided that the essential character of the building is not affected. Guidance is available from English Heritage.

This publication summarises how to comply with the guidance in the new Approved Document. First of all, the terminology is explained, the energy efficiency standards are summarised with the help of flow diagrams and, finally, five case studies illustrate the type of measures needed to comply with the new standards. The case studies are accompanied by sample constructions that meet the required energy efficiency standards.

KNAUF INSULATION'S RESPONSE TO THE NEW REGULATIONS

New products

Housebuilders and designers will be helped to meet the improved thermal standards required by the 2006 edition of Part L1B by the addition of new products to the Knauf Insulation range. These products have a lower thermal conductivity than might be expected for mineral wool insulation. The new additions include Crown DriTherm Cavity Slab 32 and Timber Roll, both with a thermal conductivity of just 0.032 W/mK.

Investment

We have made a substantial investment in our UK plants to meet the expected growth in demand for mineral wool products, and to ensure continuity of supply following implementation of the new regulations. This investment has also enabled us to manufacture lower thermal conductivity value products through improved methods of production. The enhanced products will provide increased levels of thermal resistance with only modest, or in some

cases no, change to the insulation thickness necessary for the construction to meet the U-values required.

Range

As the only manufacturer of glass, rock and foam insulation in the UK, we are uniquely placed to provide solutions that match the best product to the most appropriate application. This requires insulation systems that fully utilise the available cavities within the construction as insulation zones.

OVERVIEW

Approved Document L1B

The new edition of the Approved Document for existing dwellings keeps an elemental method of demonstrating compliance, although in some cases, there is an option to use the 2005 edition of the SAP calculation method to show that the overall energy performance of the whole extended or altered building is no worse than it would be if the elemental method were used.

There is also more emphasis than before on ensuring that the construction meets the thermal standards established at the design stage and that the heating and hot water systems are correctly commissioned.

The guidance is set out in relation to three classes of building work:

- **Extensions** to existing dwellings, including conservatories
- Dwellings created as a result of a **material change of use**
- Thermal upgrading as part of **material alterations**.

For each of these classes of work the Approved Document gives relevant energy efficiency standards for:

- new thermal elements
- replacement thermal elements
- renovated thermal elements
- retained thermal elements

- controlled fittings (glazed elements)
- controlled services.

To help the reader, the thermal elements are colour coded throughout this document, as shown across.

How to comply

An explanation of the different thermal elements and controlled fittings are outlined below. Table A summarising the required thermal insulation standards is on page 5.

This publication concentrates principally on standards for the building fabric.

Energy efficiency requirements

New thermal elements

When creating new thermal elements (e.g. in an extension), reasonable provision should be made for energy efficiency. The building fabric should also be constructed so that there are no reasonably avoidable thermal bridges, nor is there unreasonable unwanted air leakage.

Newly constructed thermal elements need to meet the highest thermal insulation standards (see Table A, page 5).

Note: A thermal element is a wall, floor or roof that separates the internal conditioned space from the external environment.

New thermal elements are mainly constructed in extensions, but can also occur when a building has a change of use.

Replacement thermal elements

When replacing thermal elements, reasonable provision should be made for energy efficiency. The building fabric should also be constructed so that there are no reasonably avoidable thermal bridges, nor is there unreasonable unwanted air leakage.

Replacement thermal elements describe existing elements in an existing building that need to be rebuilt. For pitched roofs, the U-value standards are the same as for new thermal elements, but for flat roofs, walls and floors, the standards are not as demanding (see Table A, page 5).

Renovated thermal elements

When more than 25% of the surface area of an existing element is to be renovated, (e.g. when carrying out a material alteration and/or the work is as a result of a change of use), reasonable provision should be made for energy efficiency.

Renovation means the provision of a new physical layer in the element, or the replacement of an existing layer, but excludes paintwork. Examples of renovation include:

- Addition of a new insulating/ weather-proofing layer
- Replacement of a slate/tile roof covering
- Removal of plaster on a masonry wall and replacement with a dry lining
- Replacement of felt on a flat roof

- Removal of lath and plaster ceilings and replacement with plasterboard.

Renovated thermal elements have the same basic standards as replacement elements, but there is the possibility of a lesser standard being acceptable if the required U-value cannot be achieved without compromising technical, functional or economic feasibility (see notes to Table A on page 5).

OVERVIEW

Retained thermal elements

When part of the existing opaque fabric becomes part of the thermal envelope when it was not before, it is categorised as a retained thermal element and reasonable provision should be made for energy efficiency.

An example of a retained thermal element is where a party wall within a loft space of a terraced or semi-detached house, which has no thermal insulation requirement, becomes an element bounding a heated space once a new habitable room is created within the loft space.

Retained thermal elements need to meet the same basic thermal insulation standards as renovated or replacement thermal elements, where their existing U-values are worse than what are called

“threshold values”– see Table A opposite. However, there is an exception for existing cavity walls, where it is thought reasonable for an existing masonry cavity wall with a nominal 50mm air space to be upgraded to a less stringent standard, i.e. by using retrofit cavity insulation. Another circumstance where a lesser provision might be acceptable is where the weight of the additional insulation might not be supported by the existing structure.

Controlled fittings

When a controlled fitting is to be provided either as a new or replacement item, reasonable provision should be made for energy efficiency.

Controlled fittings, defined as windows, roof windows, rooflights or glazed doors, should be draught-proofed units whose area-weighted average performance is no worse than is shown in Table 2 from AD L1B (reproduced as Table B, opposite), where column (a) applies to new extensions and column (b) to replacement fittings or new fittings installed in an existing dwelling.

The U-values of controlled fittings can be taken either as standard values from BRE Report BR 443, or as specific values relating to the particular size and configuration of the actual fitting. In the absence of other data, refer to Table 6e of SAP 2005.

The *Window energy rating* designation is from the publication *Windows for new and existing housing*, CE 66, published by the Energy Saving Trust.

Controlled services

When controlled services are to be provided, replaced or extended, reasonable provision should be made for them to be energy efficient and to have effective controls.

Heating and hot water systems need to meet certain standards of efficiency as recommended in the *Domestic Heating Compliance Guide* and commissioned correctly with a declaration to this effect being supplied to the local authority by a suitable qualified person. It is envisaged that this declaration will eventually become part of the Home Information Pack (see Providing information, below).

Pipes and ducts need to be insulated at least to the standards set out in the compliance guide referred to above.

Knauf Insulation provides a wide range of insulation products to meet this standard.

Mechanical ventilation systems need to perform no worse than those described in the BRE Good Building Guide GBG 268 and any fixed household air conditioning system needs to have a certain minimum efficiency.

In general, fixed lighting fittings should only be able to receive fluorescent or compact fluorescent lamps, although halogen lamps rated no more than 150W are acceptable as security lamps.

Providing information

Provide operating and maintenance instructions to enable the building and its services to be operated in an energy efficient manner.

The owner of the building should be provided with a set of simple operating and maintenance instructions explaining how to use the installed heating and hot

water system to achieve economy in use. The aim is that this information will eventually form part of the Home Information Pack.

Table A U-values for thermal elements and controlled fittings

Application	Cavity walls	Other external walls	Warm pitched roofs	Cold pitched roofs	Flat roofs	Floors	Windows and rooflights	Glazed doors	Other doors	Notes
New elements in an extension (Table 3 (a) in AD L1B)	0.30	0.30	0.20	0.16	0.20	0.22	1.8	2.2	3.0	Confirmation also required that the construction avoids thermal bridging and minimises air leakage – see below.
Replacement elements in the existing building (Table 3 (b) in AD L1B)	0.35 ¹	0.35 ¹	0.20	0.16	0.25	0.25 ²	2.0	2.2	3.0	Confirmation also required that the construction avoids thermal bridging and minimises air leakage – see below.
Renovated elements in the existing building (Table 3 (b) in AD L1B)	0.35 ¹	0.35 ¹	0.20	0.16	0.25	0.25 ²	-	-	-	Applies where more than 25% of the element is to be renovated. Possible U-value relaxation for technical, functional or economic reasons – see below.
Retained elements in the existing building (Table 4 (b) in AD L1B)	0.55 ³	0.35	0.20	0.16	0.25	0.25	-	-	-	Applies to an element that becomes a thermal element when previously it was not. Possible U-value relaxation for technical, functional or economic reasons – see below.
Threshold U-values (Tables 1 and 4 (a) in AD L1B)	0.70	0.70	0.35	0.35	0.35	0.70	3.3	3.3	3.3	Absolute upper limits when calculating an area-weighted U-value as an alternative way of complying with the requirements for extensions. Upper limits when seeking a U-value relaxation. The upper limits at which retained thermal elements need to be upgraded. For controlled fittings, the upper limit above which windows, roof windows and doors need to be replaced in a building subject to a change of use.

1 A lesser provision may be appropriate where meeting such a standard would result in a reduction of more than 5% in the internal floor area of the room bounded by the wall.

2 A lesser provision may be appropriate where meeting such a standard would create significant problems in relation to adjoining floor levels.

3 This only applies if the wall is suitable for filling with cavity insulation. Where this is not the case, treat as 'Other external walls'.

Windows and doors

In the table above, the heading "windows and rooflights" includes roof windows and the heading "Glazed doors" is for doors that have more than half of their internal face area glazed. The U-value shown is the overall U-value when the frame is included. Other acceptable standards are given in the table below.

Thermal bridging and air leakage

The avoidance of thermal bridging and minimising unwanted air leakage is most easily achieved by using accredited details (see page 6) or by showing that details achieve an equivalent level of performance. A suitable way of demonstrating compliance would be to submit a report by a qualified person that the specified construction is appropriate and that the work has been carried out to that specification.

Possible U-value relaxation

If a solution cannot meet the U-value requirement for technical, functional or economic reasons, a solution with the best possible U-value which has a simple payback of less more than 15 years should be chosen. The U-value should not be worse than the Threshold U-values in the table above.

Table B Reasonable provision when working on controlled fittings

Fitting	(a) Standard for new fittings in extensions	(b) Standard for new or replacement fittings in an existing dwelling
Window, roof window or rooflight	U-value=1.8 W/m ² K OR Window energy rating= Band D OR Centre-pane U-value=1.2 W/m ² K	U-value= 2.0 W/m ² K OR Window energy rating= Band E OR Centre-pane U-value=1.2 W/m ² K
Doors with more than 50% of their internal face area glazed	2.2 W/m ² K	2.2 W/m ² K
Other doors	3.0 W/m ² K	3.0 W/m ² K

OVERVIEW

Pages 6 and 7 explain what the requirements are for an extension to a dwelling and help you to decide which type of work is relevant to your project – and so what U-values are applicable.

Extensions

An extension is a new enclosure created either completely outside the existing building or by enclosing a space that is already partially enclosed, for example by adding a roof to a courtyard. It can be a conventional construction with external walls, windows and a roof or it can be a conservatory. However, if a conservatory is no more than 30m² in area, it need not comply with Part L of the Building Regulations, although any glazing needs to comply with Part N.

The definition of a conservatory is an extension to a building with:

- not less than three quarters of its roof area, and not less than one half of its external wall area, made from translucent material, and
- is thermally separated from the building by walls, windows and doors with the same U-value and draught stripping provisions as provided elsewhere in the building.

If the extension is a conservatory, there are standards for:

- the elements between the existing building and the conservatory
- independent controls for any heating to the conservatory
- the glazed elements of the conservatory (as column (b) in Table B on page 5)
- the opaque elements of the conservatory (as replacement elements in Table A on page 5)

Clearly, the majority of the work for extensions will be constructing **new thermal elements**. However, depending on the design of the building, **renovated, retained** and/or **replacement thermal elements** may also occur in the existing part of the building – use the flow chart opposite to determine if this is the case.

For the **new thermal elements** of the extension, it is possible to comply by meeting the U-value standards (see Table A on page 5) and by limiting the area of glazed elements. Alternatively, in order to benefit from greater design flexibility it is possible either to use a area-weighted average U-value calculation for the extension (see case study 2 on pages 14-15) or use SAP 2005 to demonstrate compliance for the existing building, plus the extension. If the area-weighted average U-value calculation method is chosen the **Threshold U-values** should not be exceeded (see page 5).

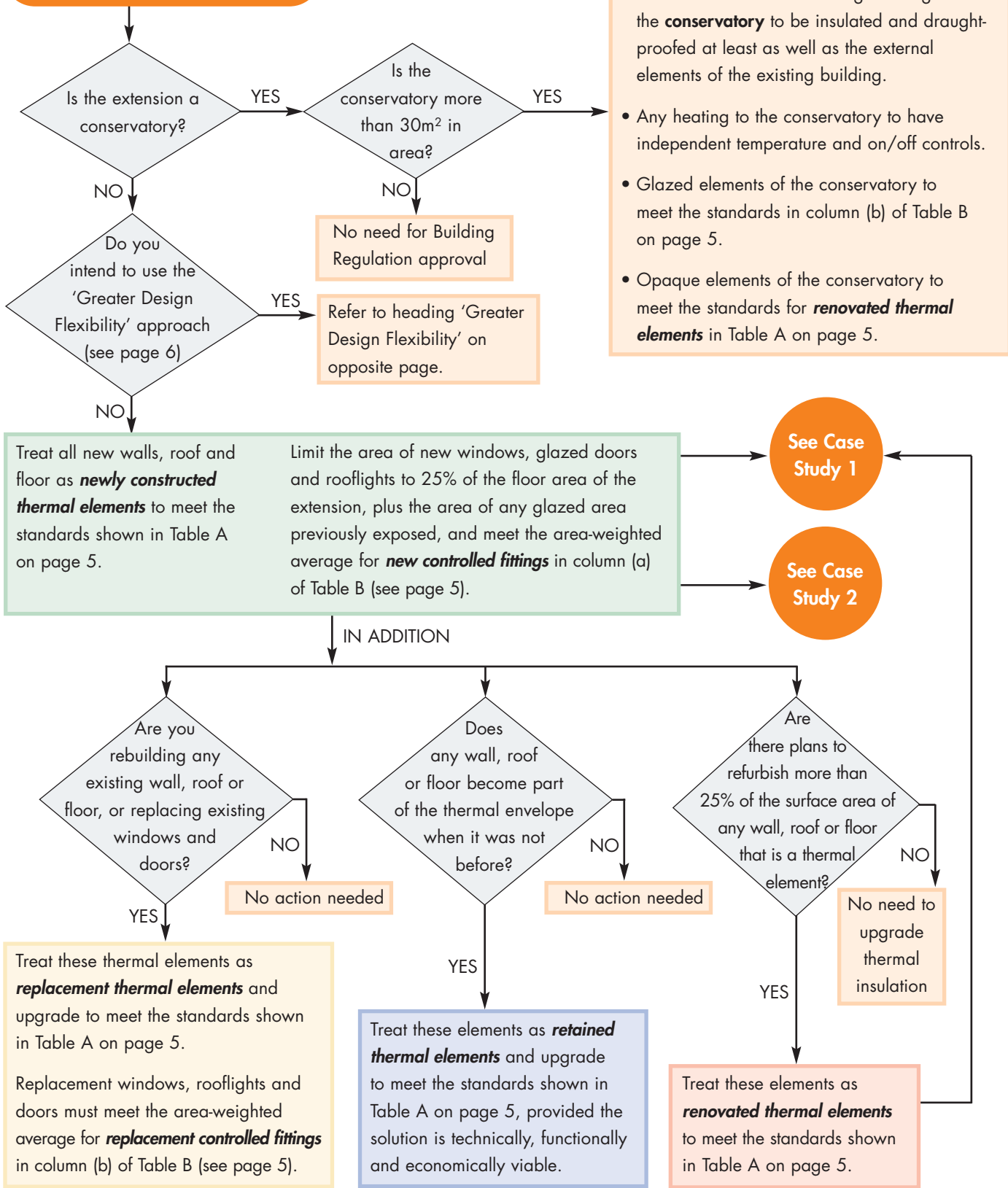
The choices for complying with the regulations, as well as details of how to comply, are shown in the flow chart opposite.

Greater Design Flexibility

There are two alternative ways of complying with Part L1B that offer greater design flexibility than adopting the Elemental U-values:

- Ensure that the area-weighted U-value of all elements in the extension is no greater than that obtained by applying the relevant U-values from Table A on page 5, provided that no element has a worse U-value than the **Threshold U-values** in Table A on page 5 and the glazed area limits are not exceeded.
- Use **SAP 2005** to demonstrate that the calculated CO₂ emission rate for the dwelling with its extension is no greater than the emission rate obtained by applying the fabric insulation standards for the extension and the estimated standards for the existing part of the building.

Find out the requirements for extensions



OVERVIEW

Pages 8 and 9 explain what 'material change of use' is, what the requirements are and help you to decide which type of work is relevant to your project – and so what U-values are applicable.

Material change of use

Under recent amendments to the Building Regulations, a change of use is material when a building (or part of a building) is used as a dwelling, or a series of dwellings when previously it was not.

Typically, for housing, this could mean creating a dwelling (or dwellings) from a building with a previous non-domestic use, e.g. a shop or industrial building. It can also mean converting a single dwelling into flats, or increasing (or reducing) the number of dwellings in a building.

When a building is subject to a change of use, it is likely to involve creating new thermal elements, renovating or replacing existing thermal elements or upgrading other existing elements to be thermal elements.

Any glazed units that have a worse U-value than the threshold value of $3.3 \text{ W/m}^2\text{K}$ need to be brought up to the standard for new or replacement fittings in existing buildings, see column (b) in Table B on page 5.

The choices for complying with the regulations, as well as details of how to comply, are shown in the flow chart opposite.

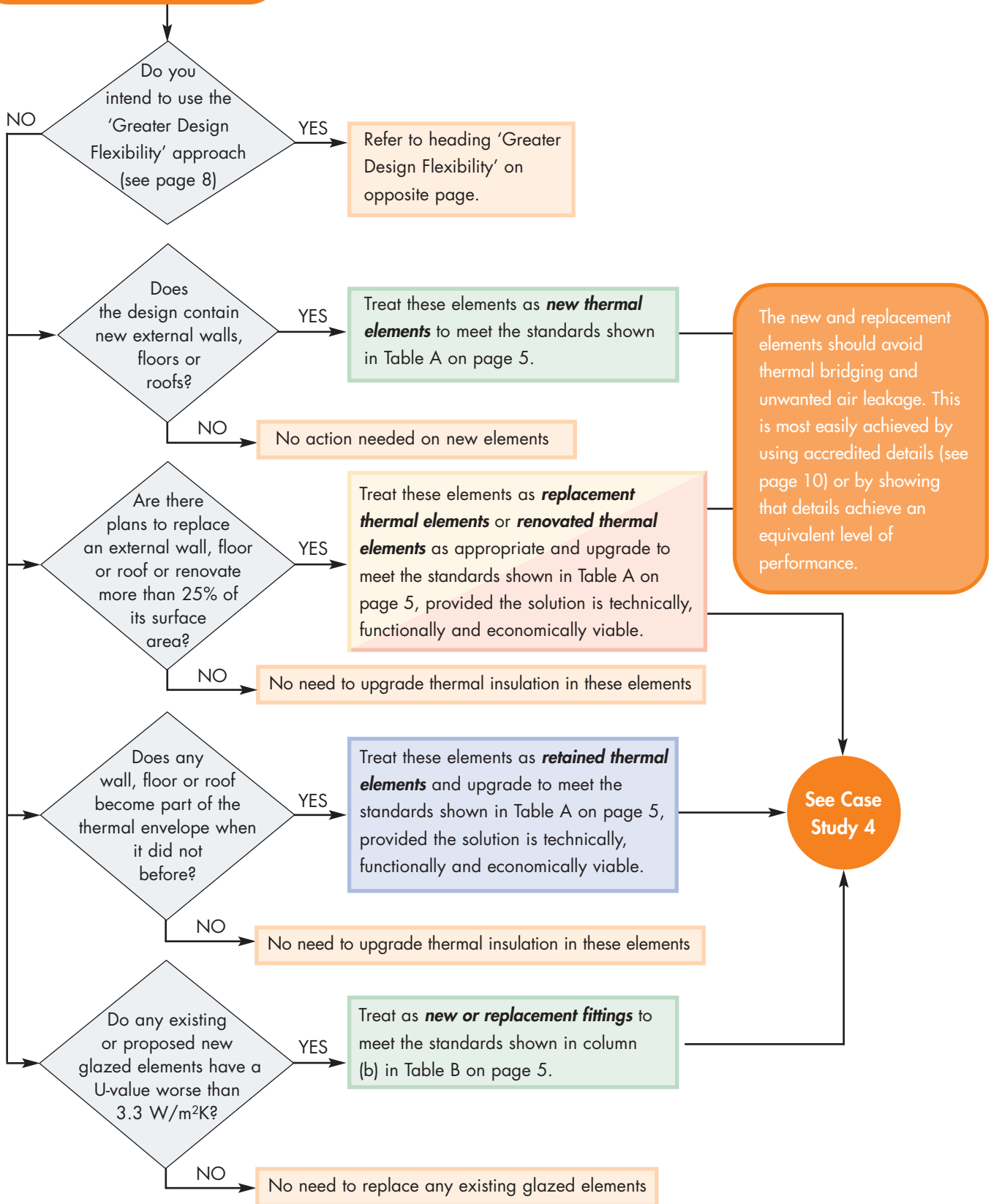
Greater Design Flexibility

There are two alternative ways of complying with Part L1B that offer greater design flexibility than adopting the Elemental U-values:

- Ensure that the area-weighted U-value of all elements in the dwelling is no greater than that obtained by applying the relevant U-values from Table A on page 5, provided that no element has a worse U-value than the **Threshold U-values** in Table A on page 5.
- Use **SAP 2005** to demonstrate that the calculated CO₂ emission rate for the dwelling is no greater than the emission rate obtained by applying the fabric insulation standards from Table A on page 5 and the relevant standards in L1B for controlled fittings and services.



Find out the requirements for material change of use



OVERVIEW

Pages 10 and 11 explain what 'material alteration' is, what the requirements are and help you to decide which type of work is relevant to your project – and so what U-values are applicable.

Material alterations

Alterations are considered to be "material" if during the period of the works, and on completion, they would affect the existing building in respect of the "relevant requirements" in the following parts of the Building Regulations:

- Part A (structure)
- paragraph B1 (means of warning and escape)
- paragraph B3 (internal fire spread – structure)
- paragraph B4 (external fire spread)
- paragraph B5 (access and facilities for the fire service)
- Part M (access to and use of buildings)

Thus, where work is done to an existing building, the work itself must comply with all the current relevant requirements of the Building Regulations, but the existing building must also not be adversely affected.

Examples of material alterations are:

- Removing part of a load-bearing wall that consequently requires the insertion of a beam to carry the load.
- Altering a three-storey house in such a way that additional work is necessary to maintain the means of escape from the third storey.
- Removing part of a wall that is not loadbearing but which is necessary for fire resistance.
- Re-covering a roof with tiles that are heavier than the originals such that there are structural implications.

In respect of alterations that relate to improved thermal insulation measures, the following examples illustrate how the "relevant requirements" might be affected:

- Creating a dormer window for a room-in-the roof loft conversion (A1 – Structure, B1 – Means of escape)

- Adding rainscreen cladding while refurbishing a block of flats (A1 – Structure, B4 – External fire spread).

If any part of the proposed work is designated as being "material", it triggers the need to upgrade thermal elements and glazed elements (controlled fittings) to a standard, which depends on whether the elements are to be **replaced** or **renovated**, or whether they are **retained thermal elements**.

The choices for complying with the regulations, as well as details of how to comply, are shown in the flow chart opposite.

Accredited Details

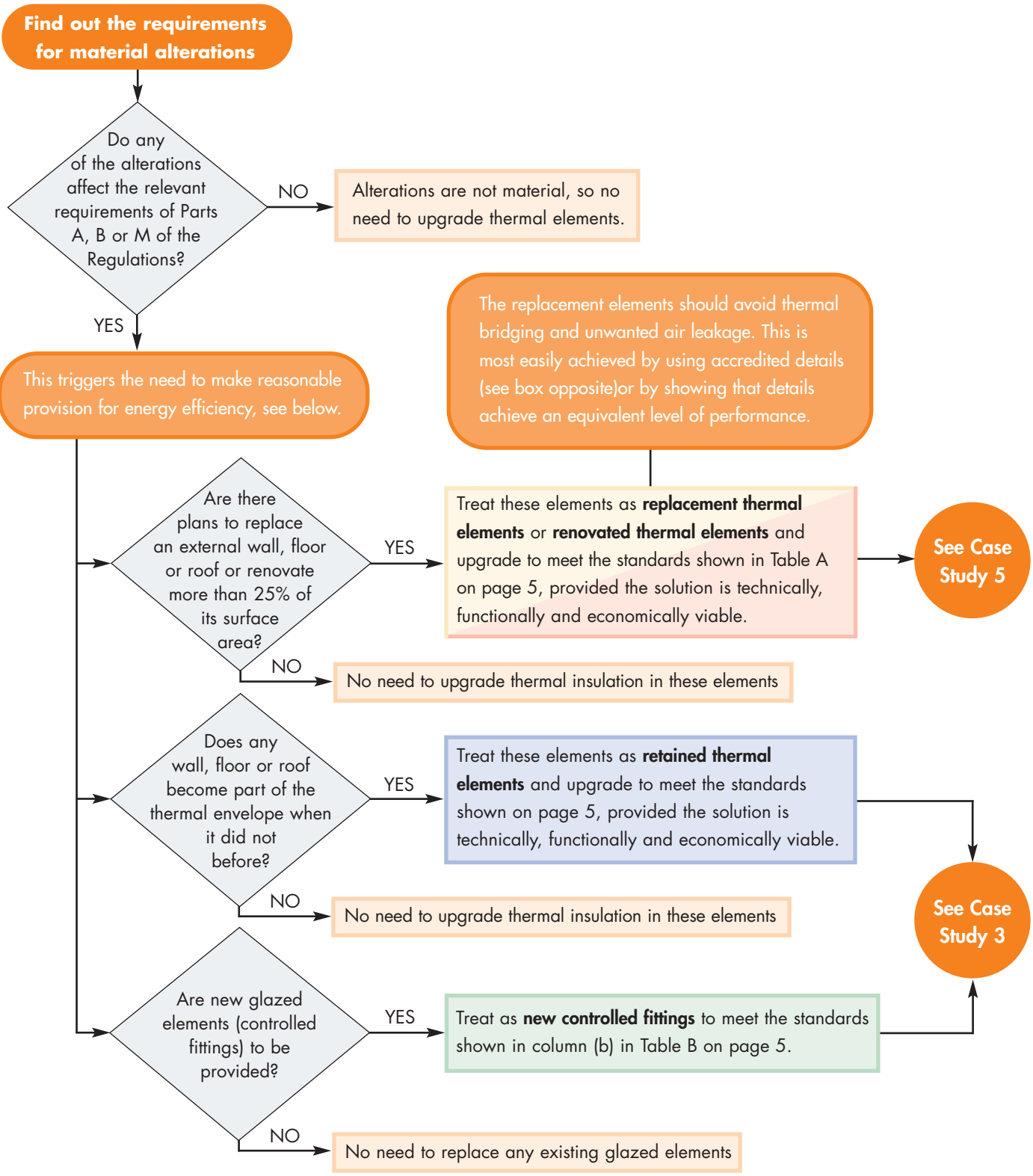
Due to be published before the implementation of Part L1B on April the 6th these details at the time of printing this document are not available. However these are best practice details for minimising thermal bridging and air leakage at openings and at junctions between elements in the dwelling's construction. They replace the old Part L Robust Details.

In new build work, SAP takes account of the degree of thermal bridging at junctions and openings.

It does this by multiplying the overall rate of fabric heat loss by the 'y' value that represents the severity of the thermal bridges. For example, a y value of 0.11 is used for thermal bridging in the notional dwelling. A value of 0.08 is used where Accredited Details are employed.

BRE Information Paper IP17/01 is being updated and will give guidance on assessing the effects of thermal bridging at junctions and around openings.

The Accredited Details publication will include construction checklists that must be completed by a suitably qualified person to demonstrate that the details have been constructed to a satisfactory standard.



CASE STUDIES

The following 10 pages illustrate 5 typical case studies. They help to explain the interpretation on which type of thermal element applies and show constructions that meet or exceed the required U-values.

1. Extension – to rear of 2 bedroom terrace house



Table of improvement measures

Element	U-value ⁽¹⁾	Construction solution
New thermal elements and controlled fittings		
External walls	0.30	Cavity masonry wall with brick outer leaf and inner leaf of lightweight aircrete, the cavity filled with 75mm Crown DriTherm Cavity Slab 34 (Actual U = 0.29 W/m²K)
Ground floor (P/A 0.58)	0.22	Solid concrete floor slab with 75mm Polyfoam Floorboard Standard insulation below the slab (Actual U = 0.22 W/m²K)
Flat roof	0.20	Timber deck with two layers of RocksilK Krimpack Flat Roof Slab, (total thickness 175mm) finished with built-up felt as a warm deck solution (Actual U = 0.19 W/m²K)
Windows	1.8	4:16:4 Double glazed window with low-e coating
External door (glazed more than 50%)	2.2	4:12:4 Double glazed door with low-e coating
Renovated thermal elements		
Ground floor (P/A less than 0.3)	0.25	Solid concrete floor slab with 50mm Polyfoam Floorboard Standard insulation below the slab (Actual U = 0.23 W/m²K)

1. The U-values standards needed to achieve 'reasonable provision' in Approved Document L1B

Description

The owner of a solid walled mid-terraced house plans to build a single-storey back extension to accommodate a modern kitchen and bathroom.

The existing pitched roof of the house is well insulated and in good condition, but the timber suspended ground floor has extensive rot and needs to be replaced. The extension needs to have a flat roof, as a pitched roof would impinge on one of the first floor windows.

Complying with Part L1B

As the external walls, ground floor and roof of the extension are **new thermal elements**, they need to comply with the U-values as shown in Table A on page 5.

The new windows and the new glazed external door to the garden, classed as **controlled fittings**, have to meet the standards in column (a) of Table B (see page 5). In addition, the glazed area for the extension should be no more than the sum of 25% of the floor area of the extension and the area of any existing windows blocked by the new extension, unless this gives insufficient daylighting.

In the existing part of the house, the rotten timber ground floor that is to be replaced is classed as a **renovated thermal element**, as more than 25% of its area needs to be replaced. Its construction needs to meet the U-value standard in Table A on page 5.

The proposed construction

The proposal is to construct the walls of the extension in cavity masonry and insulate using built-in cavity insulation. The ground floor will be insulated below the slab and the flat roof will be insulated above a timber deck as a warm deck construction.

The renovated ground floor of the existing building will be of solid concrete with insulation below the slab.

The Knauf Insulation solutions

The required U-value standards and the Knauf Insulation solutions are shown in the table.

Flat roof

The warm deck insulation solution consists of 100mm of Rocksilk Krimpact Flat Roof Slab bonded to a vapour control membrane and a second layer of 75mm Rocksilk Krimpact Flat Roof Slab bonded to the first layer and finished with a bitumen built-up roofing system to achieve a U-value of 0.19 W/m²K.

Lintel detail

The use of a 'top hat' type lintel minimises thermal bridging. Placing the double glazing in the plane of the wall insulation also helps to reduce the risk of condensation in the corners of the reveals.

Sill detail

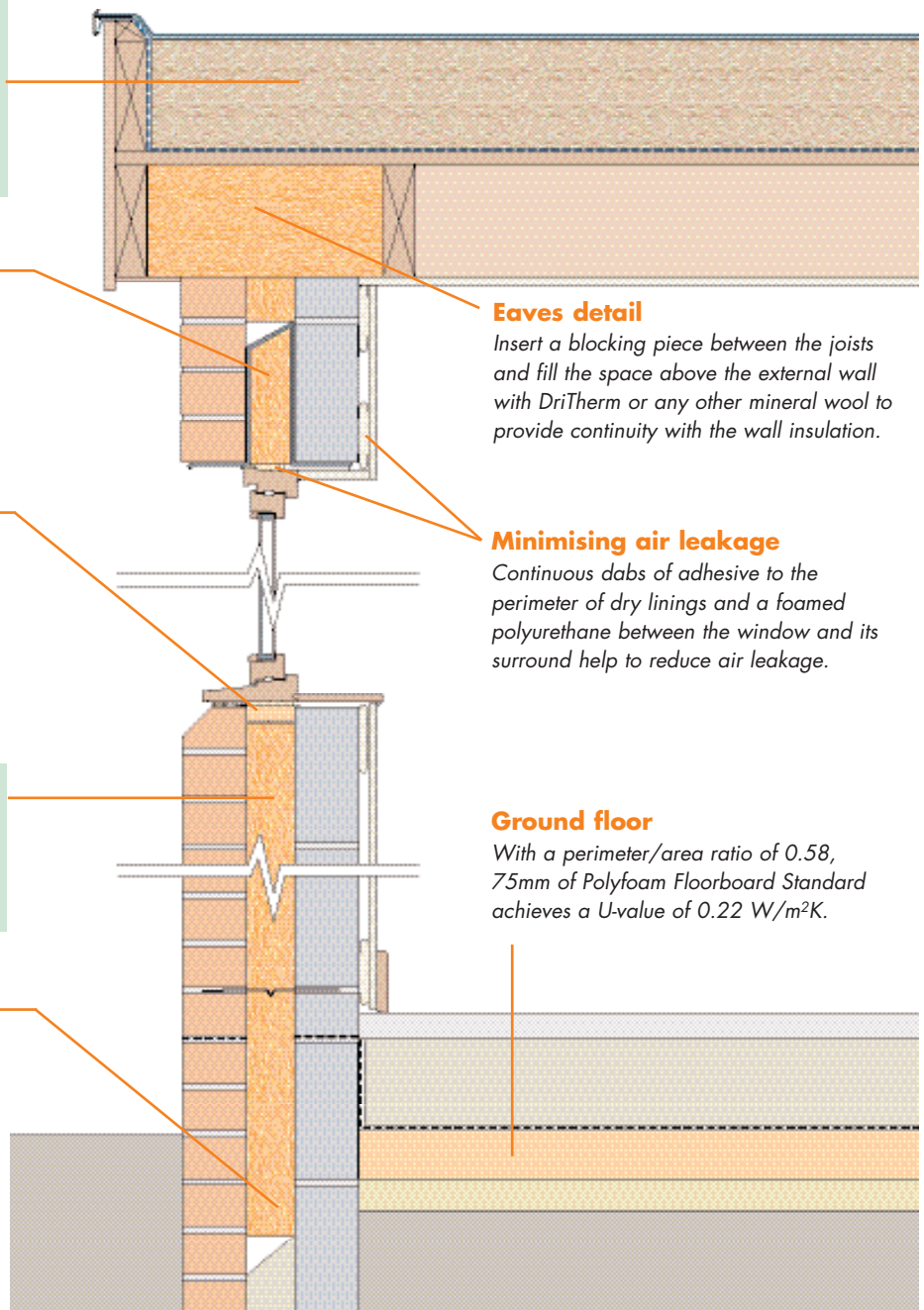
Polyfoam System-Closer is used to enclose the cavity at the sill and jambs. This eliminates any thermal bridge and makes it easier to achieve an airtight seal between the window and inner leaf.

External walls

A brick outer leaf and lightweight aircrete inner leaf filled with 75mm Crown DriTherm Cavity Slab 34 achieves a U-value of 0.29 W/m²K.

Wall/floor junction

The use of lightweight aircrete blockwork for the inner leaf and taking the cavity insulation 225mm below the top of the floor insulation minimises thermal bridging at this junction.



Eaves detail

Insert a blocking piece between the joists and fill the space above the external wall with DriTherm or any other mineral wool to provide continuity with the wall insulation.

Minimising air leakage

Continuous dabs of adhesive to the perimeter of dry linings and a foamed polyurethane between the window and its surround help to reduce air leakage.

Ground floor

With a perimeter/area ratio of 0.58, 75mm of Polyfoam Floorboard Standard achieves a U-value of 0.22 W/m²K.

CASE STUDIES

2. Extension – New bedroom above an existing garage



Table of improvement measures

Element	U-value ⁽¹⁾	Construction solution
New thermal elements and controlled fittings		
External walls	0.30	Cavity masonry wall with brick outer leaf and insulated timber frame system with 90mm Crown Timber Roll between the studs and a low emissivity breather paper (Actual U = 0.33 W/m²K)
Pitched roof (insulated at ceiling level)	0.16	Cold roof with Knauf Breatheline breather underlay and Crown Loft Roll 40 insulation at ceiling level – 100mm insulation thickness between the joists and 200mm above the joists (Actual U = 0.13 W/m²K)
Floor above garage	0.22	Chipboard flooring on 200mm joists, finished on the underside with 6mm calcium silicate board, the space between the joists filled with two layers of Rocksilks Flexible Slab – total insulation thickness 200mm (Actual U = 0.19 W/m²K)
Windows	1.8	4:16:4 Double glazed window with low-e coating

1. The U-values standards needed to achieve 'reasonable provision' in Approved Document L1B

Description

A builder is building an extension to create a new first storey over an existing attached single-story garage. The external walls and the pitched roof of the extension are new build. The roof of the garage has to be removed and a new intermediate floor constructed with deeper floor joists and at a level to coincide with the first floor of the house.

The proposed U-value of 0.33 W/m²K for the new external walls is worse than the standard elemental U-value for new wall elements, so an area-weighted average of the thermal elements must be used to show compliance.

Complying with Part L1B

The external walls and the roof are **new thermal elements**. The floor is also a **new thermal element** because it is newly constructed at a different level from the ceiling joists of the existing garage roof. The area-weighted heat loss from these elements should be no worse than adopting the standard U-values from Table A on page 5.

The new windows, called **controlled fittings** in the Approved Document, have to meet the standards in column (a) of Table B on page 5). In addition, the glazed area for the extension should not exceed 25% of the floor area of the extension, plus the area of any existing windows blocked by the new extension. In this case, the extension is not blocking any existing windows in the gable end.

The proposed construction

In order to minimise the additional load on the existing foundations, the proposal is to use a timber frame for the inner leaf of the external walls of the second storey, but raise the brick facing of the garage to be the outer leaf of the timber frame structure. The floor structure will be timber joists and the roof will be insulated at ceiling level.

Note that the proposed U-value of 0.33 W/m²K for the new external walls exceeds the standard elemental U-value of 0.30 W/m²K for new wall elements, but the area-weighted average heat loss for the thermal elements is less than using the standard elemental U-values – see table on opposite page.

The Knauf Insulation solutions

The required U-value standards and the Knauf Insulation solutions are shown in the table above.

Pitched roof

Knauf Breatheline as tiling underlay. Roof insulated with two layers of Crown Loft Roll 40, 100mm between the ceiling joists and 200mm over the ceiling joists achieves a U-value of 0.13 W/m²K.

External wall

Timber frame construction with 90mm Crown Timber Roll between the timber studs, low emissivity breather membrane, 50mm cavity and the brick outer cladding achieves a U-value of 0.33 W/m²K.

Calculation of fabric heat loss

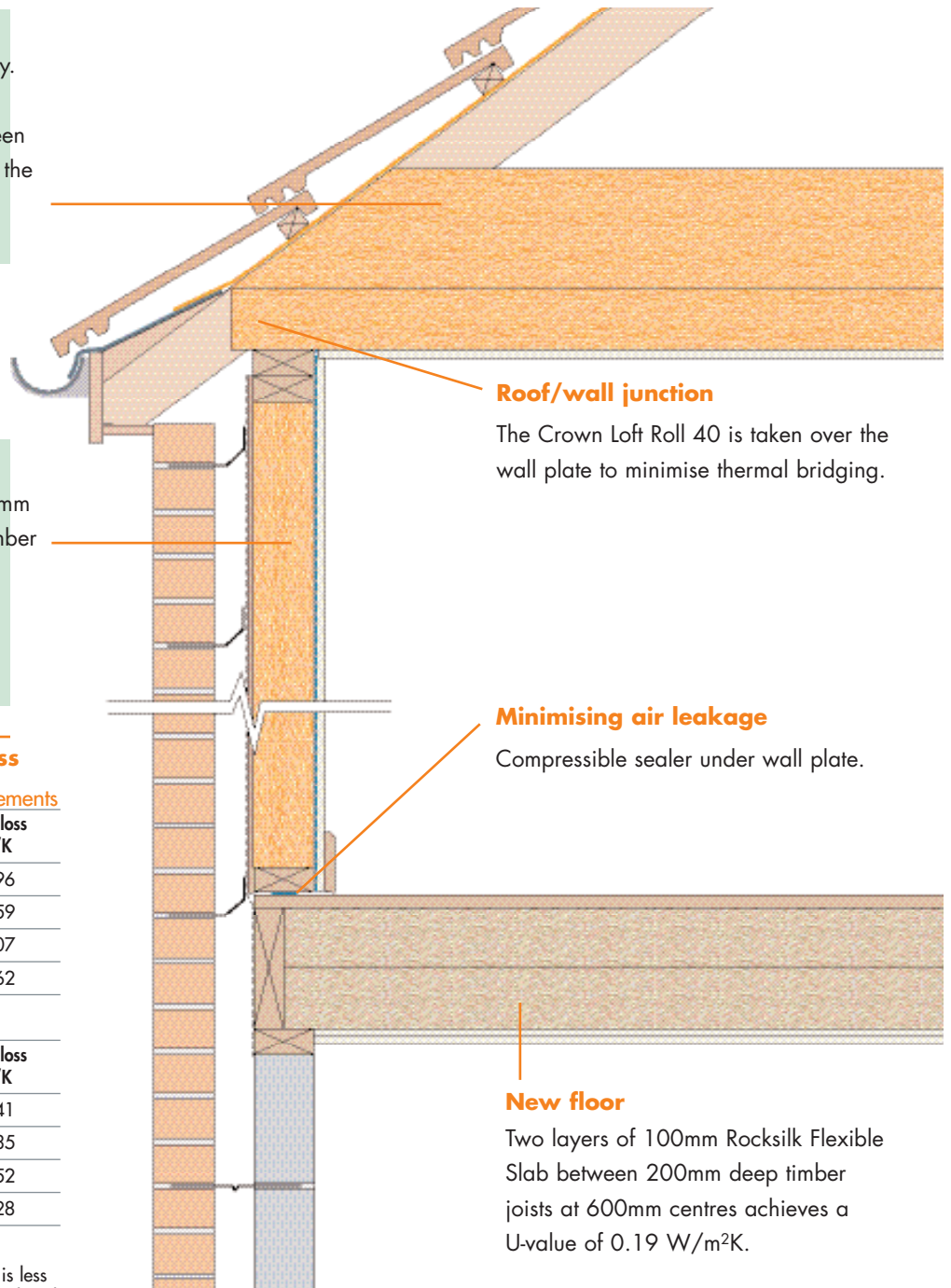
Using standard U-values for new elements

	Area m ²		Standard U-value		Heat loss W/K
Roof	18.5	x	0.16	=	2.96
Wall	25.3	x	0.30	=	7.59
Floor	18.5	x	0.22	=	4.07
Total heat loss					14.62

Using proposed U-values

	Area m ²		Proposed U-value		Heat loss W/K
Roof	18.5	x	0.13	=	2.41
Wall	25.3	x	0.33	=	8.35
Floor	18.5	x	0.19	=	3.52
Total heat loss					14.28

The heat loss from the proposed U-values is less than if the standard U-values had been used and therefore the area-weighted average complies with the requirements of the Approved Document.



Roof/wall junction

The Crown Loft Roll 40 is taken over the wall plate to minimise thermal bridging.

Minimising air leakage

Compressible sealer under wall plate.

New floor

Two layers of 100mm Rocksilk Flexible Slab between 200mm deep timber joists at 600mm centres achieves a U-value of 0.19 W/m²K.

3. Material alteration – Loft conversion



Description

A builder is proposing to create a room in the loft of a semi-detached property, which at present is insulated at ceiling level. The gable wall of the building up to the ridge of the roof will become an external wall to the new room and the solid block party wall within the existing loft space will need to be insulated. New dormer windows will be created on one side of the roof.

Complying with Part L1B

In this building, there are three elements that become part of the thermal (heated) envelope when previously they were not:

- the gable wall,
- the solid block party wall within the loft space and
- the sloping roof

These elements are, therefore, classed as **retained thermal elements** and need to be improved to meet the standards in

Table of improvement measures

Element	U-value ⁽¹⁾	Construction solution
New thermal elements and controlled fittings		
Roof to dormers (insulated between rafters)	0.20	Rafter level warm roof with 150mm Crown Rafter Roll 32 between the rafters and an inner lining of 25.5/9.5 Polyfoam Linerboard (Actual U = 0.20 W/m ² K)
Cheeks of dormers	0.30	Timber stud wall finished with tile hanging externally, insulated with 75mm Polyfoam Raftersqueeze between the studs and finished internally with 36/9.5 Polyfoam Linerboard. (Actual U = 0.30 W/m ² K)
Windows	1.8	4:16:4 Double glazed window with soft low-e coating
Retained thermal elements		
Pitched roof (insulated between rafters)	0.20	Rafter level warm roof with 130mm Crown Rafter Roll 32 between the rafters and an inner lining of 36/9.5 Polyfoam Linerboard (Actual U = 0.20 W/m ² K)
Party wall in loft space	0.35	Metal-framed AcoustiTherm Independent Lining System, with 75mm Crown AcoustiTherm Wall Roll (Actual U = 0.26 W/m ² K), allowing for shelter factor of adjoining loft space)

1. The U-values standards needed to achieve 'reasonable provision' in Approved Document L1B

Table A on page 5, provided their existing U-value are worse than the **Threshold U-value**.

In this example, since the existing U-value of the cavity-insulated gable wall is 0.52 W/m²K, it is better than the **Threshold U-value** for a wall (0.70 W/m²K) and no additional insulation is necessary. On the other hand, the party wall and the sloping roof are un-insulated so need to be improved to the values in Table A on page 5. Because the other side of the party wall is a ventilated space, it is possible to allow for a shelter factor.

As the pitched roof and cheeks of the dormer window will be **new thermal elements**, they need to comply with the U-values in Table A on page 5.

The proposed construction

The proposal is to insulate the sloping roof between, and below, the rafters from eaves to ridge with no dwarf stud walls. The gable wall will simply receive a finish of dry lining and the party wall will be insulated using an independent lining system which is designed to be fixed to walls which have an irregular surface that is unsuitable for dry lining.

The roof of the dormer will be insulated in the same way as the sloping roof and the dormer cheeks will be timber frame, twin insulated and finished externally with tiles to match the existing roof.

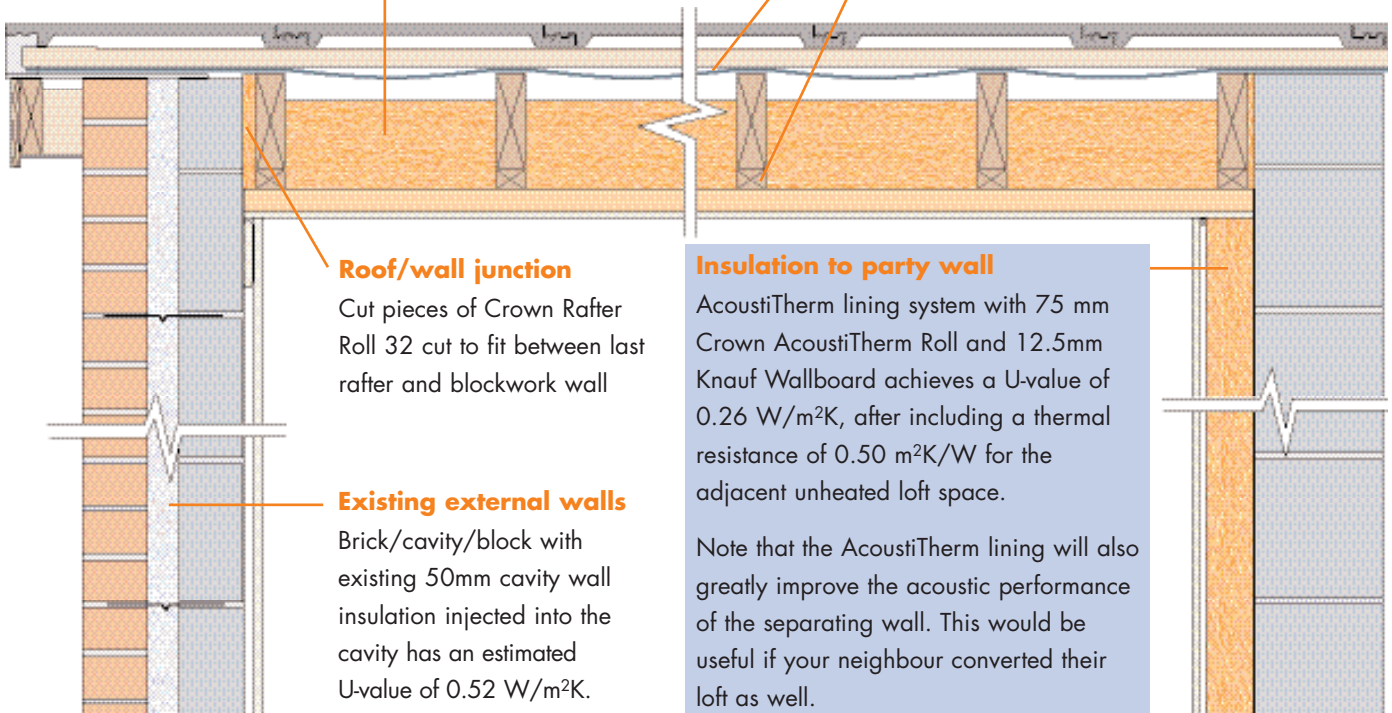
The Knauf Insulation solutions

The required U-value standards and the Knauf Insulation solutions are shown in the table above.

Pitched roof

130mm Crown Rafter Roll 32 between the rafters and 36/9.5mm Polyfoam Linerboard as the internal lining achieves a U-value of 0.20 W/m²K.

Existing roofing underlay and tiling retained
30mm deep battens added to rafter to make rafters deep enough to accept 130mm insulation and 50mm ventilation space



Roof/wall junction

Cut pieces of Crown Rafter Roll 32 cut to fit between last rafter and blockwork wall

Existing external walls

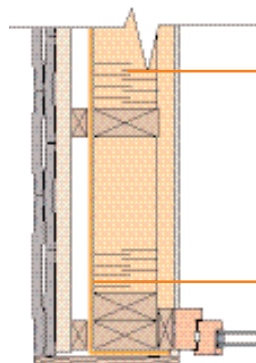
Brick/cavity/block with existing 50mm cavity wall insulation injected into the cavity has an estimated U-value of 0.52 W/m²K.

Insulation to party wall

AcoustiTherm lining system with 75 mm Crown AcoustiTherm Roll and 12.5mm Knauf Wallboard achieves a U-value of 0.26 W/m²K, after including a thermal resistance of 0.50 m²K/W for the adjacent unheated loft space.

Note that the AcoustiTherm lining will also greatly improve the acoustic performance of the separating wall. This would be useful if your neighbour converted their loft as well.

Section through gable wall, pitched roof and party wall



Dormer cheek

75mm Polyfoam Raftersqueeze between studs and 36/9.5mm Polyfoam Linerboard as the internal lining achieves a U-value of 0.30 W/m²K.

Knauf Breatheline as breather membrane.

Plan detail through dormer cheek

4. Change of use – Warehouse conversion to flats



Description

A developer intends to convert an old warehouse building into flats. The building has solid brick external walls, concrete intermediate floors supported by cast iron columns, a concrete ground floor and a pitched roof with a covering of slates.

The external walls have deeply splayed reveals and, because the facade is of architectural interest, the developer has chosen a system of internal thermal insulation.

Complying with Part L1B

In fitting out this building, it will be necessary to build new walls between the flats and the common parts, which are enclosed but unheated. These will be **new thermal elements** and will need to comply with the U-values in Table A on page 5, although when choosing a suitable insulation thickness, it will be possible to allow for a shelter factor.

Table of improvement measures

Improvement	U-value ⁽¹⁾	Solution
New thermal elements		
Walls between flats and common parts	0.30	Metal-framed separating wall insulated with two layers of 60mm RocksilK Flexible Slab (Actual U = 0.25 W/m ² K, after allowing for shelter factor)
Replacement controlled fittings		
Windows	2.00	4:1 6:4 Double glazed window with low-e coating
Renovated thermal elements		
External walls	0.35	Existing brick walls insulated internally with AcoustiTherm Independent Lining System, using 75mm Crown AcoustiTherm Wall Roll (Actual U = 0.33 W/m ² K)
Window reveals	-	Brick reveals insulated with 25/9.5 Polyfoam Linerboard to avoid thermal bridging (Typical U = 0.68 W/m ² K)
Ground floor (P/A 0.3)	0.25	Solid concrete floor slab, insulated with 50mm Polyfoam Floorboard Standard above the slab and finished with a screed (Actual U = 0.23 W/m ² K)
Pitched roof (insulated between rafters)	0.20	Rafter level warm roof with 150mm Crown Rafter Roll 32 between the rafters and an inner lining of 25.5/9.5 Polyfoam Linerboard (Actual U= 0.20 W/m ² K)

1. The U-values standards needed to achieve 'reasonable provision' in Approved Document L1B

As it is necessary to add a new construction layer to more than 25% of the area of both the external walls and the ground floor, these elements are **renovated thermal elements** and their construction needs to meet the U-value standards in Table A on page 5. Similarly, more than 25% of the slates on the pitched roof need to be replaced, making the roof also a **renovated thermal element**.

The existing windows are single glazed in steel frames with a typical U-value of 5.8 W/m²K. In the requirements for change of use, any glazed element with a U-value worse than 3.3 W/m²K, which will form part of the thermal envelope, needs to be treated as a **replacement controlled fitting** and, therefore, meet the standards in column (b) of Table B on page 5.

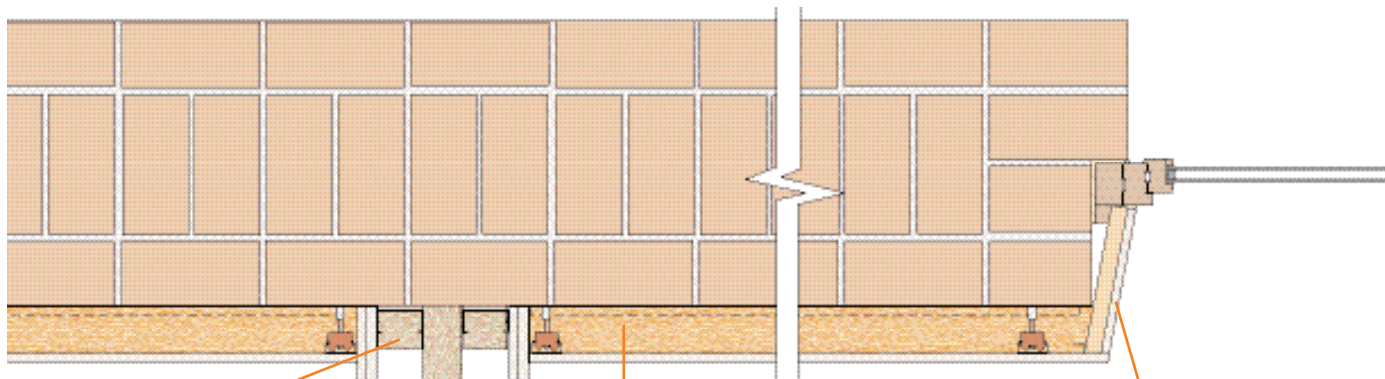
The proposed construction

All new or renovated wall elements will be based on metal frame construction for reduced loading, speed of erection and compatibility with the new steel-framed cavity separating wall construction.

The Knauf Insulation solutions

The required U-value standards and the Knauf Insulation solutions are shown in the table above.

The Polyfoam Floorboard is available grooved to accept underfloor heating pipework, as shown in the section on the page opposite.



Minimising thermal bridging

Pieces of Rocksilks Slab to ensure continuity of insulation.

Separating walls

Twin 70mm steel stud framing with 60mm Rocksilks Flexible Slab and two layers of 15mm thick Knauf Soundshield each side.

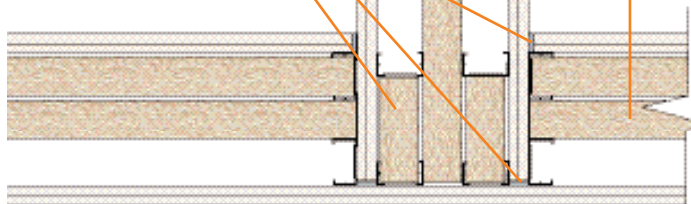
Minimising flanking sound

Acoustic sealant at joints between plasterboard and Rocksilks Slab between studs

External walls
Insulated internally with AcoustiTherm system, using 75mm thick Crown AcoustiTherm Roll, achieves a U-value of 0.33 W/m²K.

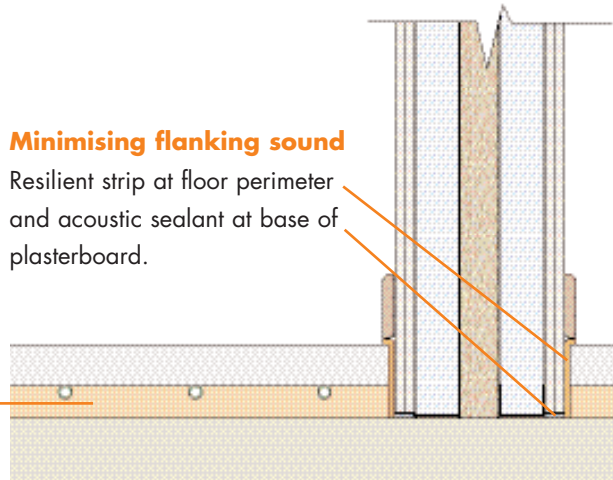
Window reveals
Polyfoam Linerboard to window reveal to minimise thermal bridging. Gap between window frame and brickwork sealed with expanding foam to minimise air leakage.

Insulating walls between flats and common areas
60mm Rocksilks Flexible Slab between 70mm steel stud framing and 60mm Rocksilks Flexible Slab friction fitted steel studs and faced with two layers of 15mm thick Knauf Soundshield each side, achieves a U-value of 0.25 W/m²K, after including a thermal resistance of 0.43 m²K/W for the adjacent unheated access corridor.



Plan through external wall and new separating walls

Ground floor
50mm Polyfoam Floorboard, grooved to accept underfloor heating pipes (as in the Osma Underfloor Heating range of systems) with 65mm sand/cement screed, achieves a U-value of 0.23 W/m²K.



Minimising flanking sound

Resilient strip at floor perimeter and acoustic sealant at base of plasterboard.

Detail section at ground floor/separating wall

5. Refurbishment of block of flats



Table of improvement measures

Improvement	U-value ⁽¹⁾	Solution
Renovated thermal elements		
External walls	0.35	Existing concrete frame with masonry infill panels insulated with 100mm Rocksilk Rainscreen Slab behind a rainscreen cladding system (Actual U = 0.35 W/m ² K)
Exposed floors	0.25	Existing solid concrete floor slab with 130/6mm Rocksilk Soffit Linerboard below the slab (Actual U = 0.25 W/m ² K)
Flat roof	0.25	Existing solid concrete roof slab with a new asphalt waterproof membrane with 120mm Polyfoam Roofboard Extra insulation, covered by Polyfoam Slimline membrane, drainage reservoir, filter membrane and growing medium for planting (Actual U = 0.23 W/m ² K)

1. The U-values standards needed to achieve 'reasonable provision' in Approved Document L1B

Description

A local authority is planning to upgrade an existing block of flats to provide modern standards of sanitary accommodation and thermal insulation. The dwellings having suffered from persistent condensation and mould growth and are expensive to heat.

As the facade is not particularly attractive, the preferred solution for the external walls is to apply a cladding system to the exterior. The exposed floors are to be thermally upgraded and the asphalt flat roof covering also needs to be replaced.

The improvements to the thermal envelope are primarily to provide affordable heating for the tenants.

Complying with Part L1B

As more than 25% of the area of the external wall (in this case, 100%) is to receive a new cladding layer, this is a **renovated thermal element**, and the construction needs to meet the U-value standard in Table A on page 5. Similarly, the exposed floors and the flat roof are also **renovated thermal elements** and will also need to meet the U-value standards in Table A on page 5.

There is no need to alter any controlled fittings as the windows were replaced with new frames and double-glazed units only a few years ago. Even if these windows were still single-glazed, there would be no mandatory obligation to replace them with more energy efficient units. However, if more than 25% of them were in such poor condition that they needed to be replaced, there would be a requirement to replace them all.

The proposed construction

The proposal is to add insulated rainscreen cladding to the existing concrete framed external wall. The exposed floors will be insulated below the concrete slab and the flat roofs will be insulated using a "green roof" warm deck protected membrane system. The structural engineers have confirmed that the structure is capable of supporting the additional roof load.

The Knauf Insulation solutions

The required U-value standards and the Knauf Insulation solutions are shown in the table above.

Wall/roof junction

Rocksilk Rainscreen Slabs carried over upstand and butted up against Polyfoam High Impact and Upstand Board to minimise thermal bridging.

External walls

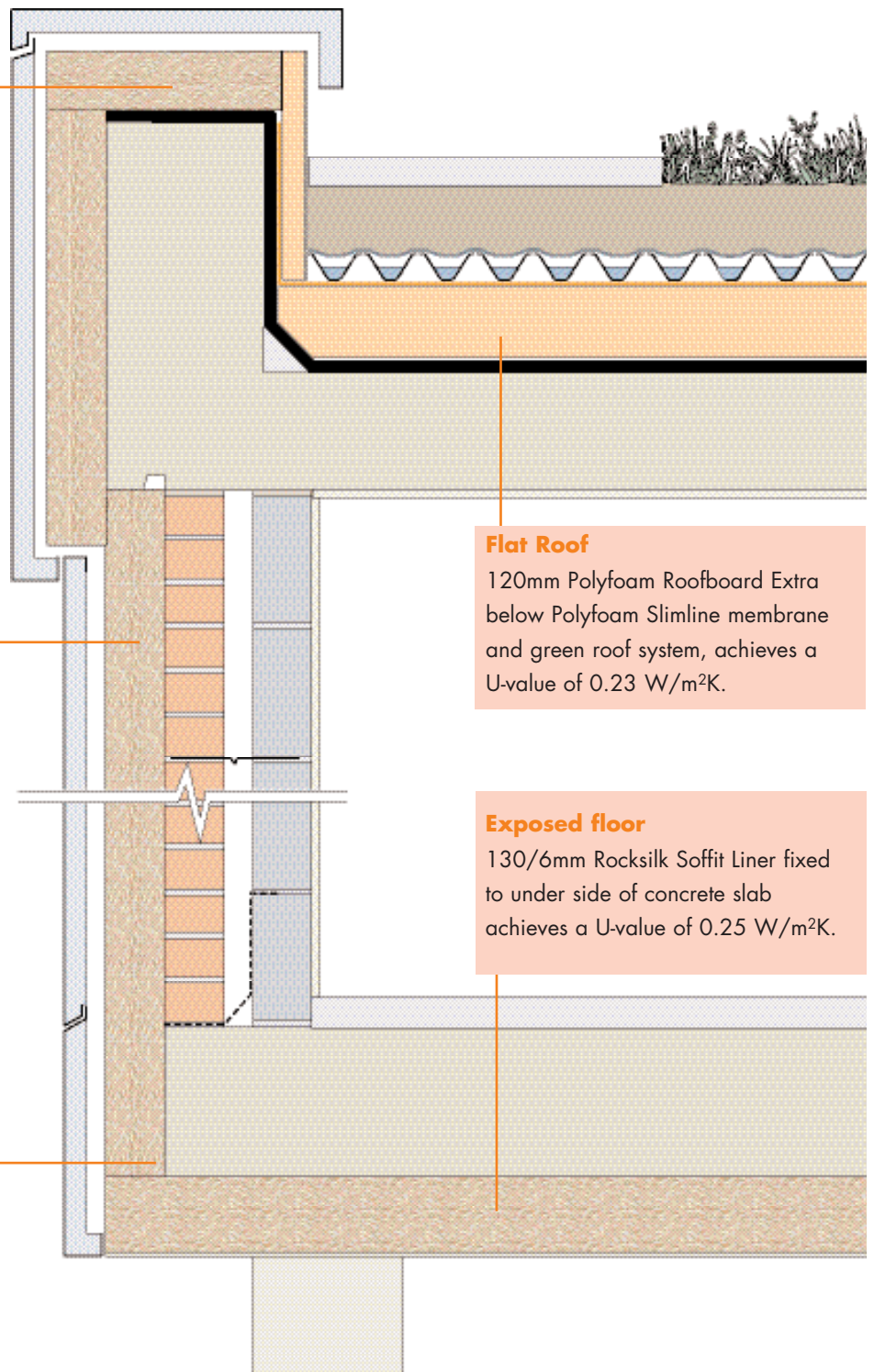
100mm Rocksilk Rainscreen Slabs fixed back to existing structure and protected by rainscreen cladding system, achieving a U-value of 0.35 W/m²K.

Note that the thermal bridging of the wall insulation by the rainscreen metal carrier system will seriously affect the overall U-value of the wall.

Always refer to the rainscreen system manufacturer for confirmation of the actual U-value.

Wall/floor junction

The wall and floor insulation to butt up against each other with no gaps to minimise thermal bridging at corner.



Flat Roof

120mm Polyfoam Roofboard Extra below Polyfoam Slimline membrane and green roof system, achieves a U-value of 0.23 W/m²K.

Exposed floor

130/6mm Rocksilk Soffit Liner fixed to under side of concrete slab achieves a U-value of 0.25 W/m²K.

HOW KNAUF CAN HELP

As the manufacturer of the largest range of thermal insulation products in the UK, Knauf Insulation recognise the need for advice and guidance to ensure that the most appropriate product is used in the right way to achieve optimal energy and cost efficiency. Knauf Insulation have therefore developed a range of services to help its customers, which are described below.

With the confusing array of insulation choices on the market today, our primary intention is to share our knowledge and expertise, empowering our customers to make the most appropriate product selection.

CPD Seminars

As a member of the RIBA CPD Providers Network, Knauf offers CPD essential training designed to maintain, enhance and increase the knowledge and skills of the professional to the benefit of his or her capabilities.

Early in 2006, Knauf Insulation will be offering On Line Learning Modules and CPD seminars on how to comply with the new Part L1B.

Training programme

Successful compliance with Part L1B will require specifiers and contractors to update their knowledge of the Regulations and the constructions required to achieve compliance. Knauf Insulation recognises its responsibility to support the specifier and contractor with comprehensive training:

- Explanation of Building Regulations, including Part L (Section 6 in Scotland) and Part E (Section 5 in Scotland), with details of methods of compliance and appropriate solutions
- A well-informed 'best practice' approach to education, preparing you for virtually every eventuality
- Clear information, support and on-line learning is also available at www.knaufinsulation.co.uk

Technical Advisory Centre

Our Technical Advisory Centre, offers ongoing, high level technical support including NBS specification clauses and documents and CAD drawings.

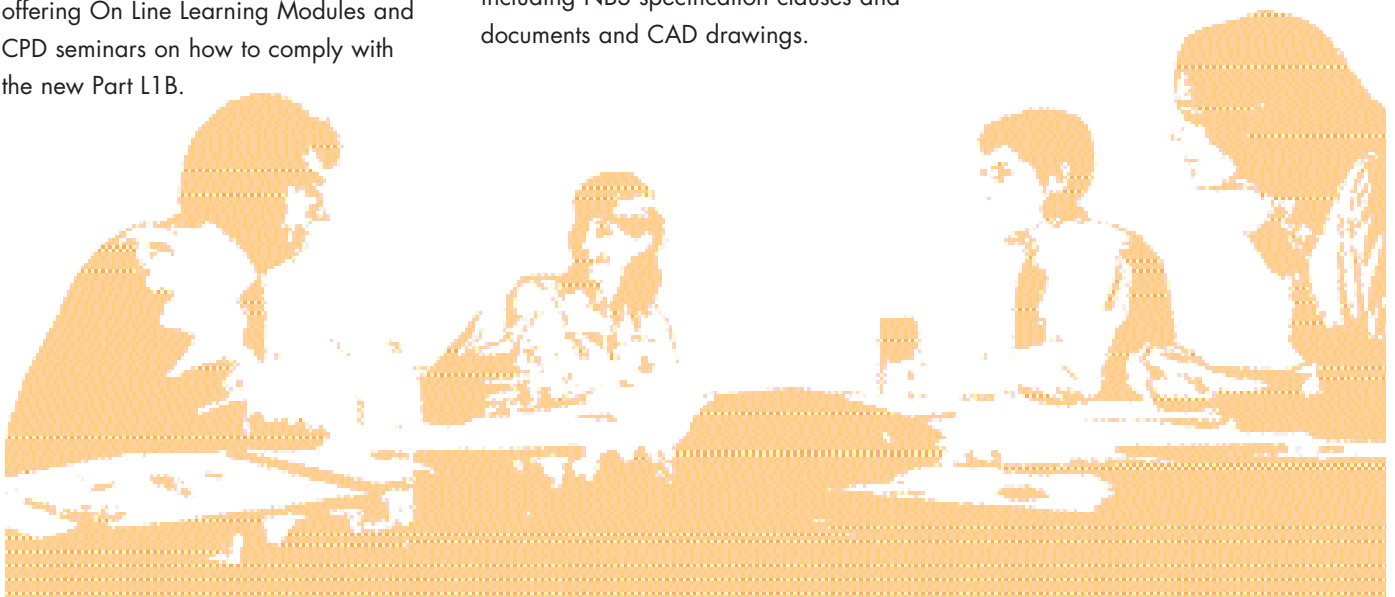
Knauf Insulation On-Line Calculation Zone

The Knauf Insulation On-Line Calculation Zone is a series of free to use software programmes developed by Knauf Insulation. This will include the following features:

- BRE approved SAP 2005 calculation tool
- U-value calculator which also includes condensation analysis routine. The U-value calculator is pre-loaded with roof, wall and floor constructions that cover most constructions situations, and a comprehensive product database including common building materials and the Knauf Insulation product range.

Project and Specification Managers

Knauf Insulation have a team of Project and Specification Managers covering all parts of the country. Their role is to provide cost-effective solutions to specifiers for thermal insulation, acoustic insulation and fire protection.



Knauf Insulation publications for housing



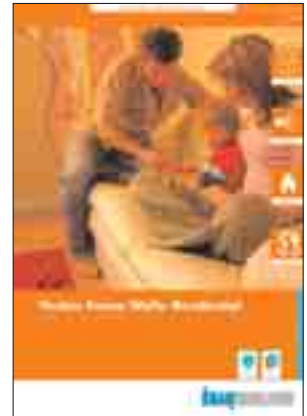
Pitched roofs



Loft conversions



Masonry cavity walls



Timber frame external walls



Masonry solid walls



Internal partition walls



Separating walls



Basement walls



Ground Floors



Upper floors



Separating and internal floors

To obtain copies of these brochures, either telephone 0870 668 660, or visit the download section of our web site, which contains pdfs of the full range of our brochures.

This information booklet is complemented by comprehensive specification and application system recommendations in the Knauf Insulation Guide, available through visiting our website.

Customer Service (Sales)

Tel: 0844 800 0135

Fax: 01744 612007

E-mail: sales@knaufinsulation.com

Technical Advisory Centre

Tel: 01744 766666

Fax: 01744 766667

E-mail: tech@knaufinsulation.com

Literature

Tel: 08700 668 660

Fax: 0870 400 5797

E-mail: info@knaufinsulation.com

Website

www.knaufinsulation.co.uk

Knauf Insulation Ltd

PO Box 10

Stafford Road

St Helens

Merseyside

WA10 3NS