

The Building Bye-Laws (Jersey) 2007

**TECHNICAL GUIDANCE DOCUMENT  
11.1B**

**PART 11  
CONSERVATION OF FUEL AND POWER  
IN EXISTING DWELLINGS**

2016  
EDITION

## **Main Changes in the 2016 edition**

This technical guidance document, Technical Guidance Document 11.1B: Conservation of fuel and power in existing dwellings supports the energy efficiency requirements of the Building Bye-laws. This technical guidance document takes effect on 18th July 2016 and applies to applications for building permission submitted on or after that date.

The main changes in this technical guidance document are that:

### **Changes in the legal requirements**

1. The requirements for consequential improvements to existing buildings have been extended to include dwellings where the proposed work consists of an extension.
2. Requirements relating to the renovation or replacement of thermal elements amended.
3. New bye-law requiring information to be provided to building owner about the building and the fixed building services.

### **Changes in the technical guidance**

1. The main technical changes comprise a general strengthening of energy efficiency standards that are considered reasonable for work on thermal elements, controlled fittings and controlled services in existing buildings.
2. Additional guidance is given for historic and traditional buildings which may have an exemption from the energy efficiency requirements or where special considerations apply.
3. Amended guidance is given where an extension is a conservatory or porch that is not exempt from the energy efficiency requirements.
4. The guidance for the renovation of a thermal element through the provision of a new layer or through the replacement of an existing layer has been expanded.
5. Guidance is provided for swimming pool basins (walls and floor) in existing buildings.

## WHAT IS A TECHNICAL GUIDANCE DOCUMENT?

The Minister for Environment has approved a series of documents that give practical guidance about how to meet the requirements of the Jersey Building Bye-laws. Technical guidance documents give guidance on each of the technical requirements of the Building Bye-laws and on Bye-law 7.

A list of all technical guidance documents that have been approved and issued by the Environment Minister can be obtained from the States of Jersey website: [www.gov.je](http://www.gov.je).

Technical guidance documents set out what, in ordinary circumstances, may be accepted as reasonable provision for compliance with the relevant requirements of the Building Bye-laws to which they refer. If you follow the guidance in a technical guidance document, there will be a presumption of compliance with the requirements covered by the guidance. However, compliance is not guaranteed; for example, 'normal' guidance may not apply if the particular case is unusual in some way.

Note that there may be other ways to comply with the requirements – *there is no obligation to adopt any particular solution contained in a technical guidance document*. If you prefer to meet a relevant requirement in some other way than described in a technical guidance document, you should discuss this with the department.

In addition to guidance, some technical guidance documents include provisions that must be followed exactly, as required by Building Bye-laws or where methods of test or calculation have been prescribed by the Minister.

Each technical guidance document relates only to the particular requirements of the Building Bye-laws that the document addresses. However, building work must also comply with any other applicable requirements of the Building Bye-laws.

## HOW TO USE THIS TECHNICAL GUIDANCE DOCUMENT

This document uses the following conventions.

- a. **Text against a blue background** is an extract from the Building Bye-laws (Jersey) 2007, as amended. These extracts set out the legal requirements of the bye-laws.
- b. **Key terms, printed in bold blue text** are defined in Appendix A.
- c. When the technical guidance document refers to a named standard or other document, the relevant versions are listed in Appendix B (documents referred to) and Appendix C (standards referred to) respectively. However, if the issuing body has revised or updated the listed version of the

standard, you should use the new version as guidance provided that it continues to address the relevant requirements of the Building Bye-laws.

- d. *Additional commentary in italic text* appears after some numbered paragraphs. This commentary is intended to assist understanding of the immediately preceding paragraph or sub-paragraph, or to direct readers to sources of additional information, but is not part of the technical guidance itself.
- e. Where reference is made to using the CO<sub>2</sub> emission factors given in SAP 2012 in the technical guidance documents or associated building services guides, that reference should be construed as meaning the CO<sub>2</sub> emission factors given in Appendix E to the technical guidance document 11.1B.

*Standards and technical approvals may also address aspects of performance or matters that are not covered by the Building Bye-laws, or they may recommend higher standards than required by the Building Bye-laws.*

The following is a high level summary of the Building Bye-laws relevant to most types of building work. Where there is any doubt you should consult the full text of the Building Bye-laws, available at [www.gov.je](http://www.gov.je).

## BUILDING WORK

Part 1 of the Building Bye-laws defines 'building work'. Building work includes:

- a. The erection or extension of a building
- b. The provision or extension of a controlled service or fitting in or in connection with a building
- c. The material alteration of a building or a controlled service or fitting
- d. The renovation and or replacement of thermal elements.

Bye-law 5 states that building work should be carried out in such a way, that when work is complete:

- a. For new buildings or work on a building that complied with the applicable requirements of the Building Bye-laws: the work and the building comply with the applicable requirements of the Building Bye-laws.
- b. For work on an existing building that did not comply with the applicable requirements of the Building Bye-laws:
  - The work itself must comply with the applicable requirements of the Building Bye-laws; **and**
  - The building must be no more unsatisfactory in relation to the requirements than before the work was carried out.

## MATERIAL CHANGE OF USE

Bye-law 2 defines a 'material change of use' in which a building or a part of a building that was previously used for one purpose will be used for another.

The Building Bye-laws set out requirements that must be met before a building can be used for a new purpose. To meet the requirements, the building may need to be upgraded in some way.

## MATERIALS AND WORKMANSHIP

In accordance with Bye-law 7, building work must be carried out in a workmanlike manner using adequate and proper materials. Guidance on materials and workmanship is given in the Technical Guidance Document - Bye-Law 7.

## ENERGY EFFICIENCY REQUIREMENTS

Part 3A of the Building Bye-laws imposes specific requirements for energy efficiency. If a building is extended or renovated, the energy efficiency of the existing building or part of it may need to be upgraded.

## NOTIFICATION OF WORK

A building permit is normally required to undertake building work and material changes of use and the department needs to be notified at the time the work commences.

A building permit is not required for work:

- a. that will be self-certified by a registered competent person and notified to the Department through an approved competent person scheme
- b. that is exempt from the need to obtain a building permit under Bye-Law 3.

## RESPONSIBILITY FOR COMPLIANCE

People who are responsible for building work (for example the agent, designer, builder or installer) must ensure that the work complies with all relevant requirements of the Building Bye-laws. The building owner may also be responsible for ensuring that work complies with the Building Bye-laws. If building work does not comply with the Building Bye-laws, the building owner may be served with an enforcement notice.

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## Summary

This technical guidance document is one of four approved documents that give guidance on how to comply with the energy efficiency requirements of the Building Bye-laws:

**Technical Guidance Document 11.1A:**

Conservation of fuel and power in new dwellings.

**Technical Guidance Document 11.1B:**

Conservation of fuel and power in existing dwellings.

**Technical Guidance Document 11.2A:**

Conservation of fuel and power in new buildings other than dwellings.

**Technical Guidance Document 11.2B:**

Conservation of fuel and power in existing buildings other than dwellings.

The technical guidance documents are supported by the:

**Domestic Building Services Compliance Guide**

**Non-Domestic Building Services Compliance Guide**

This technical guidance document contains the following sections:

**Section 1** sets out the relevant legal requirements contained in the Building Bye-laws.

**Section 2** contains general guidance, including the types of building work covered by this Technical Guidance Document, the types of building work that are exempt, procedures for notifying work and materials and workmanship.

**Section 3** gives guidance on reasonable provision for various types of building work.

**Section 4** deals with the particular case of work to thermal elements.

**Section 5** gives guidance in support of the requirement for consequential improvements for dwellings.

**Section 6** describes the information that should be provided to occupiers to help them achieve reasonable standards of energy efficiency in practice.

**Appendix A:** Key terms and abbreviations.

**Appendix B:** Work to thermal elements.

**Appendix C:** Documents referred to.

**Appendix D:** Standards referred to.

**Appendix E:** Fuel emission factors.

# Section 1: The Requirements

**1.1** This technical guidance document which takes effect on 18 July 2016, deals with the **energy efficiency requirements** in the Building Bye-laws 2007 as amended. The **energy efficiency requirements** are conveyed in Bye-laws 5A and 5B, Part 3A and Part 11 of Schedule 2 to the Building Bye-laws.

**1.2** The **energy efficiency requirements** relevant to this Technical Guidance Document, which deals with existing **dwellings**, are set out below. Where there is any doubt you should consult the full text of the Bye-laws, available at [www.gov.je](http://www.gov.je)

## Requirements relating to the renovation or replacement of thermal elements – Bye-law 5A.

1. Where the renovation of an individual thermal element –
  - a. constitutes a major renovation; or
  - b. amounts to the renovation of more than 50% of the element's surface area;
 

the renovation must be carried out so as to ensure that the whole of the element complies with paragraph 11.1(a) (i) of Schedule 2, in so far as that is technically, functionally and economically feasible.
2. Where the whole or any part of an individual element is proposed to be replaced and the replacement –
  - a. constitutes a major renovation; or
  - b. (in the case of part replacement) amounts to the replacement of more than 50% of the thermal element's surface area;
 

the whole of the thermal element must be replaced so as to ensure that it complies with paragraph 11.1(a) (i) of Schedule 2, in so far as that is technically, functionally and economically feasible to do so.
3. In this bye-law –
 

'major renovation' means the renovation of a building where more than 25% of the surface area of the building envelope undergoes renovation;

'renovation', in relation to a thermal element, means the provision of a new layer in the thermal element or the replacement of an existing layer, but excludes decorative finishes.

'building envelope', means the integrated elements of a building that separates its interior from the outdoor environment.

## Consequential improvements to energy performance. Bye-Law 17C

1. This bye-law applies to –
  - a. an existing building with a total useful floor area (as defined by bye-law 17A(3)) over 1000m<sup>2</sup> in respect of which building work is proposed if the proposed building work consists or includes –
    - i. an extension of the building; or
    - ii. the initial provision of any fixed building services, or an increase to the installed capacity of any fixed building services, in relation to the building; and
  - b. an existing dwelling where it is proposed to construct an extension to it.
2. Subject to paragraph (3), such work, if any, shall be carried out as is necessary to ensure that the building complies with the requirements of Part 11 of Schedule 2.
3. Nothing in paragraph (2) requires work to be carried out if it is not technically, functionally or economically feasible.

## Bye-Law 17E. - Information about use of fuel and power.

1. This bye-law applies where requirement 11.1 applies in relation to building work.
2. The person carrying out the work must, not later than 5 days after the work has been completed, provide to the owner sufficient information about the building, the fixed building services and their maintenance requirements, for the building to be operated in such a manner as to use no more fuel and power than is reasonable in the circumstances.

*Requirement*

*Limits on application*

## PART 11 – CONSERVATION OF FUEL AND POWER

### 11.1 Conservation of Energy

Reasonable provision must be made for the conservation of fuel and power in a building by –

- (a) limiting heat gains and heat losses –
  - i. through thermal elements and other parts of the building fabric, and
  - ii. from pipes, ducts and vessels used for space heating, space cooling and hot water services;
- (b) providing fixed building services which –
  - i. are energy efficient;
  - ii. have effective controls; and
  - iii. are commissioned by testing and adjusting as necessary to ensure they use no more fuel and power than is reasonable in the circumstances.

## Limitation on requirements

**1.3** In accordance with Bye-law 8, the requirements in Parts 1 to 7, 10 and 12 (except for requirements 3.6, 6.2 and 6.6) of Schedule 2 to the Building Bye-laws do not require anything to be done except for the purpose of securing reasonable standards of health and safety for persons in or about buildings (and any others who may be affected by buildings or matters connected with buildings).

**1.4** Requirement 3.6 and 6.2 are excluded as they deal directly with prevention of the contamination of water, and requirement 6.6 is excluded as it deals with water efficiency. Parts 8 and 9 (which deal, respectively, with access to and use of buildings, and the resistance to the passage of sound) are excluded from Bye-law 8 because they address the welfare and convenience of building users. Part 11 is excluded from Bye-law 8 because it addresses the conservation of fuel and power.

**1.5** In addition, Bye-law 5(4) of the Building Bye-laws states that where the work is being carried out in order to comply with Bye-law 5A (requirements relating to renovation or replacement of a **thermal element**), Bye-law 5B (requirements relating to a change of a building's energy status) or Bye-law 17C (**consequential improvements** to energy performance), and is not a material alteration, it need comply only with the requirements of Part 11.



## Section 2: General Guidance

### Types of work covered by this Technical Guidance Document

**2.1** This Technical Guidance Document is intended to give guidance on what, in ordinary circumstances, may be considered reasonable provision for compliance with the requirements of Bye-laws 5A, 5B, Part 3A and Part 11 of Schedule 2 to the Building Bye-laws, for those carrying out building work to existing **dwelling**s.

*Buildings exclusively containing **rooms for residential purposes** such as nursing homes, student accommodation and similar are not **dwelling**s, and in such cases Technical Guidance Document 11.2B applies.*

**2.2** In particular, this Technical Guidance Document gives guidance on compliance with the **energy efficiency requirements** where the following occurs:

- a. the construction of an extension (see paragraphs 3.1 to 3.9);
- b. a material change of use, or a change to the building's energy status, including such work as loft and garage conversions (paragraphs 3.11 to 3.16);
- c. the provision or extension of a **controlled service** or **controlled fitting** (paragraphs 3.17 to 3.36);
- d. the replacement or **renovation** of a **thermal element** (Section 4);
- e. the **major renovation** of a building.
- f. **consequential improvements** (Section 5)

**2.3** Where the activities include building work in a **dwelling** that is part of a mixed-use building, account should also be taken of the guidance in Technical Guidance Document 11.2B in relation to those parts of the building that are not **dwelling**s, including any common areas.

*It should be noted that **dwelling**s are defined as self-contained units. **Rooms for residential purposes** are not **dwelling**s, and so Technical Guidance Document 11.2B applies to them.*

### Dwellings within the scope of the energy efficiency requirements

**2.4** The **energy efficiency requirements** of the Building Bye-laws apply only to buildings which are roofed constructions having walls and which use energy to condition the indoor climate. For **dwelling**s the requirements will apply to:

- the erection of a **dwelling** (guidance on this is given in Technical Guidance Document 11.1A);
- the extension of a **dwelling** other than some extensions falling within Class 6 in Schedule 1 to the Building Bye-laws; or
- the carrying out of any building work to or in connection with an existing **dwelling** or an extension to an existing **dwelling**.

### Dwellings exempt from the energy efficiency requirements

**2.5** There are two exemptions from the **energy efficiency requirements** that may apply to building work to existing **dwelling**s or extensions to existing **dwelling**s:

- a. Buildings which are registered on the Minister's Register of Buildings and Sites of Architectural, Archaeological and Historic importance, and compliance with the energy efficiency requirements would unacceptably alter their character or appearance.
- b. Carports, covered ways and some conservatories or porches attached to existing **dwelling**s. Guidance on conservatories and porches which are exempt is given in paragraph 2.11 below.

**2.6** When undertaking work on or in connection with a building that falls within paragraph 2.5a above, the aim should be to improve **energy efficiency** as far as is reasonably practicable. The work should not prejudice the character of the host building or increase the risk of long-term deterioration of the building fabric or fittings.

**2.7** The guidance given by English Heritage should be taken into account in determining appropriate energy performance standards for building work in historic buildings. In addition English Heritage has produced detailed technical guidance on how to implement specific **energy efficiency** measures. (See list of available guidance documents at <http://www.englishheritage.org.uk/professional/advice/advice-bytopic/climate-change/energy-efficiency/>).

**2.8** In general, new extensions to historic or traditional **dwelling**s should comply with the standards of energy efficiency as set out in this Technical Guidance Document.

**2.9** 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, e.g. replacement windows, doors and rooflights;
- b. rebuilding a former historic building (e.g. 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.

**2.10** In assessing an appropriate balance between historic building conservation and energy efficiency improvements, it would be appropriate to take into account the advice of the Departments' historic buildings officer and building control surveyor.

### Conservatories and porches

**2.11** Bye-law 3(a) of the Building Bye-laws exempts some **conservatory** and porch extensions from the **energy efficiency requirements**. The exemption applies only to:

1. A **Conservatory**:
  - a. which is at ground level;
  - b. where the external fabric achieves a U-value of 2.0W/m<sup>2</sup>/k or better;
  - c. that has an internal floor area of 20m<sup>2</sup> or less;
  - d. where the glazing complies with Part 10 of Schedule 2;
  - e. that is thermally separated from the **dwelling** with walls, doors or windows which meet the **energy efficiency requirements**; and
  - f. where the heating system of the **dwelling** is not extended into the **conservatory**.
2. a porch, that is single storey constructed at ground level with an internal floor area of 5m<sup>2</sup> or less.

*Alterations to an exempt **conservatory** may result in building work or a material change of use (See paragraph 3.9)*

### Notification of work covered by the energy efficiency requirements

**2.12** In most instances in order to comply with the Building Bye-laws it will be necessary to make an application for a building permit before the work starts.

**2.13** In certain situations, however, there is no need to obtain a building permit before undertaking the work:

- a. Where the work is being carried out by a person registered with a relevant competent person self-certification scheme approved by the Minister; (see paragraphs 2.14 to 2.17).
- b. In accordance with Bye-law 14, where the work involves the provision, extension or repair of a **controlled service or fitting** the work may start before the application for a building permit has been determined. However, in such cases it will still be necessary for the work to comply with the relevant requirements and for notice to be given to the Department in advance of commencement of the work.

### Competent person self-certification schemes

**2.14** It is not necessary to notify the Department in advance of work which is to be carried out and certified by a person registered with a competent person self-certification scheme approved by the Minister. In order to join such a scheme a person must demonstrate competence to carry out the type of work the scheme covers, and also the ability to comply with all relevant requirements in the Building Bye-laws.

**2.15** Where work is carried out by a person registered with a competent person scheme, Bye-law 15 requires that the person ordering the work to be given, within 30 days of the completion of the work, a certificate confirming that the work complies fully with all applicable building bye-law requirements. There is also a requirement to give the notice of the work carried out to the Department, again within 30 days of the completion of the work. These certificates and notices are made available through the scheme operator.

**2.16** The Department will normally accept these certificates and notices as evidence of compliance with the requirements of the Building Byelaws, however inspection and enforcement powers remain unaffected, and will be used in response to a complaint that work does not comply.

**2.17** A list of approved competent person schemes and the types of work for which they are authorised can be found at [www.gov.je](http://www.gov.je)

### Materials and workmanship

**2.18** Any building work which is subject to the requirements imposed by schedule 2 to the Building Bye-laws shall be carried out in accordance with Bye-law 7. Guidance on meeting these requirements on materials and workmanship is contained in the Technical Guidance Document published in support of Bye-law 7.

Building Bye-laws are made for specific purposes, primarily the health and safety, welfare and convenience of people and for energy conservation. Standards and other technical specifications may provide relevant guidance to the extent that they relate to these considerations. However, they may also address other aspects of performance or matters which, although they relate to health and safety etc., are not covered by the Building Bye-laws.

When a Technical Guidance Document makes reference to a named standard, the relevant version of the standard to which it refers is the one listed at the end of the publication. However, if this version has been revised or updated by the issuing standards body, the new version should be used as a source of guidance provided it continues to address the relevant requirements of the Bye-laws.

## Section 3: Guidance relating to Building Work

### THE EXTENSION OF A DWELLING

#### Reference method – fabric standards

**3.1** Reasonable provision would be for the proposed extension to incorporate the following:

- newly constructed **thermal elements** that meet the standards set out in paragraphs 4.1 to 4.6;
- doors, windows, roof windows and rooflights that meet the standards set out in paragraphs 3.19 to 3.23;
- improvements to fabric elements that are to become **thermal elements**, following the guidance in paragraphs 4.7 to 4.14.

#### Area of windows, roof windows and doors

**3.2** In most circumstances reasonable provision would be to limit the total area of windows, roof windows and doors in extensions so that it does not exceed the sum of:

- 25 per cent of the floor area of the extension; **plus**
- the total area of any windows or doors which, as a result of the extension works, no longer exist or are no longer exposed.

*As a general guide, if the area of glazing is much less than 20 per cent of the total floor area, some parts of the extension and especially the part of the **dwelling** it covers may experience poor levels of daylight, resulting in increased use of electric lighting. Areas of glazing greater than 25 per cent may be acceptable, especially if this is required to make the extension consistent with the external appearance or character of the host building. In such cases and where practical, either the U-value of the window should be improved relative to the standard set out in paragraph 3.1b, or other compensating measures applied following the guidance set out in paragraphs 3.4 to 3.7.*

#### Heating and lighting in the extension

**3.3** Where a **fixed building service** is provided or extended as part of constructing the extension, reasonable provision would be to follow the guidance in paragraphs 3.24 to 3.36.

#### Optional approaches with more design flexibility

**3.4** The approach set out in paragraphs 3.1 to 3.3 is somewhat prescriptive. The following paragraphs offer more flexible approaches to

demonstrating that reasonable provision has been made. These alternative approaches allow some elements of the design to be relaxed through compensating measures elsewhere. When adopting the approach given in paragraphs 3.5 and 3.6 the U-value of any individual element should be no worse than the values given in Table 1.

#### Area-weighted U-value method

**3.5** One way of complying would be to show that the area-weighted U-value of all the elements in the extension is no greater than that of an extension of the same size and shape that complies with the fabric standards referred to in paragraph 3.1 and the opening area standards in paragraph 3.2. Any **fixed building service** provided or extended as part of constructing the extension should follow the guidance in paragraphs 3.24 to 3.36.

The area-weighted U-value is given by the following expression:

$$\frac{\{(U1 \times A1) + (U2 \times A2) + (U3 \times A3) + \dots\}}{\{(A1 + A2 + A3 + \dots)\}}$$

#### Whole dwelling calculation method

**3.6** Where even greater design flexibility is required, reasonable provision would be to use JSAP to show that the calculated energy rate from the **dwelling** with its proposed extension is no greater than for the **dwelling** plus a notional extension built to the standards of paragraphs 3.1 to 3.3. The openings in the notional extension should conform with paragraph 3.2 with door area set equal to the door area of the proposed extension, with the remainder of the openings being classified as windows. The data in JSAP can be used to estimate the performance of the elements of the existing building where these are unknown.

**3.7** If, as part of achieving the standard set out in paragraph 3.6, upgrades are proposed to the existing **dwelling**, such upgrades should be implemented to a standard that is no worse than set out in the relevant guidance contained in this Technical Guidance Document. The relevant standards for improving retained **thermal elements** are as set out in column (b) of Table 3.

*Where it is proposed to upgrade the original building, the standards set out in this Technical Guidance Document are cost-effective and should be implemented in full. It will be worthwhile implementing them even if the improvement is greater than necessary to achieve compliance. In some cases, therefore, the standard of the extended dwelling may be better than that required by paragraph 3.6 alone. Paragraph 3.7 sets limits on design flexibility and ensures that no cost-effective improvement opportunities are traded away.*



**Table 1 Limiting U-values standards (W/m<sup>2</sup>K)**

Element	Limiting U Value
Wall	0.70
Floor	0.70
Roof	0.35
Windows, roof windows, rooflights and doors <sup>1</sup>	3.3

**Notes**  
1. See paragraph 3.20

### Conservatory extensions

**3.8** Where the extension is a **conservatory** that is not exempt from the **energy efficiency requirements** (see paragraph 2.11 above), then reasonable provision would be to provide:

- Effective thermal separation between the heated area in the existing **dwelling**, i.e. the walls, doors, and windows between the **dwelling** and the **conservatory**, should be insulated and draught proofed to achieve a thermal performance not worse than 2.0W/m<sup>2</sup>K.
- Independent temperature and on/off controls to any heating system installed within the **conservatory**. Any **fixed building service** installed within the **conservatory** should also conform to the standards set out in paragraphs 3.24 to 3.36.
- Glazed elements should meet the standards set out in Table 2 and opaque elements should meet the standards set out in Table 3. However, the limitations on total area of windows, roof windows and doors as set out at paragraph 3.2 above do not apply.

**3.9** Removing, and not replacing, any or all of the thermal separation between the **dwelling** and the **conservatory**, or extending the **dwelling's** heating system into the **conservatory**, is building work, and replacing the roof of a **conservatory** with non-translucent material is a material change of use to which the energy efficiency requirements apply. In such situations, the guidance set out in paragraphs 3.15 or 3.16 should be followed.

A **conservatory** extension that has less than three quarters of its roof area and less than one half of its external wall area made from translucent material is more likely to be occupied all year round, so for the purposes of the **energy efficiency requirements** is treated as a conventional extension.

### Swimming pool basins

**3.10** Where a swimming pool is being provided in a building, the U-value of the basin (walls and floor) should not be worse than 0.25 W/m<sup>2</sup>K as calculated according to BS EN ISO 13370

– Thermal Performance of Buildings – Heat Transfer via the Ground – Calculation Methods.

*Design consideration should be taken with regards to compressive creep, insulation boards not being fully supported and the effects of point loading. Care should be taken to avoid thermal bridging particularly around basin wall and floor junctions with foundations.*

## MATERIALS CHANGE OF USE AND CHANGE OF ENERGY STATUS

### Material change of use

**3.11** Material changes of use (see Bye-law 2) covered by this document are where, after the change:

- the building is used as a **dwelling**, where previously it was not;
- the building contains a **flat**, where previously it did not; or
- the building, which contains at least one **dwelling**, contains a greater or lesser number of **dwelling**s than it did previously.
- a part of the building is used as a habitable room where previously the part was not so used.

### Change of energy status

**3.12** A change to a building's energy status is defined in Part 1 of the Building Bye-laws as:

A change which results in a building becoming a building to which the **energy efficiency requirements** apply, where previously it was not.

**3.13** The requirements relating to a change to energy status are in Bye-law 5B:

5B. Where there is a change in a building's energy status, such work, if any, shall be carried out to ensure that the building complies with the applicable requirements of Part 11 of Schedule 2.

**3.14** For the purposes of the bye-laws 'building' means the building as a whole or parts of the building that have been designed or altered to be used separately.

*For example, this could occur where a previously unheated building, or parts of the building that have been designed or altered to be used separately, were to be heated in future, or where a previously exempt building were no longer within the exempted categories. A material alteration may result in a change in buildings energy status.*

**3.15** In normal circumstances, reasonable provision where there is a material change of use or a change to the dwelling's energy status would be:

- a. Where **controlled services or fittings** are being provided or extended, to meet the standards set out in paragraphs 3.17 to 3.36.
- b. If the area of openings in the newly created **dwelling** is more than 25 per cent of the total floor area, either the area of openings should be reduced to be not greater than 25 per cent, or the larger area should be compensated for in some other way using the procedure described in paragraph 3.5 or 3.16.
- c. Where the work involves the provision of a **thermal element**, to meet the standards set out in paragraphs 4.1 to 4.6.

*For the purposes of Building Bye-laws, provision means both new and replacement elements.*

- d. Where any **thermal element** is being retained, to upgrade it following the guidance given in paragraphs 4.12 to 4.14.
- e. Where an existing window (including roof window or rooflight) or door which separates a conditioned space from an unconditioned space or the external environment has a U-value that is worse than 3.3 W/m<sup>2</sup>K, to provide replacement units following the guidance in paragraphs 3.19 to 3.23.

*For example in the case of the material change of use of an existing conservatory by the addition of a solid roof, this means there is no limitation on the amount of glazing, but any glazing that has a U-value worse than 3.3 W/m<sup>2</sup>K must be replaced.*

### Option providing more design flexibility

**3.16** To provide more design flexibility, JSAP or the area-weighted U-value method can be used to demonstrate that the energy rate for the **dwelling** as it will become will be no greater than if the **dwelling** had been improved following the guidance set out in paragraph 3.15. When adopting this approach the U-value of any individual element should be no worse than the values given in Table 1.

## WORK ON CONTROLLED FITTINGS AND SERVICES

**3.17** **Controlled services or fittings** are defined in Part 1 of the Building Bye-laws as follows:

**Controlled service or fitting** means a service or fitting in relation to which Part 3, 6 or 11 of Schedule 2 imposes a requirement.

### Controlled fittings

**3.18** In the context of this Technical Guidance Document, the application of the term **controlled fitting** to a window, roof window, rooflight or door refers to a whole unit, i.e. including the

frame. Consequently, replacing the glazing whilst retaining an existing frame is not providing a **controlled fitting**, and so such work is not controlled and does not have to meet the Part 11 standards, although where practical it would be sensible to do so. Similar arguments apply to doors, where the **controlled fitting** refers to the complete door set (leaf plus frame). Replacing a door leaf whilst retaining the existing frame is not controlled and does not have to meet the Part 11 standards, although where practical it would be sensible to do so.

**3.19** Where windows, roof windows, roof-lights or doors are to be provided, reasonable provision in normal cases would be the installation of draught-proofed units whose performance is no worse than given in Table 2. In addition, insulated cavity closers should be installed where appropriate. Where the windows or fully glazed external pedestrian doors are unable to meet the requirements of Table 2 because of the need to maintain the external appearance of the façade or the character of the building, such fittings should meet a centre pane U-value of 1.2W/m<sup>2</sup>K, where the centre-pane U-value is defined as the U-value determined in the central area of the glazing unit, making no allowance for edge spacers or window frame. As an alternative, single glazing should be supplemented with low-e secondary glazing. In this latter case, the weather stripping should be on the secondary glazing to minimise condensation risk between the primary and secondary glazing. Where enhanced performance requirements (e.g. wind load, safety, security or acoustic attenuation) require thicker glass to be used, reasonable provision would be demonstrated if the window unit with the equivalent standard glazing thickness can be shown to comply.

**3.20** U-values shall be calculated using the methods and conventions set out in BR 443 (Conventions for U-Value Calculations, BRE, 2006), and should be based on the whole unit (i.e. in the case of a window, the combined performance of the glazing and frame). The U-value of the window can be calculated for:

- a. the smaller of the two standard windows defined in BS EN 14351-16; or
- b. the standard window configuration set out in BR 443; or
- c. the specific size and configuration of the actual window.

The U-value of the door can be calculated for:

- a. the standard size as laid out in BS EN 14351-1, or
- b. the specific size and configuration of the actual door.

*SAP 2012 Table 6e gives values for different window configurations that can be used in the absence of test data or calculated values.*

**3.21** The U-values for roof windows and rooflights given in this Technical Guidance Document based on the U-value having been assessed with the roof window or rooflight in the vertical position. If a particular unit has been assessed in a plane other than the vertical, the standards given in this Technical Guidance Document should be modified by making an adjustment that is dependent on the slope of the unit following the guidance in BR 443.

**Table 2 Standards for controlled fittings<sup>1</sup>**

Fitting	Standard
Window, roof window or rooflight <sup>2</sup>	WER band C or better (see paragraph 3.22), or U-value 1.6 W/m <sup>2</sup> K
Doors with >60% of internal face glazing	Door Set Energy Rating (DSER) band E or better (see paragraph 3.22), or U-value 1.8 W/m <sup>2</sup> K
Other doors	DSER band E or better (see paragraph 3.22), or U-value 1.8W/m <sup>2</sup> K

**Notes:**

- 1) Since the U-values are determined for standard configurations (see paragraph 3.20), the effects of Georgian bars and / or leaded lights can be ignored.
- 2) For the purposes of checking compliance with this table, the true U-value based on aperture area can be converted to the U-value based on the developed area of the roof-light. Further guidance on evaluating the U-value of out-of-plane rooflights is given in Assessment of thermal performance of out-of-plane rooflights, NARM Technical Document NTD 2 (2010), See <http://www.narm.org.uk/uploads/pdfs/NARM-TAOOPR-030311.pdf>

**3.22** The calculation of Window Energy Rating (WER) and the Door Set Energy Rating (DSE) are set out in the GGF Guide to the Calculation of Energy Ratings for Windows, Roof Windows & Doors (Guide to the Calculation of Energy Ratings for Windows, Roof Windows & Doors, GGF, 2013).

The guide provides different procedures for windows, roof windows, external pedestrian doors and patio/French/sliding/folding doors. The Department may accept a WER and/or DSE declaration from a certification scheme that provides a quality assured process and supporting audit trail from calculating the performance of the window through to installation as evidence of compliance. Notwithstanding the suggested performance values set out in Table 2, guidance on energy efficient windows is available from the Energy Saving Trust ([www.energysavingtrust.org.uk/Insulation/Windows](http://www.energysavingtrust.org.uk/Insulation/Windows)).

**3.23** If a window is enlarged or a new one created, compensating measures elsewhere in the **dwelling** will need to be included as part of the work to ensure the thermal performance of the **dwelling** is no worse than it was before the work was done.

**Controlled services**

**3.24** Whenever a **fixed building service** is extended or provided, reasonable provision would be demonstrated by following the guidance set out in the Domestic Building Services Compliance Guide The Guide covers the following services:

- a. heating and hot water systems (including insulation of pipes, ducts and vessels);
- b. mechanical ventilation;
- c. mechanical cooling/air-conditioning;
- d. fixed internal lighting;
- e. fixed external lighting;
- f. renewable energy systems.

Where the Building Services Compliance Guides make reference to the 'carbon equivalent efficiency', the carbon dioxide emission factors should be taken from Appendix E of this Technical Guidance Document.

**3.25** The efficiency claimed for the **fixed building service** should be based on the appropriate test standard as set out in the *Domestic Building Services Compliance Guide* and the test data should be certified by a notified body. In the absence of such quality-assured data, the Department should be provided with information to demonstrate the claimed performance is justified.

**3.26** When replacing an existing appliance, the efficiency of the new appliance should not be significantly less than the efficiency of the appliance being replaced. The Domestic Building Services Compliance Guide contains the detailed guidance on this issue.

**3.27** If a renewable energy generator such as a wind turbine or photovoltaic array is being replaced, the new system should have an electrical output that is not less than the original installation.

**3.28** When replacing a heating appliance, consideration should be given to connecting to any existing local heat networks. If the work involves pipework changes, consideration should be given to providing capped off connections to facilitate subsequent connection to a planned local heat network.

**3.29** If a particular technology is not covered in the *Domestic Building Services Compliance Guide*, reasonable provision would be demonstrated by showing that the proposed technology gives a performance that is no worse than a reference system of the same type whose details are given in the Guide.

## Commissioning Of Fixed Building Services

**3.30** Requirement 11.1(b) of Schedule 2 to the Building Bye-laws requires **fixed building services** to be commissioned to ensure that they use no more fuel and power than is reasonable in the circumstances. In order to demonstrate that the heating and hot water systems have been adequately commissioned, Bye-law 17G states:

### 17G Commissioning

- 1) This bye-law applies to a building in relation to which requirement 11.1(b) applies and building work is carried out, but does not apply where the building work consists only of exempt electrical certifiable work (within the meaning of Bye-law 15).
- 2) The person carrying out the building work shall give to the Chief Officer a notice confirming that the relevant fixed building services have been commissioned in accordance with the procedure set out in the relevant technical guidance document.
- 3) The notice shall be given not later than –
  - i. in every case, the date on which the notice required by byelaw 13(6) in relation to the building work is given; and
  - ii. in the case of certifiable building work (within the meaning of bye-law 15), not more than 30 days after completion of the work.
- 4) For the purposes of this bye-law, the relevant technical guidance document is one concerning pressure testing in a building in order to determine heat gains and losses in the building from its pipes, ducts, and vessels, used for space heating, space cooling and hot water services.

**3.31** Reasonable provision would be to prepare a **commissioning** plan, identifying the systems that need to be tested and the tests that will be carried out. The notice required by Bye-law 17G (3) should confirm that the **commissioning** plan has been followed and that every system has been inspected in an appropriate sequence and to a reasonable standard and that the test results confirm that performance is reasonably in accordance with the design requirements.

**3.32** Not all **fixed building services** will need to be commissioned. With some systems adjustment is not possible as the only controls are ‘on’ and ‘off’ switches. Examples of this would be some mechanical extraction systems or single fixed electrical heaters. In other cases **commissioning** would be possible but in the specific circumstances would have no effect on energy use.

***Fixed building services** which do not require **commissioning** should be identified in the **commissioning** plan, along with the reason for not requiring **commissioning**.*

**3.33** Where **commissioning** is carried out it must be done in accordance with:

- a. For heating and hot water systems the approved procedures are set out in the Domestic Building Services Compliance Guide.
- b. For ventilation systems, an approved procedure would be to follow the guidance in the Domestic Ventilation Compliance Guide

**3.34** **Commissioning** is often carried out by the person who installs the system. In other cases it may be carried out by a subcontractor or by a specialist firm. It is important that whoever carries it out follows the relevant guidance in doing so.

**3.35** The notice of completion of **commissioning** should be given to the Department as soon as possible after the completion of the **commissioning** work, and not later than 2 days after completion of the **building work**.

**3.36** Until the Department receives the **commissioning** notice it cannot be reasonably satisfied that Part 11 has been complied with and consequently will not be in a position to issue a completion certificate.



# Section 4: Guidance on Thermal Elements

## The Provision of Thermal Elements

4.1 New **thermal elements** must comply with Part 11.1(a)(i) of Schedule 2 to the Building Bye-laws. Work on existing **thermal elements** must comply with Bye-law 5A of the Building Bye-laws which states:

### Bye-law 5A – Requirements relating to the renovation or replacement of thermal elements.

- 1) Where the renovation of an individual thermal element –
  - a) constitutes a major renovation; or
  - b) amounts to the renovation of more than 50% of the element’s surface area;
 

the renovation must be carried out so as to ensure that the whole of the element complies with paragraph 11.1(a) (i) of Schedule 2, in so far as that is technically, functionally and economically feasible.
- 2) Where the whole or any part of an individual element is proposed to be replaced and the replacement –
  - a) constitutes a major renovation; or
  - b) (in the case of part replacement) amounts to the replacement of more than 50% of the thermal element’s surface area;
 

the whole of the thermal element must be replaced so as to ensure that it complies with paragraph 11.1(a) (i) of Schedule 2, in so far as that is technically, functionally and economically feasible to do so.

3) In this bye-law –

‘major renovation’ means the renovation of a building where more than 25% of the surface area of the building envelope undergoes renovation;

‘renovation’, in relation to a thermal element, means the provision of a new layer in the thermal element or the replacement of an existing layer, but excludes decorative finishes.

‘building envelope’, means the integrated elements of a building that separates its interior from the outdoor environment.

## U-values

4.2 U-values shall be calculated using the methods and conventions set out in BR 443.

4.3 Reasonable provision for newly constructed **thermal elements** such as those constructed as part of an extension would be to meet the standards set out in Table 3.

4.4 Reasonable provision for those **thermal elements** constructed as replacements for existing elements would be to meet the standards set out in Table 3.

**Table 3 Standards for new thermal elements**

a. Element <sup>1</sup>	b. Standard (W/m <sup>2</sup> K) <sup>2</sup>
Wall <sup>3</sup>	0.28
Pitched roof – insulation at ceiling level	0.16
Pitched roof – insulation at rafter level	0.18
Flat roof or roof with integral insulation	0.18
Floors <sup>4</sup>	0.22
Swimming pool basin	0.25

**Notes:**

- 1) ‘Roof’ includes the roof parts of dormer windows, and ‘wall’ includes the wall parts (cheeks) of dormer windows.
- 2) Area-weighted average values.
- 3) 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.
- 4) A lesser provision may be appropriate where meeting such a standard would create significant problems in relation to adjoining floor levels. The U-value of the floor of an extension can be calculated using the exposed perimeter and floor area of the whole enlarged dwelling.

## Continuity of insulation and airtightness

4.5 The building fabric should be constructed so that there are no reasonably avoidable 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. The work should comply with all the requirements of Schedule 2, but particular attention should be paid to Parts 3 and 5.

4.6 A suitable approach to showing the requirement has been achieved would be to adopt Accredited Construction Details at [www.planningportal.gov.uk](http://www.planningportal.gov.uk).



*It is impractical to expect thermal bridge and temperature factor calculations for work in existing buildings.*

## Major renovation

**4.7 Major Renovation** means the renovation of a building where more than 25% of the surface area of the **building envelope** undergoes renovation. When assessing whether the area proportion constitutes a **major renovation** of a building, the surface area of the whole of the external **building envelope** should be taken into account i.e. external walls, floor, roof, windows, doors, roof windows and roof-lights.

## Renovation of Thermal Elements

**4.8** For the purposes of this Technical Guidance Document, **renovation of thermal elements** through:

- a. the provision of a new layer means either of the following activities:
  - i. Cladding or rendering the external surface of the **thermal element**; or
  - ii. Dry-lining the internal surface of a **thermal element**
- b. the replacement of an existing layer means either of the following activities:
  - i. Stripping down the element to expose the basic structural components (brick/blockwork, concrete, timber/metal frame, joists, rafters, etc.) and then rebuilding to achieve all the necessary performance requirements. As discussed in paragraph 2.7, particular considerations apply to renovating elements of traditional construction; or
  - ii. Replacing the water proof membrane on a flat roof.

*The installation of thermal insulation at ceiling level in a loft space where this is the only work carried out and the work is not carried out to comply with any requirement in the Building By-laws does not need to be notified.*

**4.9** Where a **thermal element** is subject to a **renovation** through undertaking an activity listed in paragraph 4.8(a) or 4.8(b), the performance of the whole of the **thermal element** should be improved to achieve or better the relevant U-value set out in column (b) of Table 4, provided the area to be renovated is greater than 50% of the surface of the individual **thermal element** or constitutes a **major renovation** where more than 25% of the surface area of the **building envelope** undergoes **renovation**.

In relation to the **renovation** of individual **thermal elements**, when assessing the proportion of the surface area that is to be renovated, the area of the **thermal element** should be assessed as the area of each individual **thermal element**, not the area of all the elements of that type in the

building. The area of each individual **thermal element** should also be interpreted in the context of whether the element is being renovated from inside or outside, e.g. if removing all the plaster finish from the inside of a solid brick wall, the area of the element is the area of external wall in the room. If removing external render, it is the area of the elevation in which that wall sits.

*This means that if all the roofing on the flat roof of an extension is being stripped down, the area of the individual element is the 'roof area' of the extension, not the 'total roof area' of the dwelling. Similarly, if the rear wall of a single storey extension is being re-rendered externally, then the rear wall of the extension should be upgraded to the standards of Table 4 column (b), even if the **renovation** affected less than 50% of the total area of the building elevation when viewed from the rear. If plaster is being removed from a bedroom wall, the relevant area is the area of the external wall in the room, not the area of the external elevation which contains that wall section. This is because the marginal cost of drylining with insulated plasterboard rather than plain plasterboard is small. When a building undergoes a **major renovation** this may represent an opportunity to consider and take into account the technical, environmental and economic feasibility of installing high efficiency alternative systems.*

**4.10** If achievement of the relevant U-value set out in column (b) of Table 4 is not technically or functionally feasible or would not achieve a **simple payback** of 15 years or less, the element should be upgraded to the best standard that is technically and functionally feasible and which can be achieved within a **simple payback** of no greater than 15 years. Guidance on this approach is given in Appendix A.

**4.11** When renovating **thermal elements**, the work should comply with all the requirements in Schedule 2, but particular attention should be paid to Parts 3 and 5.

## Retained Thermal Elements

**4.12** Part 11 of Schedule 2 to the Building By-laws applies to retained **thermal elements** in the following circumstances:

- a. Where an existing **thermal element** is part of a building subject to a material change of use;
- b. where an existing element is to become part of the thermal envelope where previously it was not, e.g. as part of a loft or garage conversion where the space is now to be heated.

**4.13** Reasonable provision would be to upgrade those **thermal elements** whose U-value is worse than the threshold value in column (a) of Table 4 to achieve the U-values given in column (b) of Table 4 provided this is technically, functionally and economically feasible. A reasonable test

of economic feasibility is to achieve a **simple payback** of 15 years or less. Where the standard given in column (b) is not technically, functionally or economically feasible, then the **thermal element** should be upgraded to the best standard that is technically and functionally feasible and delivers a **simple payback** period of 15 years or less. Generally, this lesser standard should not be worse than 0.7 W/m<sup>2</sup>K

*Examples of where lesser provision than column (b) might apply are Where the thickness of the additional insulation might reduce usable floor area of any room by more than 5 per cent or create difficulties with adjoining floor levels, or where the weight of the additional insulation might not be supported by the existing structural frame.*

**4.14** When upgrading retained **thermal elements**, the work should comply with all the requirements in Schedule 2, but particular attention should be paid to Parts 3 and 5.

**Table 4 Upgrading retained thermal elements**

Element <sup>1</sup>	a) Threshold U-value W/m <sup>2</sup> K <sup>8</sup>	b) Improved U-value W/m <sup>2</sup> K <sup>8</sup>
Wall – cavity insulation <sup>2</sup>	0.70	0.55
Wall – external or internal insulation <sup>3</sup>	0.70	0.30
Floor <sup>4,5</sup>	0.70	0.25
Pitched roof – insulation at ceiling level	0.35	0.16
Pitched roof – insulation between rafters <sup>6</sup>	0.35	0.18
Flat roof or roof with integral insulation <sup>7</sup>	0.35	0.18

**Notes:**

- 1) 'Roof' includes the roof parts of dormer windows and 'wall' includes the wall parts (cheeks) of dormer windows.
- 2) This applies only in the case of a wall suitable for the installation of cavity insulation. Where this is not the case, it should be treated as 'wall – external or internal insulation'
- 3) 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.
- 4) The U-value of the floor of an extension can be calculated using the exposed perimeter and floor area of the whole enlarged building.
- 5) A lesser provision may be appropriate where meeting such a standard would create significant problems in relation to adjoining floor levels.
- 6) A lesser provision may be appropriate where meeting such a standard would create limitations on head room. In such cases, the depth of the insulation plus any required air gap should be at least to the depth of the rafters, and the thermal performance of the chosen insulant should be such as to achieve the best practicable U-value.
- 7) A lesser provision may be appropriate if there are particular problems associated with the load-bearing capacity of the frame or the upstand height.
- 8) Area-weighted average values.

## Section 5: Consequential Improvements to Energy Performance

**5.1** Bye-law 17 C may require additional work to be undertaken to make an existing building more energy efficient when certain types of building work are proposed.

**5.2** This requirement arises in existing **dwelling**s where the proposed work consists of constructing an extension to the dwelling.

**5.3** Where Bye-law 17C applies, **consequential improvements**, in addition to the proposed building work (the **principal works**), should be made to ensure that the building complies with Part 11, to the extent that such improvements are technically, functionally and economically feasible. Paragraphs 5.4 to 5.6 below set out guidance on what will constitute technically, functionally and economically feasible **consequential improvements** in most cases.

*The **principal works** must comply with the **energy efficiency requirements** in the normal way.*

**5.4** Where improvement works other than an extension are planned as part of the building work, owners can use these as contributing to the **consequential improvements**. The exception to this is if additional work is being done to the existing building to compensate for a poorer standard of an extension (see paragraphs 3.4 to 3.7).

*For example, if, as well as extending the building, the proposals included total window replacement, then the window replacement work would satisfy the requirement for **consequential improvements**, provided the cost was at least five per cent of the cost of the extension.*

**5.5** Measures such as those listed in Table 5 that achieve a **simple payback** not exceeding 15 years will be economically feasible unless there are unusual circumstances.

**5.6** A way of complying with Bye-law 17C would be to adopt measures such as those in Table 5 to the extent that their value is not less than five per cent of the value of the **principal works**. The value of the **principal works** and the value of the **consequential improvements** should be established at the date the building application is made and details included as part of the building application plans.

*A way of establishing the value of the **consequential improvements** would be to use the guidance given in the department's 'template' for the submission of building applications.*

**Table 5 Improvements that in ordinary circumstances are practical and economically feasible**

No	Improvement measure
1	Upgrading lighting that has an average lamp efficacy of less than 40 lamp-lumens per circuit watt.
2	Upgrading heating controls to achieving better timing, temperature and zone control.
3	Draught-proof windows and doors.
4	Upgrading un-insulated hot water cylinders.
5	Insulate pipes and ducts.
6	Upgrading thermal elements which have U-values worse than those set out in column (a) of Table 4.
7	Replace old non-condensing heating boilers.
8	Replacing existing windows, roof windows or rooflights.

# Section 6: Providing Information

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**6.1** On completion of the work, in accordance with Bye-law 17E, the owner of the **dwelling** should be provided with sufficient information about the building, the **fixed building services** and their operating and maintenance requirements so that the **dwelling** can be operated in such a manner as to use no more fuel and power than is reasonable in the circumstances. This requirement applies only to the work that has actually been carried out, e.g. if the work involves replacing windows, there is no obligation on the contractor to provide details on the operation of the heating system.

**6.2** Where the work involves the provision of a new heating system, 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 and power 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). The instructions should be directly related to the particular system(s) installed as part of the work that has been carried out.

**6.3** Without prejudice to the need to comply with health and safety requirements, any instructions should explain to the occupier of the **dwelling** how to operate the system(s) efficiently. This should include:

- a. the making of adjustments to timing, temperature and flow control settings;
- b. what routine maintenance is needed to enable operating efficiency to be maintained at a reasonable level through the service life(s) of the system(s).

# Appendix A: Key terms and abbreviations

## Key terms:

The following are key terms used in this document:

**Building envelope** in relation to a building means the walls, floor, roof, windows, doors, roof windows and roof-lights.

**Commissioning** means the advancement of a **fixed building service** following installation, replacement or alteration of the whole or part of the system, from the state of static completion to working order by testing and adjusting as necessary to ensure that the system as a whole uses no more fuel and power than is reasonable in the circumstances, without prejudice to the need to comply with health and safety requirements. For each system **commissioning** includes setting-to-work, regulation (that is testing and adjusting repetitively) to achieve the specified performance, the calibration, setting up and testing of the associated automatic control systems, and recording of the system settings and the performance test results that have been accepted as satisfactory.

**Consequential improvements** means those energy efficiency improvements required by by-law 17C.

A **conservatory** is an extension that has not less than three quarters of its roof area and not less than one half of its external wall area made from translucent material, that is adequately thermally separated from the **dwelling**.

**Controlled service or fitting** means a service or fitting in relation to which Part 3 (combustion appliances and fuel storage systems) Part 6 (drainage, sanitation, hot water safety and water efficiency), or Part 11 (conservation of fuel and power) of Schedule 2 to the Building Bye-laws imposes a requirement.

**Dwelling** means a self-contained unit, including a house or a flat, designed to be used separately to accommodate a single household. (**Rooms for residential purposes** are not **dwelling**s so Technical Guidance Document 11.2B applies to work in such buildings.)

**Energy efficiency requirements** means the requirements of Bye-laws 5A, 5B, Part 3A and Part 11 of Schedule 2 to the Building Bye-laws.

## Fixed building service means –

- a fixed internal or external lighting system (other than an emergency escape lighting system or a specialist process lighting system); or
- a fixed system for heating, providing hot water, providing air conditioning or providing mechanical ventilation.

**Major renovation** means the **renovation** of a building where more than 25% of the surface area of the **building envelope** undergoes **renovation**.

**Room for residential purposes** means a room, or suite of rooms –

- that is not a dwelling house or flat; and
- that is used by one or more persons to live and sleep in, and includes rooms in hotels, hostels, guest houses, halls of residence and residential homes but does not include rooms in hospitals, or similar establishments, used for patient accommodation.

**Renovation** in relation to a **thermal element** means the provision of a new layer in the **thermal element** or the replacement of an existing layer, but excludes decorative finishes, and 'renovate' shall be construed accordingly.

**Simple payback** means the amount of time it will take to recover the initial investment through energy savings, and is calculated by dividing the marginal additional cost of implementing an energy efficiency measure by the value of the annual energy savings achieved by that measure taking no account of GST. When making this calculation the following guidance should be used:

- the marginal additional cost is the additional cost (materials and labour) of incorporating (e.g.) additional insulation, not the whole cost of the work;
- the cost of implementing the measure should be based on prices current at the date the proposals are made known to the Department and be confirmed in a report signed by a suitably qualified person;
- the annual energy savings should be estimated using the JSAP methodology;

- d. for the purposes of this Technical Guidance Document, the energy prices that are current at the time of the application to the Department should be used when evaluating the annual energy savings. Current energy prices can be obtained from [www.jerseyfuelwatch.com](http://www.jerseyfuelwatch.com).

**Thermal element** is defined as:

A wall, floor or roof (but does not include windows, doors, roof windows or roof-lights) which separates a thermally conditioned part of the building ('the conditioned space') from:

- a. the external environment (including the ground); or
- b. in the case of floors and walls, another part of the building which is:
  - i. unconditioned;
  - ii. an extension falling within class 6 in Schedule 1; or
  - iii. where this clause applies, conditioned to a different temperature,

and includes all parts of the element between the surface bounding the conditioned space and the external environment or other part of the building.

Paragraph (b)(iii) only applies to a building which is not a dwelling, where the other part of the building is used for a purpose which is not similar or identical to the purpose for which the conditioned space is used.

*This definition encompasses the walls and floor of a swimming pool basin where this is part of an existing **dwelling**.*



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## Appendix B: Work to Thermal Elements

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1. Where the **renovation** of an individual **thermal element** constitutes a **major renovation**; or amounts to the **renovation** of more than 50% of the element's surface area, an opportunity exists for cost-effective insulation improvements to be undertaken at marginal additional cost. This appendix provides guidance on the cost effectiveness of insulation measures when undertaking various types of work on a **thermal element**.
2. Table A1 sets out the circumstances and the level of performance that would be considered reasonable provision in ordinary circumstances. When dealing with existing **dwelling**s some flexibility in the application of standards is necessary to ensure that the context of each scheme can be taken into account while securing, as far as possible, the reasonable improvement. The final column in Table A1 provides guidance on a number of specific issues that may need to be considered in determining an appropriate course of action. As part of this flexible approach, it will be necessary to take into account technical risk and practicality in relation to the **dwelling** under consideration and the possible impacts on any adjoining building. In general the proposed works should take account of:
  - a. the requirements of any other relevant parts of Schedule 2 to the Building Bye-laws;
  - b. the general guidance on technical risk relating to insulation improvements contained in BR 262. (Thermal insulation: Avoiding risks, BRE, 2002.);
  - c. for buildings registered on the Minister's Register of Buildings and Sites of Architectural, Archaeological and Historic Importance, the guidance produced by English Heritage.
  - d. Where it is not reasonable in the context of the works project to achieve the performance set out in Table A1 the level of performance achieved should be as close to this as practically possible.
3. Table A1 incorporates, in outline form, examples of construction that would achieve the proposed performance, but designers are free to use any appropriate construction that satisfies the energy performance standard, so long as they do not compromise performance with respect to any other part of the Building Bye-laws.
4. General guidance is available from such sources as the Energy Saving Trust and relevant British Standards.

**Table B1 Cost-effective U-value targets when undertaking renovation works to thermal elements**

Proposed works	Target U-value (W/m <sup>2</sup> K)	Typical construction	Comments (reasonableness, practicability and cost-effectiveness)
<b>Pitched roof constructions</b>			
Renewal of roof covering – No living accommodation in the roof void – existing insulation (if any) at ceiling level. No existing insulation, existing insulation less than 50 mm, in poor condition, and/ or likely to be significantly disturbed or removed as part of the planned work.	0.16	Provide loft insulation – 250 mm mineral fibre or cellulose fibre as quilt laid between and across ceiling joists or loose fill or equivalent.	Assess condensation risk in roof space and make appropriate provision in accordance with the requirements of Part 5 relating to the control of condensation. Additional provision may be required to provide access to and insulation of services in the roof void.
Renewal of roof covering – Existing insulation in good condition and will not be significantly disturbed by proposed works. Existing insulation thickness 50 mm or more but less than 100 mm.	0.16	Top up loft insulation to at least 250 mm mineral fibre or cellulose fibre as quilt laid between and across ceiling joists or loose fill or equivalent. This may be boarded out.	Assess condensation risk in roof space and make appropriate provision in line with the requirements of Part 5 relating to the control of condensation. Additional provision may be required to provide insulation and access to services in the roof void.  Where the loft is already boarded out and the boarding is not to be removed as part of the work, the practicality of insulation works would need to be considered.
Renewal of the ceiling to cold loft space. Existing insulation at ceiling level removed as part of the works.	0.16	Provide loft insulation – 250 mm mineral fibre or cellulose fibre as quilt laid between and across ceiling joists or loose fill or equivalent. This may be boarded out.	Assess condensation risk in roof space and make appropriate provision in accordance with the requirements of Part 5 relating to the control of condensation. Additional provision may be required to provide insulation and access to services in the roof void.  Where the loft is already boarded out and the boarding is not to be removed as part of the work, insulation can be installed from the underside but the target U-value may not be achievable.
Renewal of roof covering – Living accommodation in roof space (room-in-the-roof type arrangement), with or without dormer windows.	0.18	Cold structure – Insulation (thickness dependent on material) placed between and below rafters.  Warm structure – Insulation placed between and above rafters.	Assess condensation risk (particularly interstitial condensation), and make appropriate provision in accordance with the requirements of Part 5 relating to the control of condensation (Clause 8.4 of BS 5250:2002 and BS EN ISO 13788:2002)  Practical considerations with respect to an increase in structural thickness (particularly in terraced dwellings) may necessitate a lower performance target.
<b>Dormer window constructions</b>			
Renewal of cladding to side walls.	0.30	Insulation (thickness dependent on material) placed between and/ or fixed to outside of wall studs. Or fully external to existing structure depending on construction.	Assess condensation risk and make appropriate provision in accordance with the requirements of Part 5.
Renewal of roof covering.	–	Follow guidance on improvement to pitched or flat roofs as appropriate.	Assess condensation risk and make appropriate provision in accordance with the requirements of Part 5.
<b>Flat roof constructions</b>			
Renewal of roof covering – Existing insulation, if any, less than 100mm, mineral fibre (or equivalent resistance) or in poor condition and likely to be significantly disturbed or removed as part of the planned work.	0.18	Insulation placed between and over joists as required to achieve the target U-value – Warm structure	Assess condensation risk and make appropriate provision in accordance with the requirements of Part 5. Also see BS 6229:2003 for design guidance.



Table B1 Cost-effective U-value targets when undertaking renovation works to thermal elements

Proposed works	Target U-value (W/m <sup>2</sup> K)	Typical construction	Comments (reasonableness, practicability and cost-effectiveness)
<b>Flat roof constructions</b>			
Renewal of the ceiling to flat roof area. Existing insulation removed as part of the works.	0.18	Insulation placed between and to underside of joists to achieve target U-value.	Assess condensation risk and make appropriate provision in accordance with the requirements of Part 4. Also see BS 6229:2003 for design guidance. Where ceiling height would be adversely affected, a lower performance target may be appropriate.
<b>Solid wall constructions</b>			
Renewal of internal finish to external wall or applying a finish for the first time.	0.30	Dry-lining to inner face of wall – insulation between studs fixed to wall to achieve target U-value – thickness dependent on insulation and stud material used Insulated wall board fixed to internal wall surface to achieve the required U-value – thickness dependent on material used.	<p>Assess the impact on internal floor area. In general it would be reasonable to accept a reduction of no more than 5% in the area of a room. However, the use of the room and the space requirements for movement and arrangements of fixtures, fittings and furniture should be assessed.</p> <p>In situations where acoustic attenuation issues are particularly important (e.g. where insulation is returned at party walls) a less demanding U-value may be more appropriate. In such cases, the U-value target may have to be increased to 0.35 or above depending on the circumstances.</p> <p>Assess condensation and other moisture risks and make appropriate provision in accordance with the requirements of Part 5. This will usually require the provision of a vapour control and damp protection to components. Guidance on the risks involved is provided in BR 262 and, on the technical options, in Energy Saving Trust publications.</p>
Renewal of finish or cladding to external wall area or elevation (render or other cladding) or applying a finish or cladding for the first time.	0.30	External insulation system with rendered finish or cladding to give required U-value.	Assess technical risk and impact of increased wall thickness on adjoining buildings.
<b>Ground floor constructions</b>			
Renovation of a solid or suspended floor involving the replacement of screed or a timber floor deck.	See column 4.	<p>Solid floor – replace screed with an insulated floor deck to maintain existing floor level</p> <p>Suspended timber floor – fit insulation between floor joists prior to replacement of floor deck</p>	The cost-effectiveness of floor insulation is complicated by the impact of the size and shape of the floor (perimeter/area ratio). In many cases existing un-insulated floor U-values are already relatively low when compared with wall and roof U-values. Where the existing floor U-value is greater than 0.70 W/m <sup>2</sup> K, then the addition of insulation is likely to be cost-effective. Analysis shows that the cost-benefit curve for the thickness of added insulation is very flat, and so a target U-value of 0.25 W/m <sup>2</sup> K is appropriate subject to other technical constraints (adjoining floor levels, etc.)

# Appendix C: Documents referred to

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### **BRE**

[www.bre.co.uk](http://www.bre.co.uk)

BR 262 *Thermal insulation: avoiding risks* (2002 Edition) printed in 2006. ISBN 1860815154

BRE Report BR 443 *Conventions for U-value calculations*, 2006. (Available at [www.bre.co.uk/uvalues](http://www.bre.co.uk/uvalues))

### **Department for Business, Innovation and Skills**

[www.bis.gov.uk](http://www.bis.gov.uk)

Technical Standards and Regulations Directive 98/34/EC. (Available at [www.bis.gov.uk/policies/innovation/infrastructure/Standardisation/techstandards-directive](http://www.bis.gov.uk/policies/innovation/infrastructure/Standardisation/techstandards-directive)).

### **Glass and Glazing Federation (GGF)**

[www.ggf.org.uk](http://www.ggf.org.uk)

Guide to the Calculation of Energy Ratings for Windows, Roof Windows & Doors, GGF, 2013.

### **Heating and Ventilating Contractors Association**

[www.hvca.org.uk](http://www.hvca.org.uk)

DW/143 A practical guide to ductwork leakage testing, HVCA 2000. ISBN 978 0 90378 330 9.

### **National Association of Rooflight Manufacturers (NARM)**

[www.narm.org.uk](http://www.narm.org.uk)

NARM Technical Document NTD 2, 2010.

### **Department for Communities and Local Government**

*Domestic Building Services Compliance Guide*, DCLG, 2013.

(Available to download from [www.gov.uk](http://www.gov.uk))

### **Legislation**

The Building Bye-laws (Jersey) 2007, as amended.

### **English Heritage**

[www.english-heritage.org.uk](http://www.english-heritage.org.uk)

Energy Efficiency and Historic Buildings, English Heritage, 2011.

### **Department for Energy and Climate Change (DECC)**

[www.decc.gov.uk](http://www.decc.gov.uk)

The Government's Standard Assessment Procedure for energy rating of dwellings, SAP 2012. (Available at [www.bre.co.uk/sap2012](http://www.bre.co.uk/sap2012))

Current Energy Prices ([www.jerseyfuelwatch.com](http://www.jerseyfuelwatch.com))

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## Appendix D: Standards referred to

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**BS EN ISO 13370** Thermal performance of buildings – Heat transfer via the ground – Calculation methods [2007 incorporating corrigendum March 2009].

**BS EN 14351-1** Windows and doors – Product standard, performance characteristics. Windows and external pedestrian doorsets without resistance to fire and/or smoke leakage characteristics [2006 (+AMD 1:2010)].

# Appendix E: Fuel emission factors

**Table E1 Fuel emission factors**

Fuel name	Emissions factor in kg CO <sub>2</sub> per kWh
Gas: mains gas	0.241
Gas: bulk LPG	0.241
Gas: bottled LPG	0.241
Oil: heating oil	0.298
Gas: biogas (including anaerobic digestion)	0.098
Gas: LPG metered cylinders	0.241
Solid fuel: dual fuel appliance (mineral and wood)	0.226
Solid fuel: house coal	0.394
Solid fuel: manufactured smokeless fuel	0.433
Solid fuel: anthracite	0.394
Solid fuel: wood logs	0.019
Solid fuel: wood chips	0.016
Solid fuel: wood pellets (in bags, for secondary heating)	0.039
Solid fuel: wood pellets (bulk supply for main heating)	0.039
Electricity: general domestic	0.101
Electricity: economy 7 (off-peak)	0.101
Electricity: economy 7 (on-peak)	0.101
Electricity: comfort heat (off-peak)	0.101
Electricity: comfort heat (on-peak )	0.101
Electricity: 24-hour heating tariff	0.101
Electricity: electricity sold to grid	0.101
Electricity: electricity displaced from grid	0.101
Electricity: economy 20 (on-peak)	0.101
Electricity: economy 20 (off-peak)	0.101
Community heating schemes: heat from heat pump	0.101
Community heating schemes: heat from boilers – waste combustion	0.047
Community heating schemes: heat from boilers – biomass	0.031
Community heating schemes: heat from boilers – biogas (landfill or sewage gas)	0.098
Community heating schemes: waste heat from power stations	0.058
Community heating schemes: geothermal heat source	0.041
Community heating schemes: electricity generated by CHP	0.101
Community heating schemes: electricity for pumping in distribution network	0.101
Community heating schemes: heat from boilers – mains gas	0.241
Community heating schemes: heat from boilers – LPG	0.241
Community heating schemes: heat from boilers – oil	0.331
Community heating schemes: heat from boilers – coal	0.380
Community heating schemes: heat from boilers – B30D	0.269

Table E1 Fuel emission factors

Fuel name	Emissions factor in kg CO <sub>2</sub> per kWh
Community heating schemes: heat from boilers that can use mineral oil or liquid biofuel	0.331
Community heating schemes: heat from boilers using biodiesel from any biomass source	0.123
Community heating schemes: heat from boilers using biodiesel from vegetable oil only	0.083
Oil: biodiesel from any biomass source	0.123
Oil: biodiesel from vegetable oil only	0.083
Oil: appliances able to use mineral oil or liquid biofuel	0.298
Oil: B30K - for appliances that specifically use a blend of 30% biodiesel from cooking oil and 70% kerosene	0.245
Oil: bioethanol from any biomass source	0.140

