

# Approved Document L - Conservation of fuel and power

## Volume 1: dwellings

### Consultation version – October 2019

*This draft guidance accompanies the October 2019 consultation on the Future Homes Standard, Part L and Part F of the Building Regulations. The Government is seeking views on the standards for new dwellings, and the structure of the draft guidance. The standards for work to existing dwellings are not a subject of this consultation.*

# The approved documents

## What is an approved document?

The Secretary of State has approved a series of documents that give practical guidance about how to meet the requirements of the Building Regulations 2010 for England. These approved documents give guidance on each of the technical parts of the regulations and on regulation 7. The approved documents provide guidance for common building situations.

It is the responsibility of those carrying out building work to meet the requirements of the Building Regulations 2010. Although it is ultimately for the courts to determine whether those requirements have been met, the approved documents provide practical guidance on potential ways to achieve compliance with the requirements of the regulations in England.

Although approved documents cover common building situations, compliance with the guidance set out in the approved documents does not provide a guarantee of compliance with the requirements of the regulations because the approved documents cannot cater for all circumstances, variations and innovations. Those with responsibility for meeting the requirements of the regulations will need to consider for themselves whether following the guidance in the approved documents is likely to meet those requirements in the particular circumstances of their case.

Note that there may be other ways to comply with the requirements than the method described in an approved document. If you prefer to meet a relevant requirement in some other way than described in an approved document, you should seek to agree this with the relevant building control body at an early stage.

Where the guidance in the approved document has been followed, a court or inspector will tend to find that there is no breach of the regulations. However, where the guidance in the approved document has not been followed, this may be relied upon as tending to establish breach of the regulations and, in such circumstances, the person carrying out building works should demonstrate that the requirements of the regulations have been complied with by some other acceptable means or method.

In addition to guidance, some approved documents include provisions that must be followed exactly, as required by regulations or where methods of test or calculation have been prescribed by the Secretary of State.

Each approved document relates only to the particular requirements of the Building Regulations 2010 that the document addresses. However, building work must also comply with all other applicable requirements of the Building Regulations 2010 and all other applicable legislation.

## How to use this approved document

This document uses the following conventions.

- a. **Text against a green background** is an extract from the Building Regulations 2010 or the Building (Approved Inspectors etc.) Regulations 2010 (both as amended). These extracts set out the legal requirements of the regulations.
- b. **Key terms, printed in green**, are defined in Appendix A.
- c. References are made to appropriate standards or other documents, which can provide further useful guidance. When this approved document refers to a named standard or other reference document, the standard or reference has been clearly identified in this document. Standards are highlighted in **bold** throughout. The full name and version of the document referred to is listed in Appendix D (standards) or Appendix C (other documents). However, if the issuing body has revised or updated the listed version of the standard or document, you may use the new version as guidance if it continues to address the relevant requirements of the Building Regulations.

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- d. Standards and technical approvals also address aspects of performance or matters that are not covered by the Building Regulations and may recommend higher standards than required by the Building Regulations. Nothing in this approved document precludes you from adopting higher standards.
- e. In this consultation version of the Approved Document technical differences to the Approved Document 2013 edition incorporating 2016 amendments are generally highlighted in yellow, although editorial changes have been made to the whole document which may have changed the meaning of some guidance

## **User requirements**

The approved documents provide technical guidance. Users of the approved documents should have adequate knowledge and skills to understand and apply the guidance correctly to the building work being undertaken.

# The Building Regulations

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

## Building work

Regulation 3 of the Building Regulations 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
- c. the material alteration of a building or a controlled service or fitting.

Regulation 4 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 Regulations: the building complies with the applicable requirements of the Building Regulations.
- b. For work on an existing building that did not comply with the applicable requirements of the Building Regulations:
  - (i) the work itself must comply with the applicable requirements of the Building Regulations and
  - (ii) the building must be no more unsatisfactory in relation to the requirements than before the work was carried out.

## Material change of use

Regulation 5 defines a 'material change of use' in which a building or part of a building that was previously used for one purpose will be used for another.

The Building Regulations 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 regulation 7, building work must be carried out in a workmanlike manner using adequate and proper materials. Guidance on regulation 7(1) is given in Approved Document 7, and guidance on regulation 7(2) is provided in Approved Document B.

## Independent third party certification and accreditation

Independent schemes of certification and accreditation of installers can provide confidence that the required level of performance for a system, product, component or structure can be achieved.

Building control bodies may accept certification under such schemes as evidence of compliance with a relevant standard. However, a building control body should establish before the start of the building work that a scheme is adequate for the purposes of the Building Regulations.

## Energy efficiency requirements

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Part 6 of the Building Regulations imposes additional 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**

Most building work and material changes of use must be notified to a building control body unless one of the following applies.

- a. It is work that will be self-certified by a registered competent person or certified by a registered third party.
- b. It is work exempted from the need to notify by regulation 12(6A) of, or Schedule 4 to, the Building Regulations.

## **Responsibility for compliance**

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

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# Section 0: Introduction

## Introduction

**0.1** This approved document is **Approved Document L: volume 1 - conservation of fuel and power in dwellings**. It gives guidance on how to comply with Part L of Schedule 1 of the Building Regulations and the associated **energy efficiency requirements** for dwellings. For guidance for non-domestic buildings, use **Approved Document L: volume 2 - conservation of fuel and power in buildings other than dwellings**.

**0.2** This approved document contains the following sections.

<b>Approved Document Section</b>	<b>Related Building Regulations requirements</b>
<b>Section 0: Introduction</b>	N/A
<b>Section 1: Calculating the target emission rate and target primary energy rate.</b>	Regulations 24, 25, 25B, 26, 27, new regulations for primary energy and new regulations for householder affordability: Energy performance of buildings calculations
<b>Section 2: Calculating the dwelling primary energy rate and dwelling emission rate</b>	
<b>Section 3: Consideration of high-efficiency alternative systems</b>	[Regulation for the consideration of high efficiency alternative systems]
<b>Section 4: Limiting heat losses and gains</b>	Requirement L1(a) of Schedule 1
<b>Section 5: Minimum building services efficiencies and controls</b>	Requirement L1(b)(i) and (ii) of Schedule 1 and [regulation for Self-regulating devices]
<b>Section 6: Air permeability and pressure testing</b>	Regulation 43
<b>Section 7: Commissioning</b>	Regulation 44, and requirement L1(b)(iii) of Schedule 1
<b>Section 8: Providing information</b>	Regulation 40
<b>Section 9: Extensions and change of use</b>	[Not included in this consultation]
<b>Section 10: Renovation or replacement of thermal elements</b>	[Not included in this consultation]
<b>Section 11: Consequential improvements</b>	[Not included in this consultation]
<b>Appendix A: Key terms</b>	N/A
<b>Appendix B: Reporting evidence of compliance</b>	N/A
<b>Appendix C: Documents referred to</b>	N/A
<b>Appendix D: Standards referred to</b>	N/A

## Application

**0.3** The guidance in this volume of Approved Document L applies to dwellings only.

**[Note for consultation:** the guidance presented in this draft guidance relates to new dwellings. Ultimately, the intent, subject to further consultation, is to also include guidance for work to existing dwellings in this document]

In a mixed-use building, *[the guidance for buildings other than dwellings]* should be consulted for building work in those parts of the building that are not dwellings.

**NOTE:** Dwellings are self-contained units. Rooms for residential purposes are not dwellings, and so *[the guidance for buildings other than dwellings]* applies to them. Buildings that contain only rooms for residential purposes are not dwellings, and *[the guidance for buildings other than dwellings]* applies to them.

### New buildings

**0.4** Guidance for newly constructed buildings is given in **Sections 1 to 8** of this approved document.

### Common areas in buildings with multiple dwellings

**0.5** The common areas of buildings containing more than one dwelling fall outside the scope of this document. For the common areas.

- a. If they are heated follow *[the guidance for buildings other than dwellings]*
- b. if they are unheated, individual fabric elements should meet the minimum standards set out in **Section 4**.

### Extensions and work in existing buildings

**[Note for consultation:** This consultation does not set out the requirements for work in existing dwellings]

### Exemptions for historic and traditional buildings

**[Note for consultation:** This consultation does not set out the requirements for work in existing dwellings]

### Exemptions for covered areas, conservatories and porches

**[Note for consultation:** This consultation does not set out the requirements for work in existing dwellings]

### Conservatories and porches in new buildings

**[Note for consultation:** This consultation does not set out guidance for conservatories and porches in new buildings, as the guidance for new conservatories and porches references the guidance for work to existing buildings]

### Live-work units

**0.15** A unit that contains both living accommodation and space to be used for commercial

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purposes (e.g. as a workshop or office) should be treated as a **dwelling**, as long as the commercial part can revert to domestic use.

- 0.16** The commercial part of a building can revert to domestic use if all of the following apply.
- a. there is direct access between the commercial space and the living accommodation; and
  - b. the commercial space and the living accommodation are within the same **thermal envelope**; and
  - c. the living accommodation comprises a substantial proportion of the total area of the unit. What constitutes a 'substantial proportion' should be assessed on a case-by-case basis.

**Note:** A large non-domestic building that contains a small flat for a manager is not treated as a **dwelling**. A **dwelling** that contains a room used as an office or utility space is still treated as a **dwelling**.

**Mixed-use developments**

- 0.17** When constructing a **dwelling** as part of a larger building that contains other types of accommodation, sometimes called a mixed-use development, refer to the two volumes of Approved Document L as follows.
- a. For guidance on each individual **dwelling**, use this Approved Document (Approved Document L volume 1).
  - b. For guidance on the non-dwelling parts of the building, such as heated common areas and the commercial or retail space, use *[the guidance for buildings other than dwellings]*.

# Regulations 24, 25, 25B 26, 27, new regulations for primary energy and new regulations for householder affordability: Energy performance of buildings calculations

This approved document deals with the requirements of regulations 24, 25, 25B, 26 and 27, new regulations for primary energy, and new regulations for householder affordability of the Building Regulations 2010.

**[regulations will be amended as necessary in line with the performance sections below]**

## **Methodology of calculation of the energy performance of buildings**

24.(1) The Secretary of State shall approve—

- (a) a methodology of calculation of the energy performance of buildings, including methods for calculating asset ratings and operational ratings of buildings; and
- (b) ways in which the energy performance of buildings, as calculated in accordance with the methodology, shall be expressed.

(2) In this regulation—

‘asset rating’ means an energy performance indicator determined from the amount of energy estimated to meet the different needs associated with a standardised use of the building; and  
‘operational rating’ means an energy performance indicator determined from the amount of energy consumed during the occupation of a building over a period of time and the energy demand associated with a typical use of the building over that period.

## **Minimum energy performance requirements for new buildings**

**[Regulation to be amended to remove fabric efficiency rates, and to add both primary energy and householder affordability metric]**

25. Minimum energy performance requirements shall be approved by the Secretary of State, calculated and expressed in accordance with the methodology approved pursuant to regulation 24, for—

- (a) new buildings (which shall include new dwellings), in the form of target CO<sub>2</sub> emission rates; and
- ~~(b) new dwellings, in the form of target fabric efficiency rates.~~

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**Nearly zero-energy requirements for new buildings**

**25B.** Where a building is erected, it must be a nearly zero-energy building.

**Interpretation**

**35(1).** 'Energy performance of a building' means the calculated or measured amount of energy needed to meet the energy demand associated with a typical use of the building, which includes, inter alia, energy used for heating, cooling, ventilation, hot water and lighting.

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### CO<sub>2</sub> emission rates for new buildings

26. Where a building is erected, it shall not exceed the target CO<sub>2</sub> emission rate for the building that has been approved pursuant to regulation 25, applying the methodology of calculation and expression of the energy performance of buildings approved pursuant to regulation 24.

### ~~Fabric energy efficiency rates for new dwellings~~

~~26A. Where a dwelling is erected, it shall not exceed the target fabric energy efficiency rate for the dwelling that has been approved pursuant to regulation 25, applying the methodology of calculation and expression of the energy performance of buildings approved pursuant to regulation 24.~~

### Primary energy rates for new buildings

[New regulation for primary energy for new buildings]

### Householder affordability for new dwellings

[New regulation for householder affordability for new dwellings]

### CO<sub>2</sub> emission rate calculations

27. (1) This regulation applies where a building is erected and regulation 26 applies.
- (2) Not later than the day before the work starts, the person carrying out the work shall give the local authority a notice which specifies—
- (a) the target CO<sub>2</sub> emission rate for the building, calculated and expressed in accordance with the methodology approved pursuant to regulation 24,
  - (b) the CO<sub>2</sub> emission rate for the building as designed, calculated and expressed in accordance with the methodology approved pursuant to regulation 24, and
  - (c) a list of specifications to which the building is to be constructed.
- (3) Not later than five days after the work has been completed, the person carrying out the work shall give the local authority—
- (a) a notice which specifies—
    - (i) the target CO<sub>2</sub> emission rate for the building, calculated and expressed in accordance with the methodology approved pursuant to regulation 24,
    - (ii) the CO<sub>2</sub> emission rate for the building as constructed, calculated and expressed in accordance with the methodology approved pursuant to regulation 24, and
    - (iii) whether the building has been constructed in accordance with the list of specifications referred to in paragraph (2)(c), and if not a list of any changes to those specifications; or
  - (b) a certificate of the sort referred to in paragraph (4) accompanied by the information referred to in sub-paragraph (a).
- (4) A local authority are authorised to accept, as evidence that the requirements of regulation 26 have been satisfied, a certificate to that effect by an energy assessor who is accredited to produce energy performance certificates for that category of building.
- (5) In this regulation, 'specifications' means specifications used for the calculation of the CO<sub>2</sub> emission rate.

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### Fabric energy efficiency rate calculations

~~27A. (1) This regulation applies where a dwelling is erected and regulation 26A applies.~~

~~— (2) Not later than the day before the work starts, the person carrying out the work shall give the local authority a notice which specifies—~~

~~(a) the target fabric energy efficiency rate for the dwelling calculated and expressed in accordance with the methodology approved pursuant to regulation 24;~~

~~(b) the fabric energy efficiency rate for the dwelling as designed, calculated and expressed in accordance with the methodology approved pursuant to regulation 24; and~~

~~-(c) a list of specifications to which the dwelling is to be constructed.~~

~~— (3) Not later than five days after the work has been completed, the person carrying out the work shall give the local authority—~~

~~(a) a notice which specifies—~~

~~(i) the target fabric energy efficiency rate for the dwelling calculated and expressed in accordance with the methodology approved pursuant to regulation 24;~~

~~(ii) the fabric energy efficiency rate for the dwelling as constructed, calculated and expressed in accordance with the methodology approved pursuant to regulation 24; and~~

~~-(iii) whether the dwelling has been constructed in accordance with the list of specifications referred to in paragraph (2)(c), and if not a list of any changes to those specifications; or~~

~~(b) a certificate of the sort referred to in paragraph (4) accompanied by the information referred to in sub-paragraph (a).~~

~~— (4) A local authority is authorised to accept, as evidence that the requirements of regulation 26A have been satisfied, a certificate to that effect by an energy assessor who is accredited to produce energy performance certificates for that category of building.~~

~~— (5) In this Regulation, 'specifications' means specifications used for the calculation of the fabric energy efficiency rate.~~

**NOTE:**  
Where  
the  
building  
control  
body is  
an

approved inspector, see regulation 20 of the Building (Approved Inspectors etc.) Regulations 2010 (as amended).

**NOTE:** Buildings which meet the standards set out in this Approved Document will meet the definition of nearly zero-energy buildings.

## Performance

### Regulation 24 and 25

Regulations 24 and 25 of the Building Regulations set requirements for the Secretary of State to set a

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methodology for the energy performance of a building. For a new dwelling, the approved methodology is the Standard Assessment Procedure.

Calculation methodologies are set out in **Section 1** and **Section 2**.

**Regulation 26 and [the regulation for target primary energy]**

A newly constructed building must be shown to meet regulation 26 and [the regulations for target primary energy] of the Building Regulations 2010 by producing calculations to show that the dwelling meets both of the following.

- a. target primary energy rate
- b. target emission rate

A newly constructed building must be shown to meet regulation 27 and [the regulations for dwelling primary energy] of the Building Regulations 2010 by producing calculations to show that the dwelling meets both of the following.

- a. dwelling primary energy rate
- b. dwelling emission rate

**Sections 1 and 2** set out both of the following:

- a. the requirements for meeting the primary energy, CO<sub>2</sub> emission and householder affordability rating targets
- b. the approved methodologies for calculating a dwelling's primary energy and CO<sub>2</sub> emission householder affordability rating.

**[The regulations for householder affordability]**

A newly constructed dwelling must be shown to meet [the regulation for householder affordability] by demonstrating that under average household occupation, there are cost-efficient means of servicing the building, including:

- a. Heating
- b. Lighting
- c. Hot water

In the Secretary of State's view, [the regulation for householder affordability] may be met by following **paragraph 1.4**.

# Section 1: Calculating the target emission rate and target primary energy rate.

- 1.1 A new dwelling must be built to a minimum standard of total energy performance. This includes both of the following.
- The CO<sub>2</sub> emissions from the dwelling, influenced by the fabric and the fuel choice: this is the **target emission rate**
  - The **primary energy** used by the dwelling, influenced by the fabric and fuel choice: this is the **target primary energy rate**
- 1.2 The **target emission rate** and **target primary energy rate** for individual dwellings must be calculated using the The Government's Standard Assessment Procedure for Energy Rating of Dwellings, **version 10.1**. A list of approved software tools can be found by **following the link to SAP10.1** at the following web page: <https://www.gov.uk/guidance/standard-assessment-procedure> *[Note for consultation: this list of approved software tools will not be available at consultation stage. A consultation version of the Standard Assessment Procedure, cSAP, will be available at the following web page: <https://www.isap.org.uk/>.*

## Target emission rate and target primary energy rate

- 1.3 Both of the following should be calculated using the **Standard Assessment Procedure** in two stages:
- The **target emission rate**, in kg/m<sup>2</sup>/year.
  - The **target primary energy rate**, in kWh<sub>PE</sub>/m<sup>2</sup>/year

### Stage 1

Calculate both:

- the CO<sub>2</sub> emissions
- the primary energy use**

from a theoretical dwelling (the **notional dwelling**) of the same size and shape as the actual dwelling, but with standardised properties for fabric and services. The standardised properties are set out in Appendix R of the **Standard Assessment Procedure**.

The calculation tool should report both:

- the CO<sub>2</sub> emissions
- the primary energy use**

arising from the use of all of the following.

- Space heating and hot water, C<sub>H</sub>

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ii. Pumps and fans,  $C_{PF}$

iii. Internal lighting,  $C_L$

### Stage 2

For dwellings served by a community heating scheme, calculate the target emission rate and the target primary energy rate using the following formulae:

$$\text{Target Emission Rate}_{2020} = (1.45C_H) + C_{PF} + C_L$$

$$\text{Target Primary Energy Rate}_{2020} = (1.05C_H) + C_{PF} + C_L$$

For all other dwellings, the target emission rate and target primary energy rate are a sum of  $C_H$ ,  $C_{PF}$  and  $C_L$ .

*[Note for consultation: the specifications for the Standard Assessment Procedure notional dwelling can be found in the consultation version of SAP10.1]*

## Householder affordability

1.4 [The consultation is seeking views on how householder affordability might be demonstrated in practice.]

## Buildings that contain multiple dwellings

1.5 For a building that contains more than one dwelling, for example a block of flats or a terrace of houses, an average target emission rate and target primary energy rate may be calculated as an alternative to an individual target for each dwelling. The floor-area-weighted average of the target emission rates and target primary energy rate for all the dwellings in the building should be calculated using the following formula:

$$\frac{\{(target\ emission\ rate1 \times Floor\ area1) + (target\ emission\ rate2 \times Floor\ area2) + (target\ emission\ rate3 \times Floor\ area3) + \dots\}}{(Floor\ area1 + Floor\ area2 + Floor\ area3 + \dots)}$$

1.6 The average target primary energy rate should be calculated using the formula above, but replacing target emission rate with target primary energy rate.

Calculating an average target emission rate or target primary energy rate for separate buildings on the same site is *not* considered to be a reasonable demonstration of compliance.

1.7 Each individual dwelling in a building that contains more than one dwelling should meet the householder affordability requirement in paragraph 1.4.

## Section 2: Calculating the dwelling primary energy rate and dwelling emission rate

2.1 For all new dwellings:

- a. the dwelling emission rate must be less than or equal to the target emission rate.
- b. the dwelling primary energy rate must be less than or equal to the target primary energy rate.

2.2 The dwelling emission rate and the dwelling primary energy rate must be calculated at both of the following points.

- a. before work starts, using design values. The dwelling emission rate and the dwelling primary energy rate must be no greater than the target emission rate and the target primary energy rate.
- b. when work is complete, using figures for the building as constructed, incorporating both of the following.
  - i. any changes to the list of specifications that have been made during construction
  - ii. the measured air permeability

2.3 The dwelling emission rate and the dwelling primary energy rate should be calculated using the Government's Standard Assessment Procedure for Energy Rating of Dwellings, version 10.1. A list of approved software tools can be found by following the link to SAP10.1 at the following web page: <https://www.gov.uk/guidance/standard-assessment-procedure> [Note for consultation: this list of approved software tools will not be available at consultation stage. A consultation version of the Standard Assessment Procedure, cSAP, is available at the following web page: <https://www.isap.org.uk/>]

### Building control notification

2.4 The building control body must be notified before the work starts of all the following:

- a. the dwelling primary energy rate (calculated using design values) and the target primary energy rate
- b. the dwelling emission rate and the target emission rate
- c. a list of specifications used in the calculations.

2.5 The building control body must be notified once the work is complete of all of the following.

- a. the as-built target emission rate and as-built dwelling emission rate
- b. the as-built target primary energy rate and as-built dwelling primary energy rate
- c. whether the building was constructed in accordance with the list of specifications submitted to the building control body before work started. A list of any changes to the design-stage list of specifications must be given to the building control body. Building control bodies are

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authorised to accept a certificate of compliance signed by a suitably accredited energy assessor.

## Buildings that contain multiple dwellings

**2.6** Buildings that contain more than one dwelling must comply with one of the following.

- a. every individual dwelling has all of:
  - i. a dwelling emission rate that is no greater than the individual dwelling's target emission rate
  - ii. a dwelling primary energy rate that is no greater than the individual dwelling's target primary energy rate
  - iii. Each individual dwelling meets the householder affordability requirement in paragraph 1.4

OR

- b. all of:
  - i. the average dwelling emission rate for the whole building, calculated to paragraph 2.7, is no greater than the average target emission rate
  - ii. the average dwelling primary energy rate for the whole building is no greater than the average target primary energy rate
  - iii. Each individual dwelling meets the householder affordability requirements in paragraph 1.4

**2.7** The average dwelling emission rate and dwelling primary energy rate are the floor-area-weighted average of the individual dwelling emission rates and dwelling primary energy rates for all the dwellings in the building. The average dwelling emission rate and dwelling primary energy rate are calculated in the same way as the average target emission rate, in paragraphs 1.5 and 1.6.

An average dwelling emission rate or dwelling primary energy rate should *not* be calculated across separate buildings on a site.

**NOTE:** Information must be provided for each individual dwelling, as described in **Section 8**.

## Secondary heating in the dwelling emission and primary energy calculation

**2.8** When calculating the dwelling emission rate and dwelling primary energy rate for a dwelling with a secondary heating appliance, all of the following apply.

- a. The fraction of heat provided by the secondary heating system in the calculation must be as defined by the Standard Assessment Procedure for the particular combination of main heating system and secondary heating appliance.
- b. The efficiency of the secondary heating appliance with its appropriate fuel should be used in the calculation of the dwelling emission rate and dwelling primary energy rate
- c. If a chimney or flue is provided but no appliance is installed, the presence of the following appliances should be assumed when calculating the dwelling emission rate and dwelling primary energy rate.

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- i. if a gas point is located adjacent to the hearth, assume a decorative fuel-effect gas fire open to the chimney or flue with an efficiency of 20 per cent;
- ii. if there is no gas point, either:
  - if the dwelling is *not* in a smoke control area, assume an open fire in grate for burning multi-fuel with an efficiency of 37 per cent.
  - if the dwelling is in a smoke control area, the fuel should be taken as smokeless solid mineral fuel.
- d. If no secondary heating appliance is installed and there is no chimney or flue provided, then no secondary heating system should be assumed in the calculation.

## Internal lighting in the dwelling emission and dwelling primary energy rate calculations

**2.9** Both the dwelling emission rate and dwelling primary energy rate calculations should account for the efficacy of lamps installed in the fixed lighting locations.

### Achieving the target emission rate and target primary energy rate

**2.10** Provided the dwelling satisfies the minimum standards for fabric set out in **Section 4**, the designer can achieve the target emission rate and the target primary energy rate by using any combination of the following.

- a. fabric energy efficiency
- b. efficient building services
- c. low and zero carbon technologies integrated in an appropriate mix.

**NOTE:** The target emission rate and the target primary energy rate are not likely to be met by using the minimum standards for fabric alone.

## Special considerations when calculating dwelling emission rate and dwelling primary energy rate

### Community energy systems

**2.11** When determining the dwelling emission rate and dwelling primary energy rate for a dwelling connected to a community energy system, the annual percentage of heat supplied from each heat source should be the same for each newly connected dwelling. A submission to the building control body should be made to demonstrate that the community scheme has the capacity to provide the percentage of heat that is assumed.

When calculating the percentage of heat supplied from a district heating system, the calculation should account for the predicted effect of all dwellings which will be connected to the system in the first 12 months of operation, so that the increased operation of any marginal plant (e.g. gas boilers) is properly accounted for.

### Swimming pool basins

**2.12** When determining the dwelling emission rate and, dwelling primary energy rate for a dwelling with a swimming pool, the thermal performance of the pool basin should not be included in the calculation. Instead, the dwelling emission rate and dwelling primary energy rate should be calculated as if the area covered by the pool were replaced with the equivalent area of floor with the same U-value as the pool surround.

### Party walls

**2.12** When calculating the dwelling emission rate and dwelling primary energy rate for a dwelling, a party wall U-value for the type of construction adopted as set out in Table 4.1 should be applied.

Table 4.1 U-values for party walls	
Party wall construction	U-value W/(m <sup>2</sup> .K)
Solid <sup>1</sup>	0.0
Unfilled cavity with no effective edge sealing	0.5
Unfilled cavity with effective sealing around all exposed edges and in line with insulation layers in abutting elements <sup>1</sup>	0.2
A fully filled cavity with effective sealing at all exposed edges and in line with insulation layers in abutting elements	0.0
NOTES	
1. To claim a reduced U-value (0.2 or 0.0), it is necessary to demonstrate that the edge sealing is likely to be robust under normal site conditions.	

# Regulation for the Consideration of high-efficiency alternative systems

This approved document deals with the requirements of [the regulation for the consideration of high efficiency alternative systems as amended] of the Building Regulations 2010.

**Regulation for the consideration of high-efficiency alternative systems.**

[Amended regulation for the consideration of high efficiency alternative systems]

**NOTE:** Where the **building control body** is an approved inspector, see regulation 20 of the Building (Approved Inspectors etc.) Regulations 2010 (as amended).

## Performance

When a dwelling is erected, the person carrying out the work must comply with [the regulation for the consideration of high efficiency alternative systems] of the Building Regulations 2010 by analysing the feasibility of installing high efficiency alternative systems.

The Building Regulations do not require that high-efficiency alternative systems or other low and zero carbon systems are installed.

**Section 3** of this document provides more details.

## Section 3: Consideration of high efficiency alternative systems

- 3.1 Before building work starts, the person undertaking the work must analyse the technical, environmental and economic feasibility of using high-efficiency alternative systems in the **dwelling** design. This analysis should be taken into account when designing the **dwelling**.
- 3.2 The analysis of high-efficiency alternative systems must be documented and available for verification processes. The documentation should state whether high-efficiency alternative systems have been included in the building design.
- 3.3 The analysis may be carried out for individual **dwellings**, groups of similar **dwellings**, or for common types of **dwelling** in the same area. Where a number of **dwellings** are connected to a community energy system, a single analysis may be carried out for all the **dwellings** connected to the system.
- 3.4 The documented results of the analysis should be retained for the **building control body** to inspect upon request.
- 3.5 The analysis may also consider the issues of healthy indoor climate conditions, fire safety, and risks related to intense seismic activity.

**[Note for consultation: This consultation does not set out any changes to the requirements for work in existing dwellings]**

# Requirement L1(a): Limiting heat gains and losses

This approved document deals with the requirements of Part L1(a) of Schedule 1 to the Building Regulations 2010.

<i>Requirement</i>	<i>Limits on application</i>
<p><b>Schedule 1 – Part L Conservation of fuel and power</b></p> <p><b>L1.</b> Reasonable provision shall be made for the conservation of fuel and power in buildings by:</p> <p><b>(a) limiting heat gains and losses–</b></p> <p><b>(i) through thermal elements and other parts of the building fabric; and</b></p> <p><b>(ii) from pipes, ducts and vessels used for space heating, space cooling and hot water services;</b></p> <p><b>(b) providing fixed building services which–</b></p> <p>(i) are energy efficient;</p> <p>(ii) have effective controls; and</p> <p>(iii) are commissioned by testing and adjusting as necessary to ensure they use no more fuel and power than is reasonable in the circumstances.</p>	

## Performance

Requirements for the conservation of fuel and power are given in Part L of Schedule 1 of the Building Regulations 2010.

In the Secretary of State’s view, requirement L1(a) will be met where both of the following are achieved.

- a. Limiting unwanted heat *losses* from the dwelling by meeting the standards for all of the following.
  - i. the building fabric, including walls, floors, roof, windows and openings (for new buildings - **paragraphs 4.1 to 4.8**)
  - ii. uncontrolled air loss (for new buildings - **Section 6**)
  - iii. the pipework and services (for new buildings – **paragraphs 4.11 to 4.19**)
  
- b. Limiting unwanted heat *gains* to the dwelling, throughout the year, through any of the routes listed in point a. as set out in **Section 4**.

## Section 4: Limiting heat losses and gains

### Limiting standards for fabric

**4.1** New insulating fabric elements should meet the limiting standards in Table 4.1. This includes all of the following.

- a. elements in new buildings
- b. new or replacement elements in existing buildings **[Note for consultation: This consultation does not set out any changes to the requirements for work in existing dwellings]**
- c. elements in extensions to existing buildings. **[Note for consultation: This consultation does not set out any changes to the requirements for work in existing dwellings]**

**4.2** U-values should be calculated using the methods and conventions set out in BRE publication **BR 443**. U-values should be for the whole thermal element (e.g. in the case of a window, the combined performance of the glazing and the frame).

### Windows, doors and roof-lights

**4.3** The U-value of a window should be calculated for one of the following:

- a. the specific size and configuration of the window; or
- b. the smaller of the two standard windows defined in **BS EN 14351-1**; or
- c. the standard configuration set out in **BR 443**;

The U-value of a door should be calculated for either of the following:

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

**4.4** Alternatively, the default value from the **Standard Assessment Procedure** Table 6e can be used for doors or windows.

**4.5** The limiting U-value for windows and roof windows in Table 4.1 is presented assuming the element is assessed in the vertical position. **The limiting U-value for a roof-light in Table 4.1 is presented assuming it is assessed in the horizontal position. If a roof window was not assessed in the vertical plane or roof-light was not assessed in the horizontal plane its U-value should be adjusted according to the guidance in BR 443.**

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Table 4.1 Limiting U-values for new thermal elements		
Element type	Maximum U-value W/(m <sup>2</sup> .K) <sup>1</sup>	
	In new buildings	In existing buildings
Pitched roof – insulation at ceiling level	0.16	
All other roof types <sup>2</sup>	0.16	
Wall	0.26	
Floor	0.18	
Party wall	0.20	
Swimming pool basin	0.25	
Window or roof window <sup>4,5</sup>	1.6	
Roof-light <sup>7,8,9</sup>	2.2	
Doors (including glazed doors)	1.6	
Air Permeability	8.0 m <sup>3</sup> / h.m <sup>2</sup> at 50Pa	

Notes:

1. Area-weighted average values.
2. For dormer windows, 'roof' includes the roof parts of the windows, and 'wall' includes the wall parts (cheeks).
3. [note 3 not used]
4. The effects of Georgian bars and/or leaded lights can be ignored.
5. If performance requires thicker glass to be used, an equivalent window unit with standard thickness (6mm) glazing should be shown to meet the required standard.
6. Including roof windows and curtain walling
7. U-values for roof-lights should be based on the total heat loss through the developed surface area of the roof light. The developed surface area may be different to the roof aperture area. Further guidance is given in **BR 443** and NARM Technical Document **NTD 2**.
8. Further guidance on evaluating the U-value of out-of-plane roof-lights is given in NARM Technical Document **NTD 2**.
9. The U-value of upstands and builders' kerbs is subject to the limiting U-value for walls.

## Continuity of insulation

**4.6** The building fabric should be constructed so that all of the following apply.

- a. the insulation is reasonably continuous over the whole building's **thermal envelope**; and
- b. thermal bridging, including at the party wall, is reasonably limited

**NOTE:** Any solution to edge sealing or thermal bridging should take particular account of **Part E** of the Building Regulations.

**4.7** Thermal bridges should be assessed using one of the following means.

- a. Use construction joint details calculated by a suitably competent person following the guidance in BRE **Report BR 497** and the temperature factors set out in BRE **Information Paper IP 1/06**
- b. Use the values in the **Standard Assessment Procedure**, Table K1, in the 'default' column
- c. Use a default  $y$ -value of  $0.20 \text{ W}/(\text{m}^2\cdot\text{K})$

**NOTE:** A mixture of approaches may be used for different elements on the same building. When using the approach in (a), an appropriate system of site inspection should be in place.

**4.8** To avoid air movement within **thermal elements**, either

- a. the insulation layer should be against the air barrier at all points in the building envelope
- b. the space between the air barrier and insulation layer should be filled with solid material.

## Limiting the effects of solar gains in summer

**[Note for consultation:** – Paragraphs 4.9 and 4.10 relate to overheating. We plan to consider standards for overheating in further consultation, and this guidance may be subject to further consideration]

**4.9** The effects of solar gain in summer should be limited by an appropriate combination of all of the following.

- a. window size and orientation
- b. solar protection e.g. through shading
- c. ventilation
- d. exposed thermal mass

**4.10** It should be demonstrated, by following the procedure in the **Standard Assessment Procedure** Appendix P, that the **dwelling** does not have a high risk of high internal temperatures. This assessment should be carried out regardless of whether the **dwelling** has mechanical cooling. If the **dwelling** has mechanical cooling, the assessment should be based on the design without the cooling system operating, but with an appropriate assumption about ventilation rates.

## Limiting heat losses from building services

### Hot water pipework

**4.11** In a new system, all of the following new pipework should be insulated.

- Primary circulation pipes for heating circuits where they pass outside the heated living space, including where pipework passes into voids.
- All primary circulation pipes for domestic hot water.
- All pipes that are connected to hot water storage vessels, for at least 1 metre from the point at which they connect to the cylinder.
- All **secondary circulation** pipework that is kept hot by that circulation.

**4.12** In an existing system whenever a boiler or hot water storage vessel is replaced, any accessible pipes in the dwelling, should be insulated.

**4.13** Heat losses from insulated pipework should not exceed those in **BS 5422** for hot water services at 60°C, regardless of the actual design temperature. Meeting the standards in Table 4.2 is one way of demonstrating that this has been achieved.

**Table 4.2 Minimum thicknesses of pipework insulation for hot water services and space heating applications using high performance insulation**

Nominal internal pipe diameter (mm)	Minimum insulation thickness <sup>1</sup> (mm) for low temperature hot water systems
≤ 10	5
≤ 25	10
≤ 50	15
≤ 100	20

**Notes:**

1: Thicknesses apply for insulation with a thermal conductivity of 0.025W/m.K or better. For other circumstances consult **BS 5422**.

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### External pipework for community heating systems

- 4.14** Pipework for community heating systems should be insulated to either of the following.
- the standards in **BS EN 253** for pre-insulated pipes
  - an equivalent performance for conventionally insulated pipes.
- 4.15** Where pipework is run above ground, the performance of the pipe insulation should be at least as high as the insulating performance of pipework in the buried part of the system.

### Heated water storage for space or domestic hot water

- 4.16** Vessels that store heated water for a heating or domestic hot water system should have standing losses that are a maximum of the heat loss given in Table 4.3 for that system type.

<b>Nominal volume (litres)</b>	<b>Heat loss (kWh/24h)</b>	<b>Nominal volume (litres)</b>	<b>Heat loss (kWh/24h)</b>
50	1.03	400	2.59
100	1.49	500	2.80
150	1.88	600	2.98
200	2.06	700	3.14
250	2.22	800	3.29
300	2.36	900	3.44
350	2.48	1000	3.57

**Notes:**  
1. The heat loss from cylinders (volume V litres) larger than 1000 litres should not exceed  $(16.66 + 8.33 \times V^{0.4}) / (1000 \times 24)$ .

- 4.17** Hot water storage vessels should comply with the following.
- Copper hot water storage combination units should comply with **BS 3198**.
  - Vented cylinders should comply with the heat loss and heat exchanger requirements of **BS 1566-1** or **BS EN 12897** as appropriate.
  - Unvented hot water storage system products should comply with **BS EN 12897**.
- 4.18** Primary storage systems should meet the insulation requirements of the Hot Water Association Performance **Specification for Thermal Stores**.

### Heat interface units

- 4.19** Vessels that store heated water for a heating or domestic hot water system should have standing losses that are a maximum of the heat loss given in Table 4.3 for that system type.

# Requirement L1(b)(i) and (ii): Fixed building services efficiency and controls

This approved document deals with the requirements of Part L1(b)(i) and (ii) of Schedule 1 to the Building Regulations 2010.

<i>Requirement</i>	<i>Limits on application</i>
<p><b>Schedule 1 – Part L Conservation of fuel and power</b></p> <p><b>L1.</b> Reasonable provision shall be made for the conservation of fuel and power in buildings by:</p> <p>(a) limiting heat gains and losses–</p> <p>(i) through thermal elements and other parts of the building fabric; and</p> <p>(ii) from pipes, ducts and vessels used for space heating, space cooling and hot water services;</p> <p><b>(b) providing fixed building services which–</b></p> <p><b>(i) are energy efficient;</b></p> <p><b>(ii) have effective controls;</b> and</p> <p>(iii) are commissioned by testing and adjusting as necessary to ensure they use no more fuel and power than is reasonable in the circumstances.</p>	

## Performance

Requirements for the conservation of fuel and power are given in Part L of Schedule 1 of the Building Regulations 2010.

In the Secretary of State’s view, requirement L1(b)(i) and (ii) will be met where **fixed building services** are provided which meet the minimum efficiencies and controls set out in **Section 5**.

# Regulation for Self-regulating devices

This approved document deals with the requirements of [the regulation for self-regulating devices] of the Building Regulations 2010.

## Self-regulating devices

Regulation to transpose the requirement of Article 8(1) of the energy performance of buildings directive:

[Member states shall require new buildings, where technically and economically feasible, to be equipped with self-regulating devices for the separate regulation of the temperature in each room or, where justified, in a designated heated zone of the building unit. In existing buildings, the installation of self-regulating devices shall be required when heat generators are replaced, where technically and economically feasible.]

## Performance

When a dwelling is erected it must be demonstrated to comply with [the regulation for self-regulating devices] of the Building Regulations 2010.

In the Secretary of State's view [the regulation for self-regulating devices] will be met in new dwellings where both:

- a. Self-regulating devices are installed where technically and economically feasible, as set out in paragraphs 5.8 to 5.10.
- b. Self-regulating devices provide separate regulation of the temperature in either:
  - i. each room
  - ii. where justified in accordance with paragraph 5.19, in a designated heated zone of the building unit.

**[Note for consultation: This document does not set out the requirements for work in existing buildings]**

## Section 5: Minimum building services efficiencies and controls

**[Note for consultation: this section of the draft guidance gives guidance for systems which may be commonly installed in new dwellings. We plan to introduce further guidance for systems commonly installed in existing dwellings in further consultation at a later date]**

### Minimum building services efficiencies

**5.1** Each fixed building service should be at least as efficient as the value set out in this section.

If a proposed service is not covered by this document, then it should be demonstrated that it is no less efficient than a comparable service that is covered in this document.

**NOTE:** Minimum efficiencies may also be set under the Ecodesign for Energy-Related Products Regulations 2010 (as amended)

**5.2** Both of the following apply to the efficiency claimed for a fixed building service.

- a. The efficiency should be based on the appropriate test standard set out in this section.
- b. The test data should be certified by a notified body.

### Replacing components in existing systems

**[Note for consultation – guidance for work to existing buildings is outside the scope of this consultation]**

### Heating and hot water systems

**5.3** Paragraphs 5.4 to 5.10 set standards that all heating and hot water systems should achieve, except where stated otherwise. Further guidance is given for specific system types.

#### Controls, zoning and self-regulating devices

**5.4** For wet heating systems in new dwellings with a floor area of 150m<sup>2</sup> or greater, a minimum of two independently controlled heating circuits should be provided.

**5.5** System controls should be wired so that when there is no demand for space heating or hot water, the heating appliance and pump are switched off.

**5.6** Domestic hot water circuits that are supplied from a hot water store should have both of the following.

- a. time control which is independent of space heating circuits, and
- b. electronic temperature control.

**5.7** Primary hot water circuits for domestic hot water or heating should have fully pumped circulation

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where this is compatible with the heat generator.

### Self-regulating devices

**5.8** Each room or, where justified in accordance with paragraph 5.9 a heating zone, must be provided with self-regulating devices for the separate control of heating in the room/zone.

**5.9** It may be justified to control a heating zone rather than individual rooms where any of the following apply:

- a. In single-storey, open-plan dwellings in which the living area is greater than 70% of the total floor area, sub-zoning of temperature control might not be appropriate. In such cases, the dwelling should be considered as a single heating zone.
- b. Where two adjacent rooms have a similar function and heating requirements (e.g. kitchen and utility room).

**Note:** it might not be possible to equip some heating system types with self-regulating devices for the control of individual rooms. Such systems must still be equipped with self-regulating devices, and may still be used where controlling a heating zone can be justified.

**5.10** The requirement for self-regulating devices may be satisfied by providing any of the following

- a. An individual networked heat emitter control for each emitter.
- b. Both of the following.
  - i. a thermostat in a room that the heating circuit serves
  - ii. an individual self-regulating device for each heat emitter, such as a thermostatic radiator valve, on all heat emitters outside the room which contains the thermostat
- c. An individual room/zone thermostat or fan coil thermostat for each room/zone
- d. Any other controls which meet the function of [the regulation for self-regulating devices]

### Work on existing systems

**[Note for consultation: guidance for work to existing buildings is outside the scope of this consultation]**

## Gas-fired heating systems

**5.11** In addition to meeting the general requirements for heating and hot water systems in paragraphs 5.4 to 5.10, all gas-fired heating systems should comply with the minimum efficiency of a gas-fired heating system in **Table 5.1**.

**NOTE:** The minimum system efficiency in **Table 5.1** might need to be improved upon to meet the target emission rate and primary energy rate for the building.

System type	Minimum efficiency	Notes
Wet heating	92%	Efficiency as defined in ErP <sup>1</sup>

**Notes:**

1. For Standard Assessment Procedure modelling, SEDBUK values should be used.

## Electric heating systems

**NOTE:** Electric resistance heating is assumed to be 100% efficient, therefore no minimum efficiency is set for these types of system.

### Electric storage heaters

**5.12** In addition to meeting the general requirements for heating and hot water systems in paragraphs 5.4 to 5.10, automatic control of input charge should be provided for electric storage heaters. Temperature control should operate by adjusting the rate of heat release from the appliance, using an adjustable damper or other thermostatically controlled method.

## Solid fuel appliances

**5.13** Solid fuel appliances should have a minimum efficiency (gross calorific value) as specified in Table 5.3 for the category of appliance.

**Table 5.3 Solid fuel appliance categories and minimum efficiencies**

Category <sup>1</sup>	Appliance description	Minimum efficiency (gross calorific value)	Feed-type
D1/2/3/4	Open fire and high output boiler	63%	Batch
E1/2/3	Dry room heater – wood or multi-fuel	65%	Batch/ auto
E4	Dry room heater – pellet stove	65% part load 70% nominal load	Auto
F	Room heater with boiler	67% (mineral fuels and wood logs) 70% (wood pellets – part load) 75% (wood pellets – nominal load)	Batch/ auto
G1	Cooker without boiler not exceeding 3.5 kW	55% (wood fuels)	Batch
G2	Cooker with heating boiler exceeding 3.5 kW	60% (wood fuels)	Batch

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J2	Independent boiler – wood logs only	75%	Batch
J5	Independent boiler – wood/pellets/chips	75% nominal load 70% part load	Auto
<p>Notes:</p> <p>1. Refers to the categories as set out in The Official Guide to HETAS Approved Products and Services, 2017</p>			

### Central heating systems using certain types of solid fuel appliance

**5.14** Paragraphs 5.15 and 5.16 provide guidance on the following types of solid fuel appliance used to deliver primary heating as part of a central heating system.

- a. batch-fed open fires with high output boilers (appliance types D1 to D4 in Table 5.3)
- b. batch-fed and automatic-feed room heaters and stoves with boilers (appliance type F in Table 5.3)
- c. batch-fed cookers with boilers (appliance type G2 in Table 5.3)
- d. batch-fed wood log, wood pellet and woodchip-fired independent boilers (appliance types J2 and J5 in Table 5.3).

**5.15** The manufacturer’s instructions should be followed on the size and position of radiators designed to keep the system operating effectively by leaking heat (known as heat leak radiators).

**5.16** In addition to complying with the standards in paragraphs 5.4 to 5.10, both of the following should apply.

- a. Space heating and hot water circuits should be provided with separate time control.
- b. All appliances should have automatic control of the burning rate.

### Community heating

**5.17** Paragraphs 5.18 to 5.23 apply where work involves connecting dwellings to a new or existing community heating scheme that achieves both of the following.

- a. supplies 15 or more dwellings from a central source such as a boiler, combined heat and power unit, or heat pumps
- b. distributes heat from the central source using a wet radiator system (although warm air heating and underfloor heating systems may also be used).

**5.18** The central heat source should comply with the requirements in [the guidance for buildings other than dwellings], except where specified in this section.

**[Note for consultation: This consultation does not set out the requirements for work in buildings other than dwellings]**

### Connecting dwellings to an existing community heating scheme

**5.19** When connecting to an existing district or community heating system, the carbon intensity and

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primary energy of the scheme should be assessed. Emission factors and primary energy factors should be determined by a suitably qualified person, based on the particular details of the scheme, and taking account of the annual average performance of the whole system including distribution circuits and all the heat generating plant, combined heat and power, waste heat recovery and heat dumping.

### **Minimising energy used by pumps**

**5.20** For new community heating systems, both of the following should apply.

- a. The design temperature difference for the community heating primary circuit should be a minimum of 20°C.
- b. Variable volume control systems should be used to reduce the volume of water and the pressure difference required from the pumps under part load.

### **Controls**

**5.21** The maximum design flow rate into the dwelling's heating system should be limited by suitable control and balancing valves to maintain the overall balance in the network and to avoid excessive pumping energy.

**5.22** For new community heating systems, the hot water system should be controlled using variable volume controls designed to maintain low return temperatures in the primary community heating circuit.

### **Metering**

**5.23** Community heating systems should be designed to accommodate heat meters for each dwelling at the point of installation

## **Underfloor heating**

### **Zoning and Controls**

**5.24** In addition to the guidance on controls, zoning and self-regulating devices in paragraphs 5.4 to 5.10, all of the following apply to underfloor heating systems.

- a. All floor heating systems should be fitted with controls to adjust the operating temperature.
- b. Room thermostats for electric underfloor heating systems should have a manual override feature.
- c. Thick screed floor heating systems (>65 mm) should have facilities to automatically adjust the room temperature to a lower level at night or when the room is unoccupied.

### **Minimising heat losses**

**5.25** Ground floors and those in contact with the outside should be insulated to limit heat losses to not more than 10 W/m<sup>2</sup>. The heat loss from the floor should be calculated using the sum of the thermal resistance of the floor finish and the underlying heated layer, multiplied by 10.

**5.26** Floor heating systems intended for intermittent or cyclical operation or installed over unheated rooms should be separated from the structural floor by a layer of thermal insulation of at least 1.25 (m<sup>2</sup>.K)/W.

**5.27** The intermediate floor should have a separating layer of system thermal insulation with thermal resistance of one of the following.

- a. as in paragraph 5.47

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- b. as specified in **BS EN 1264-4**, in one of the following scenarios.
  - i. for electric systems, of not less than 0.5 (m<sup>2</sup>.K)/W
  - ii. for wet systems, of not less than 0.75 (m<sup>2</sup>.K)/W.

**5.28** Distribution pipework which does not provide useful heat to a room should be insulated to the standards of paragraph 4.13.

### Specific standards for electric underfloor heating

**5.29** Electric cables for underfloor heating should be installed within screeds as follows.

- a. for direct-acting systems, within screeds not exceeding 60mm
- b. for night energy storage systems, within screeds of at least 65mm.

**5.30** Where electric cable underfloor heating night energy storage systems are used, both of the following should apply.

- a. A minimum of 20% of the floor area of the dwelling should have fast-response systems such as panel heaters
- b. Controls should be installed which are designed to modify the input charge in response to both of the following.
  - i. the room thermostat
  - ii. floor temperature sensing

**5.31** Programmable room thermostats with an override feature should be provided for all direct-acting zones of the electric underfloor heating system with air and floor temperature sensing capabilities, to be used individually or combined.

## Heat pumps

**NOTE:** Where the heat pump provides comfort cooling, guidance is also given in paragraphs 5.41 to 5.43.

### Warm water and hot water heat pumps

**5.32** Electrically driven air-to-air heat pumps with an output less than or equal to 12 kW should have a **seasonal coefficient of performance** rating for the median temperature range in **BS EN 14825** of at least D.

**5.33** Other types of heat pump should have a **coefficient of performance** that meets both of the following requirements.

- a. a minimum of **2.8** for space heating
- b. a minimum of **2.0** for heating domestic hot water

### Controls

**5.34** In addition to the guidance on controls, zoning and self-regulating devices in paragraphs 5.4 to 5.10, the heat pump unit should include controls to do all of the following.

- a. control water pump operation (internal and external as appropriate)
- b. control both of the following.
  - i. water temperature for wet systems
  - ii. air temperature for air systems
- c. control outdoor fan operation for air-to-water and air-to-air units
- d. provide defrost control of external airside heat exchanger for air-to-water and air-to-air

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systems

- e. control **secondary heating** (if fitted) on air-to-air systems
- f. protect for water flow failure
- g. protect for high water temperature
- h. protect for high refrigerant pressure
- i. protect for air flow failure on air-to-water and air-to-air units.

**5.35** External heat pump controls should include both of the following.

- a. weather compensation or internal temperature control
- b. timer or programmer for space heating.

## Solar water heating

**NOTE:** The guidance for solar water heating in this document applies to indirect solar systems that supply domestic hot water and have both of the following.

- a. a solar collector area of less than 20m<sup>2</sup>
- b. a solar heated water storage volume of less than 440 litres.

## System design

**5.36** Collectors should be independently certified as complying with all required tests according to **BS EN 12975-1** for both of the following.

- a. thermal performance
- b. reporting and identification

**5.37** The electrical input power of the primary pump in the solar system should be less than the higher of the following.

- a. 50 Watts
- b. 2% of the peak thermal power of the collector.

**5.38** For a heat exchanger between a solar primary and secondary system, a minimum of 0.1 m<sup>2</sup> or equivalent of heat exchanger area should be provided or every 1 m<sup>2</sup> of the net absorber area of the solar collector, or equivalent.

## Controls

**5.39** Controls should be fitted to solar domestic hot water systems to do all of the following.

- a. maximise the useful energy gain from the solar collectors
- b. minimise the accidental loss of stored energy
- c. ensure that hot water produced by back-up sources is not used when adequate solar pre-heated water is available
- d. provide a means to control the adverse effects of excessive temperatures and pressures
- e. where a separate domestic hot water heating appliance is pre-heated by a solar system, the appliance should be controlled to add no extra heat if the target temperature is met from the solar pre-heated vessel.

## Hot water storage

**5.40** The ratio of the storage volume of solar heated water to the area of the collector should be either of the following.

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- a. The dedicated solar storage volume should be a minimum of 25 litres per net square metre of the solar collector absorber area.
- b. Alternatively, the dedicated solar storage volume should be a volume equivalent to at least 80% of the daily hot water demand (as defined by the [Standard Assessment Procedure](#)).

## Comfort cooling

- 5.41** The energy efficiency ratio of an air conditioner working in cooling mode should be a minimum of 3.87.
- 5.42** Fixed air conditioners should have a minimum energy efficiency classification of Class C in Schedule 3 of the labelling scheme adopted under the Energy Information (Household Air Conditioners) (No 2) Regulations.
- 5.43** Exposed refrigeration pipework should be both of the following.
- a. insulated
  - b. enclosed in protective trunking.

## Mechanical ventilation

- 5.44** The specific fan power for mechanical ventilation systems should be a maximum of:
- a. for intermittent extract ventilation systems: 0.5 W/(l.s)
  - b. for continuous extract ventilation systems: 0.7 W/(l.s)
  - c. for continuous supply ventilation systems: 0.5 W/(l.s)
  - d. for continuous supply and extract with heat recovery ventilation systems: 1.5 W/(l.s).
- 5.45** All packaged ventilation systems providing both supply and extract ventilation should be fitted with all of the following.
- a. heat recovery system
  - b. summer bypass (the possibility to bypass the heat exchanger or to control its heat recovery performance)
  - c. variable speed controller.
- 5.46** Ventilation heat recovery systems, where incorporated, should have a minimum efficiency of 73%.

## Lighting

### Internal and external lighting

- 5.47** Where internal lighting is being installed, each internal light fitting should have lamps with a minimum luminous efficacy of 60 lamp lumens per circuit-watt
- 5.48** Where installed, external light fittings should have both of the following controls.
- a. All external light fittings should have automatic controls which switch luminaires off in response to daylight.
  - b. If the lamp efficacy is 60 lumens or less, external light fittings should have automatic controls which switch luminaires off in response to occupancy. Otherwise manual control is acceptable.

# Regulation 43: Pressure testing

This approved document deals with the requirements of regulation 43 of the Building Regulations 2010.

## Pressure testing

- 43.** (1) This regulation applies to the erection of a building in relation to which paragraph L1(a)(i) of Schedule 1 imposes a requirement.
- (2) Where this regulation applies, the person carrying out the work shall, for the purpose of ensuring compliance with regulation 26 ~~and regulation 26A~~ and paragraph L1(a)(i) of Schedule 1:
- (a) ensure that:
- (i) pressure testing is carried out in such circumstances as are approved by the Secretary of State; and
  - (ii) the testing is carried out in accordance with a procedure approved by the Secretary of State; and
- (b) subject to paragraph (5), give notice of the results of the testing to the local authority.
- (3) The notice referred to in paragraph (2)(b) shall:
- (a) record the results and the data upon which they are based in a manner approved by the Secretary of State; and
  - (b) be given to the local authority not later than seven days after the final test is carried out.
- (4) A local authority are authorised to accept, as evidence that the requirements of paragraph (2)(a)(ii) have been satisfied, a certificate to that effect by a person who is registered by the Independent Air Tightness Testing Scheme Limited or the Air Tightness Testing and Measurement Association in respect of pressure testing for the air tightness of buildings.
- (5) Where such a certificate contains the information required by paragraph (3)(a), paragraph (2)(b) does not apply.

**NOTE:** Where the **building control body** is an approved inspector, see regulation 20 of the Building (Approved Inspectors etc.) Regulations 2010 (as amended).

## Performance

When a dwelling is erected, it must be demonstrated to comply with regulation 43 of the Building Regulations 2010 by carrying out pressure testing.

**Section 6** of this document sets out how the pressure testing should be carried out.

Compliance with Regulation 43 of the Building Regulations 2010 may be demonstrated by pressure testing according to paragraphs 6.1 to 6.11.

## Section 6: Air permeability and pressure testing

- 6.1 The minimum standard for air permeability of a new build dwelling is  $8 \text{ m}^3/\text{h.m}^2$  at 50Pa, as stated in **Section 4**.
- 6.2 The developer should provide a **building control body** with evidence that test equipment has been calibrated within the previous 12 months using a UKAS-accredited facility.
- 6.3 **Building control bodies** may accept a pressure test certificate as evidence that the building complies with Regulation 43 of the Building Regulations.
- The **building control body** should be provided with evidence that the person who pressure-tested the building both
- has received appropriate training
  - is registered to test the specific class of building.
- 6.4 **An air pressure test should be carried out on every dwelling.**

### Showing compliance, and reporting pressure test results

- 6.5 The **dwelling emission rate** and the **dwelling primary energy rate** calculated using the measured **air permeability** must not be worse than the **target emission rate** and the **target primary energy rate**.
- 6.6 If the criteria in paragraphs 6.1 and 6.5 are not achieved, the dwelling **air permeability** should be improved. New tests should be carried out until the **dwelling** achieves the criteria in paragraphs 6.1 and 6.5.
- 6.7 The results of all pressure tests on dwellings should be reported to the **building control body**, including any test failures.

### Air pressure testing procedure

- 6.8 **Air pressure tests should be performed following the guidance set out in [the approved air tightness testing methodology – see consultation document]. The procedures set out in this document have been approved by the Secretary of State.**

# Requirement L1(b)(iii) and Regulation 44: Commissioning

This approved document deals with the requirements of Part L1(b)(iii) of Schedule 1 to the Building Regulations 2010 and regulation 44.

<i>Requirement</i>	<i>Limits on application</i>
<p><b>Schedule 1 – Part L Conservation of fuel and power</b></p> <p><b>L1.</b> Reasonable provision shall be made for the conservation of fuel and power in buildings by:</p> <p>(b) providing fixed building services which–</p> <p>(i) are energy efficient;</p> <p>(ii) have effective controls; and</p> <p><b>(iii) are commissioned by testing and adjusting as necessary to ensure they use no more fuel and power than is reasonable in the circumstances.</b></p>	
<p><b>Commissioning</b></p> <p>44.—(1) This regulation applies to building work in relation to which paragraph F1(2) of Schedule 1 imposes a requirement, but does not apply to the provision or extension of any fixed system for mechanical ventilation or any associated controls where testing and adjustment is not possible.</p> <p>(2) This regulation applies to building work in relation to which paragraph L1(b) of Schedule 1 imposes a requirement, but does not apply to the provision or extension of any fixed building service where testing and adjustment is not possible or would not affect the energy efficiency of that fixed building service.</p> <p>(3) Where this regulation applies the person carrying out the work shall, for the purpose of complying with paragraph F1(2) or L1(b) of Schedule 1, give to the local authority a notice confirming that the fixed building services have been commissioned in accordance with a procedure approved by the Secretary of State.</p> <p>(4) The notice shall be given to the local authority –</p> <p>(a) not later than the date on which the notice required by regulation 16(4) is required to be given; or</p> <p>(b) where the regulation does not apply, not more than 30 days after the completion of the work.</p>	

## Performance

When a dwelling is erected, it must be demonstrated to comply with L1(b)(iii) of Schedule 1 to the Building Regulations 2010, and regulation 44 of the Building Regulations 2010 by carrying out commissioning.

In the Secretary of State's view, L1(b)(iii) and regulation 44 may be met by commissioning fixed building services in accordance with **Section 7**.

## Section 7: Commissioning

**7.1** Fixed building services must be commissioned to ensure that they use no more fuel and power than is reasonable in the circumstances. The commissioning process should involve testing and adjusting the fixed building services as necessary and in accordance with the manufacturer's instructions.

**7.2** A commissioning plan should be produced, identifying both of the following.

- a. systems that need to be tested
- b. how these systems will be tested

The commissioning plan should be given to the building control body with the design stage emission rate and primary energy calculations.

**7.3** A fixed building service that cannot be adjusted by design, or for which commissioning would not affect energy use, does not need to be commissioned.

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

**7.4** The notice of completion of commissioning for regulation 44 should be given as follows.

- a. If a building notice or full plans have been given to a local authority building control body, the notice should be given to that building control body within five days of the commissioning work being completed.
- b. If the building control body is an approved inspector, the notice should generally be given to the approved inspector within five days of the work being completed.
- c. In other cases, for example, if the work is carried out by a person registered with a competent person scheme, the notice must be given to the building control body within 30 days.

Where fixed building services that require commissioning are installed by a person registered with a competent person scheme, that person may give the notice of commissioning.

### System specific guidance

#### Hot water systems for space and domestic hot water heating

**7.5** Before a new heating appliance is installed, all central heating and primary hot water circuits should be thoroughly cleaned and flushed out. A suitable chemical inhibitor should be added to the primary heating circuit to protect against scale and corrosion.

**NOTE:** The Benchmark Commissioning Checklist can be used to show that commissioning has been carried out satisfactorily for gas-fired wet heating systems.

#### Community heating systems

**7.6** For community heating systems, both of the following should be done.

- a. systems should be commissioned to optimise the use of energy for pumping

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- b. flow rates in individual heat emitters should be balanced by either:
  - i. using appropriate return temperatures
  - ii. using calibrated control valves.

**Underfloor heating**

**7.7** All installed equipment in underfloor heating systems should be commissioned in accordance with **BS EN 1264-4**.

# Regulation 40: Providing information

This approved document deals with the requirements of regulation 40 of the Building Regulations 2010.

**[regulations will be amended as necessary in line with the performance sections below]**

## Information about use of fuel and power

- 40.** (1) This regulation applies where paragraph L1 of Schedule 1 imposes a requirement relating to building work.
- (2) The person carrying out the building work shall not later than five days after the work has been completed provide to the owner sufficient information about the building, the fixed building services and their maintenance requirements so that the building can be operated in such a manner as to use no more fuel and power than is reasonable in the circumstances.

## Performance

**[Note for consultation: Chapter 6 of the consultation document proposed a number of further changes to this section.]**

When a new dwelling is erected, information about the fixed building services must be given to the owner of the building.

In the Secretary of State's view, Regulation 40 may be met by providing information according to the guidance given in **paragraphs 8.1 to 8.2**.

For new dwellings where **building automation and control systems** are installed, information about the energy performance of **building automation and control systems** must also be given to the building owners.

## Section 8: Providing information

**[Note for consultation: Chapter 6 of the consultation document proposed a number of further changes to this section.]**

### Operating and Maintenance instructions

**8.1** Operating and maintenance instructions should be provided to the occupiers of the **dwelling**. The instructions should contain sufficient information to help the occupiers achieve the expected level of energy efficiency, and to verify compliance with the energy performance requirements of the Building Regulations. The documentation should be all of the following.

- a. easy to understand,
- b. specific to the **dwelling**
- c. durable
- d. in an accessible format.

**8.2** For new **dwellings**, the operating and maintenance instructions should achieve all of the following.

- a. Explain the following for the heating, hot water, ventilation and any other technologies.
  - i. what they are
  - ii. what they are for
  - iii. where they are located, using a floor plan
  - iv. how to operate them
  - v. how to control them, including the location and operation of timers and sensors
  - vi. how to maintain them
- b. Signpost other important documentation, which should include the following.
  - i. appliance manuals;
  - ii. data used in the **emission rate** and **primary energy** calculations;
  - iii. the Recommendations Report generated with the 'on-construction' **energy performance certificate**.

### Building automation and control systems

**8.3** For new dwellings where **building automation and control systems** are installed, information about the energy performance of **building automation and control systems** must also be given to the building owner.

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# Regulations 2(1) and 22: Change of energy status

This approved document deals with the requirements of regulation 2(1) and 22 of the Building Regulations 2010.

any change which results in a building becoming a building to which the energy efficiency requirements of these Regulations apply, where previously it was not.

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 regulation 40 and Part L of Schedule 1.

**[Note for consultation: This consultation does not set out the requirements for work in existing dwellings]**

**[Note for consultation: This consultation does not set out the requirements for work in buildings other than dwellings]**

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## Section 9: Extensions and change of use

**[Note for consultation: This consultation does not set out the requirements for work in existing dwellings]**

# Regulation 23: Renovation or replacement of thermal elements

This approved document deals with the requirements of regulation 23 to the Building Regulations 2010.

## Requirements for the renovation or replacement of thermal elements – Regulation 23

(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 L1(a)(i) of Schedule 1, 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 L1(a)(i) of Schedule 1, in so far as that is technically, functionally and economically feasible.

**[Note for consultation: This consultation does not set out the requirements for work in existing dwellings]**

**[Note for consultation: This consultation does not set out the requirements for work in buildings other than dwellings]**

## Section 10: Renovation or replacement of thermal elements

**[Note for consultation: This consultation does not set out the requirements for work in existing dwellings]**

**[Note for consultation: This consultation does not set out the requirements for work in buildings other than dwellings]**

# Regulation 28: Consequential improvements

This approved document deals with the requirements of regulation 28 of the Building Regulations 2010.

## Consequential improvements to energy performance

### 28.

(1) Paragraph (2) applies to an existing building with a total useful floor area over 1000 m<sup>2</sup> where the proposed building work consists of or includes—

- (a) an extension;
- (b) the initial provision of any fixed building services; or
- (c) an increase to the installed capacity of any fixed building services.

(2) Subject to paragraph (3), where this paragraph applies, such work, if any, shall be carried out as is necessary to ensure that the building complies with the requirements of Part L of Schedule 1.

(3) Nothing in paragraph (2) requires work to be carried out if it is not technically, functionally or economically feasible.

**NOTE:** Where the **building control body** is an approved inspector, see regulation 20 of the Building (Approved Inspectors etc.) Regulations 2010 (as amended).

**[Note for consultation: This consultation does not set out the requirements for work in existing dwellings]**

**[Note for consultation: This consultation does not set out the requirements for work in buildings other than dwellings]**

# Section 11: Consequential improvements

**[Note for consultation: This consultation does not set out the requirements for work in existing dwellings]**

**[Note for consultation: This consultation does not set out the requirements for work in buildings other than dwellings]**

## Appendix A: Key terms

**Air permeability** is the physical property used to measure airtightness of the building fabric. It is defined as air leakage rate per hour per square metre of envelope area at the test reference pressure differential of 50 pascals (50 N/m<sup>2</sup>).

The limiting **air permeability** is the worst allowable **air permeability**.

The design **air permeability** is the target value set at the design stage.

The assessed **air permeability** is the value used in establishing the **dwelling emission rate** and the **dwelling primary energy rate**. The assessed **air permeability** is based on a measurement of the **air permeability** of the **dwelling** concerned

**Building automation and control system** means a system comprising all products, software and engineering services that can support energy efficient, economical and safe operation of technical building systems through automatic controls and by facilitating the manual management of those building systems.

**Building control body** means a local authority building control department or an approved inspector.

**Circuit-watt** refers to the power consumed in lighting circuits by lamps and, where applicable, their associated control gear (including transformers and drivers) and power factor correction equipment.

**Coefficient of performance (COP)** is a measure of the efficiency of a heat pump at specified source and sink temperatures, measured using the procedures in **BS EN 14511**:

**Heating COP** = heat output / power input

**% COP** (COP×100) is the **heat generator** efficiency.

**Commissioning** is the advancement of a **fixed building service** after all or part of the system has been installed, replaced or altered. The system is taken from a state of static completion to working order. Testing and adjusting, as necessary, ensure that the whole system uses no more fuel and power than is reasonable in the circumstances, without compromising the need to comply with health and safety requirements.

For each system, **commissioning** includes the following: setting-to-work; regulation (that is, testing and adjusting repetitively) to achieve the specified performance; calibration, setting up and testing of the associated automatic control systems; and recording the system settings and the performance test results that have been accepted as satisfactory.

**Consequential improvements** mean those energy efficiency improvements required by regulation 28.

**Controlled service or fitting** is defined in Regulation 2(1) as:

a service or fitting in relation to which Part G (sanitation, hot water safety and water efficiency), H (drainage and waste disposal), J (combustion appliances and fuel storage systems), L (conservation of fuel and power) or P (electrical safety) of Schedule 1 to the Building Regulations

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imposes a requirement.

**Dwelling emission rate** is the dwelling CO<sub>2</sub> emission rate expressed as kgCO<sub>2</sub>/(m<sup>2</sup>·year) and determined using the **Standard Assessment Procedure**.

**dwelling primary energy rate** is expressed as kWh/(m<sup>2</sup>·year) and determined using the **Standard Assessment Procedure**.

**Dwelling** means a self-contained unit designed to accommodate a single household.

**NOTE:** Buildings exclusively containing **rooms for residential purposes**, such as nursing homes, student accommodation and similar, are not **dwelling**s. In such cases, Approved Document L volume 2 applies.

**Energy efficiency requirements** are defined in Regulation 2(1) as:

the requirements of regulations 23, 25A, 25B, 26, 26A, 28 and 40 of, and Part L of Schedule 1 to the Building Regulations.

**Energy performance certificate** is defined in the Energy Performance of Buildings Directive as:

a certificate which—

(a) in the case of a certificate entered on the register before 9th January 2013 complied with

the requirements of regulation 11(1) of the Energy Performance of Buildings (Certificates and Inspections) (England and Wales) Regulations 2007(d);

(b) in the case of a certificate entered on the register on or after 9th January 2013 complies

with the requirements of regulation 9(1) of these Regulations; or

(c) complies with the requirements of regulation 29(e) of the Building Regulations 2010;

**Fixed building services** are defined in Regulation 2(1) as:

any part of, or any controls associated with—

(a) fixed internal or external lighting systems (but not including emergency escape lighting or specialist process lighting);

(b) fixed systems for heating, hot water, air conditioning or mechanical ventilation; or

(c) any combination of systems of the kinds referred to in paragraph (a) or (b).

**Fixed external lighting** means lighting fixed to an external surface of the dwelling and supplied from the occupier's electrical system. It excludes lighting in common areas of blocks of flats and in other communal accessways.

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A heating zone is a conditioned area of a building which is on a single floor and has the same thermal characteristics and temperature control requirements throughout.

Householder affordability rating [to be determined subject to consultation]

Light fitting means a fixed light or a lighting unit, which can comprise one or more lamps and lampholders, control gear and an appropriate housing. The control gear may be integrated in the lamp or located elsewhere, in or near the fixed light.

Primary energy means energy from renewable and non-renewable sources which has not undergone any conversion or transformation process.

Room for residential purposes is defined in Regulation 2(1) as:

a room, or a suite of rooms, which is not a dwelling-house or a flat and which is used by one or more persons to live and sleep and includes a room in a hostel, an hotel, a boarding house, a hall of residence or a residential home, but does not include a room in a hospital, or other similar establishment, used for patient accommodation.

Seasonal coefficient of performance (SCOP) is a measure of the efficiency of a heat pump over the designated heating season, measured using the procedures in **BS EN 14825**.

Secondary heating means a space heating appliance or system which operates separately to the main heating system in the dwelling, and does not provide the majority of heating in the dwelling. For example, a decorative fuel-effect fire in a room which also contains radiators for a central heating system.

Self-regulating device means a device or system that automatically controls the output of heating and/or cooling emitters to independently control the temperature in each room or, (where justified, a heating zone) where heating and/or cooling is provided by a fixed building service.

The Standard Assessment Procedure calculations use SPF – either measured values for products listed in the Product Characteristics Database, or default values in Table 4a of the Standard Assessment Procedure for products not listed in the database. Seasonal primary energy efficiency ratio (SPEER) is a measure of the use of primary energy for all types of heat pump, fossil fuel boiler and gas-driven cogeneration technologies, as well as hybrid systems where solar heating or a heat pump is backed up with electric heating or a fossil fuel boiler.

Energy labelling with the SPEER is mandatory under the Energy Labelling Directive.

Testing and rating for SPEER is in accordance with **BS EN 14825**, as for SCOP.

SEDBUK (Seasonal Efficiency of Domestic Boilers in the UK) is the methodology for determining boiler efficiency defined in the Standard Assessment Procedure, Appendix D.

Standard Assessment Procedure is the current approved procedure for assessing the performance of dwellings in line with this document. The Standard Assessment Procedure is detailed in The Government's Standard Assessment Procedure for Energy Rating of Dwellings **version 10.1**.

Target emission rate is the maximum CO<sub>2</sub> emission rate for the dwelling, expressed as kgCO<sub>2</sub>/(m<sup>2</sup>·year), and determined using the Standard Assessment Procedure.

Target primary energy rate is the maximum primary energy use for the dwelling, expressed as

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**kWh<sub>PE</sub>/(m<sup>2</sup>·year), and determined using the Standard Assessment Procedure.**

**Thermal element** is defined in regulation 2(3) of the Building Regulations as follows:

2(3) In these Regulations ‘thermal element’ means 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 VII in Schedule 2; or
  - iii. where this paragraph 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 as the case may be.

2(4) Paragraph 2(3)(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.

**Thermal envelope** is the combination of **thermal elements** of a building which enclose a particular conditioned indoor space or groups of indoor spaces.

**U-value** is a measure of the ability of a building element or component to conduct heat from a warmer environment to a cooler environment. It is expressed as the quantity of heat (in watts) that will flow through one square metre of area divided by the difference in temperature (in degrees K) between the internal and external environment, and the unit is W/m<sup>2</sup>.K.

## Appendix B: Reporting evidence of compliance

**B.1** To aid communication between the builder and **building control body**, it helps to use a standardised report format to present the evidence that demonstrates compliance with the **energy efficiency requirements**.

**B.2** Compliance software should produce this report as a standard output option.

**B.3** Two versions of the standardised report may be produced by the compliance software.

- the first, before commencement of works, to include all of the following.
  - the **emission rate**
  - **primary energy rate**
  - a supporting list of specifications
- the second, after completion, to include all of the following.
  - the as-built **emission rate**
  - **primary energy rate**
  - any changes to the list of specifications.

These reports can then be used by the **building control body** to assist checking that what has been designed is actually built.

A standardised report should indicate the source of the evidence and state the credentials of those submitting the evidence.

**B.4** An important part of demonstrating compliance is to make a clear connection between the product specifications and the data inputs required by the compliance software (e.g. what wall construction delivers the claimed U-value?).

Examples of how compliance software might provide this link are as follows.

- a. By giving each data input a unique reference code. In a separate submission, the builder/developer then details the specification that corresponds to each reference code.
- b. By providing a free-text entry facility along with each input parameter that has a unique reference code, thereby allowing the software to capture the specification of each item and so include the full details in an integrated output report.
- c. By including one or more utility programs that derive the data input from the specification, e.g. a U-value calculator that conforms to BRE's **BR 443** and that calculates the U-value based on the layer thicknesses and conductivities, repeating thermal bridge effects etc. Outputs from such a utility program could then automatically generate the type of integrated report described in sub-paragraph b.

It also helps the **building control body** if the software includes a facility to compare the 'as designed' and 'as constructed' data input files and automatically produce a schedule of

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changes.

**B.5** The report should highlight any items whose specification is better than typically expected values. The **building control body** should check any aspects where the claimed specification delivers an energy efficiency standard better than that of Table B.1.

Wall U-value	0.15 W/(m <sup>2</sup> ·K)
Roof U-value	0.13 W/(m <sup>2</sup> ·K)
Floor U-value	0.13 W/(m <sup>2</sup> ·K)
Window/door U-value	1.20 W/(m <sup>2</sup> ·K)
Party wall U-value	0.20 W/(m <sup>2</sup> ·K)
Thermal bridging value	0.04 W/(m <sup>2</sup> ·K)
Design air permeability	4.0 m <sup>3</sup> /(h·m <sup>2</sup> ) at 50 Pa
Any <b>secondary heating</b> appliance	No threshold value
Any item involving the <b>Standard Assessment Procedure</b> Appendix Q	No threshold value
Use of any low-carbon or renewable energy technology	No threshold value

Note: if the design of solutions that use electric resistance heating does not include a significant element of renewable energy, the solutions may have to exceed several of these fabric parameters.

# Appendix C: Documents referred to

## Legislation

The Building Regulations 2010, SI 2010/2214

Building (Approved Inspectors etc.) Regulations 2010, SI 2010/2215

Energy Information (Household Air Conditioners) (No 2) Regulations, SI 2005/1726

## Documents

### BRE

BR 443 Conventions for U-value calculations [2019]. Consultation version available at:  
<https://www.bregroup.com/sap/sap10/>

BRE Report BR 497 Conventions for calculating linear thermal transmittance and temperature factors [2007 and 2010 amendment and conventions]. ISBN 978 1 86081 986 5

Information Paper IP 1/06 Assessing the effects of thermal bridging at junctions and around openings in the external elements of buildings [2006]. ISBN 978 1 86081 904 9

### Department for Business, Energy and Industrial Strategy (BEIS)

The Government's Standard Assessment Procedure for energy rating of dwellings [as amended for Part L 2020]

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**Glass and Glazing Federation (GGF)**

*Guide to the Calculation of Energy Ratings for Windows, Roof Windows and Doors* [2013]

**HETAS**

The Official Guide to HETAS Approved Products and Services [2017]

**Hot Water Association**

Performance Specification for Thermal Stores [2010]

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

Technical Document NTD 2 Assessment of thermal performance of out-of-plane rooflights [2010].

**OFTEC**

OFS A102:2004 [Applied Standard A102 Room heaters with atomising or vapourising burners with or without boilers, heat output up to 25kW](#)

## Appendix D: Standards referred to

**BS 3198** Specification for copper hot water storage combination units for domestic purposes [1981]

**BS 5422** Method for specifying thermal insulating materials for pipes, tanks, vessels, ductwork and equipment operating within the temperature range -40°C to +700°C [2009]

**BS EN 253** District heating pipes. Preinsulated bonded pipe systems for directly buried hot water networks. Pipe assembly of steel service pipe, polyurethane thermal insulation and outer casing of polyethylene [2009+A2:2015]

**BS EN 1264-4** Water based surface embedded heating and cooling systems. Installation [2009]

**BS EN 12897** Water supply. Specification for indirectly heated unvented (closed) storage water heaters [2016]

**BS EN 12975-1** Thermal solar systems and components. Solar collectors. General requirements [2006+A1:2010]

**BS EN 14511** Air conditioners, liquid chilling packages and heat pumps with electrically driven compressors for space heating and cooling [2013]

**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)].

**BS EN 14825** Air conditioners, liquid chilling packages and heat pumps, with electrically driven compressors, for space heating and cooling. Testing and rating at part load conditions and calculation of seasonal performance [2016]

# Index

***[Note for consultation: The index will be provided at implementation stage]***