States of Jersey

The Building Bye-Laws (Jersey) 2007

TECHNICAL GUIDANCE DOCUMENT 11.1A

PART 11
CONSERVATION OF FUEL AND POWER IN NEW DWELLINGS

2011 EDITION

MAIN CHANGES IN THE 2011 EDITIONS

1. This Technical Guidance Document 11.1A comes into force on 01 January 2011 in support of the Building Bye-laws (Jersey) 2007 as amended. From that date the 2002 edition of Approved Document L1 will become obsolete. The main changes in the legal requirements and the supporting technical guidance in this edition of Technical Guidance Document 11.1A are as follows.

Changes in the legal requirement

2. The main legal changes are reproduced at the front of this Technical Guidance Document and interleaved as well in the relevant text for ease of reference. In cases of doubt however refer to the SI itself.

3. Part 11 of schedule 2 has been consolidated into a single requirement 11.1, covering all types of building with no limits on application.

4. As well as changes to Part 11, there are changes to the definitions of building works and exempt works, new minimum energy performance requirements, and new requirements for pressure testing, commissioning and energy calculations.

Changes in the technical guidance

5. Four Technical Guidance Documents are published reflecting the specialisation in the construction market. In the new Technical Guidance Documents regulatory requirements are shown on a blue background and defined terms are highlighted. More use has been made of more comprehensive and detailed technical reference publications that therefore form part of the approved guidance. Commentary text has been added in places to explain, for instance the aims of the guidance and how outcomes are calculated.

6. In this Technical Guidance Document the Elemental Method and the Target U-value Method are omitted. There is now only one approach to showing compliance with the energy efficiency requirements. This addresses five criteria:

    a. The annual energy perfomance rate of the completed dwelling, as calculated using SAP 2005, must not exceed the target set by a reference building.

    b Building fabric and services performance specification are within reasonable limits.

    c Solar shading and other measures to limit risks of summer overheating are reasonable

    d Fabric insulation and airtightness, as built, are as intended. More guidance is given on testing the achievement of the intended energy performance including arrangements for pressure testing samples of dwellings.

    e Satisfactory information must be provided enabling occupiers to achieve energy efficiency in use.

7. New technical references are given which provide guidance on ways of complying when providing heating and hot water services systems and the benefits of low and zero carbon systems.

8. The technical provisions will mean that higher fabric, heating, ventilation, and lighting systems designs will be necessary, delivering an overall improvement of on average 20%

Contents

Use of Guidance

THE TECHNICAL GUIDANCE DOCUMENTS

This document is one of a series that has been approved and issued by the Minister for Planning and Environment for the purpose of providing practical guidance with respect to the requirements of Schedule 2 and Bye-law 7 of the Building Bye-laws (Jersey) 2007.

A list of all technical guidance documents that have been approved and issued by the Planning and Environment Minister for this purpose can be obtained from the department.

Technical Guidance Documents are intended to provide guidance for some of the more common building situations. However, there may well be alternative ways of achieving compliance with the requirements. Thus, there is no obligation to adopt any particular solution contained in a Technical Guidance Document if you prefer to meet the relevant requirement in some other way.

OTHER REQUIREMENTS

The guidance contained in a Technical Guidance Document relates only to the particular requirements of the Bye-laws which the document addresses. The building work will also have to comply with the requirements of any other relevant parts in Schedule 2 to the Bye-laws.

There are Technical Guidance Documents which give guidance on each of the parts of Schedule 2 and on Bye-law 7.

LIMITATION ON REQUIREMENTS

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

Requirements 3.6 and 6.2 are excluded from Bye-law 8 because they deal directly with prevention of the contamination of water. Parts 8 and 9 (which deal, respectively, with access to and use of buildings and resistance to the passage of sound,) are excluded from Bye-law 8 because they address the welfare and convenience of building users. Part 11 is excluded from Bye-law 8 because it addresses the conservation of fuel and power. All these matters are amongst the purposes, other than health and safety, that may be addressed by Building Bye-laws.

MATERIALS AND WORKMANSHIP

Any building work which is subject to the requirements imposed by Schedule 2 to the Building Bye-laws should, in accordance with Bye-law 7, be carried out with proper materials and in a workmanlike manner.

You may show that you have complied with Bye-law 7 in a number of ways. These include the appropriate use of a product bearing CE marking in accordance with the Construction Products Directive (89/106/EEC)[1], the Low Voltage Directive (73/23/EEC and amendment 93/68/EEC)[2] and the EMC Directive (89/336/ EEC)[3] as amended by the CE Marking Directive (93/68/EEC)[4] or a product complying with an appropriate technical specification (as defined in those Directives), a British Standard, or an alternative national technical specification of any state which is a contracting party to the European Economic Area which, in use, is equivalent, or a product covered by a national or European certificate issued by a European Technical Approval Issuing body, and the conditions of use are in accordance with the terms of the certificate. You will find further guidance in the Technical Guidance Document supporting Bye-law 7 on materials and workmanship

INDEPENDENT CERTIFICATION SCHEMES

There are many UK product certification schemes. Such schemes certify compliance with the requirements of a recognised document which is appropriate to the purpose for which the material is to be used. Materials which are not so certified may still conform to a relevant standard.

Many certification bodies which approve such schemes are accredited by UKAS.

TECHNICAL SPECIFICATIONS

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

[1] As implemented by the Construction Products Regulations 1991 (SI 1991/1620).

[2] As implemented by the Electrical Equipment (Safety Regulations 1994)

[3] As implemented by the Electromagnetic Compatibility Regulations 1992 SI 1994/3260).

[4] As implemented by the Construction Products (Amendment) Regulation 1994 (SI 1994/3051) and The Electromagnetic Compatibility (amendment) Regulations 1994 (SI 1994/3080)

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

The appropriate use of a product which complies with a European Technical Approval as defined in the Construction Products Directive will meet the relevant requirements.

The Department intends to issue periodic amendments to its Technical Guidance Documents to reflect emerging harmonised European Standards. Where a national standard is to be replaced by a European harmonised standard, there will be a co-existence period during which either standard may be referred to. At the end of the co-existence period the national standard will be withdrawn.

MIXED USE DEVELOPMENT

In mixed use developments part of a building may be used as a dwelling while another part has a non-domestic use. In such cases, if the requirements of this part of the Bye-laws for dwelling and non-domestic use differ, the requirements for non-domestic use should apply in any shared parts of the building.

The Requirement

This Technical Guidance Document, which takes effect on 01 January 2011, deals with the energy efficiency requirements in the Building Bye-laws (Jersey) 2007, as amended. The energy efficiency requirements are conveyed in Part 11 of schedule 2 to the Building Bye-laws and Bye-laws 5A,5B and 17C as described below

Requirement

Part 11 Conservation of Fuel and Power.

11.1 Reasonable provision shall be made for the conservation of fuel and power in buildings by:

a limiting heat gains and heat losses:

i through thermal elements and other parts of the building fabric; and

ii from pipes, ducts and vessels used for space heating, space cooling and hot water services;

b providing and commissioning energy efficient fixed building services with effective controls; and

c in a case where building work is carried out in connection with a building that is (or any component of which is) required to comply with any provision of sub-paragraph (a) or (b), providing to the owner of the relevant building on completion of that building work 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 are reasonable in the circumstances.

Other changes to the Bye-laws

There are new Bye-laws that introduce new energy efficiency requirements and other relevant changes to the existing bye-laws. For ease of reference the principal elements of the bye-laws that bear on energy efficiency are repeated below and, where relevant, in the body of the guidance in the rest of this Technical Guidance Document. However it must be recognised that the Statutory Instrument takes precedence if there is any doubt over interpretation.

Interpretation

"building work" means –

(a) the erection or extension of a building;
(b) the provision or extension of a controlled service or fitting in or in connection with a building;
(c) a material alteration in relation to a building;
(d) work required by bye-law 5A, 5B, 6, or 17C, in relation to a building;
(e) work involving the underpinning of a building;
(f) the provision, alteration or extension of an electrical installation in a building, including, where such an installation is altered or extended, any work on the existing electrical installation of the building;;

"'change to a building's energy status' means a change to a building, being a change that has the result that the building becomes one to which any of the energy efficiency requirements applies where previously the requirement did not so apply:

'energy efficiency requirements' means the requirements of –

(a) bye-laws 5A and 5B;
(b) Part 3A; and
(c) Part 11 of Schedule 2:

"fixed building service' means –

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

'technical guidance document' means a technical guidance document published under Article 32 of the Law;

'thermal element' has the meaning set out in bye-law 2A;

'thermally conditioned' means capable of being maintained at or near a given temperature by the use of one or more mechanical devices.

Bye-law (2) is amended to include the following new definitions.

(k) the building is used as an office, where previously it was not; or
(l) in the case of a building that is or contains a dwelling or garage, part of the building is used as a habitable room where previously the part was not so used.

A new Bye-Law 2A has been added as follows:

(1) In these bye-laws, 'thermal element' means a wall, floor, or roof, that separates a thermally-conditioned part of a building from –

(a) part or all of the external environment; or
(b) in the case of a wall or floor, another part of the building, being a part that is –
(i) not thermally conditioned,
(ii) an extension falling within Class 6 in Schedule 1, or
(iii) where this clause applies, thermally conditioned to a different temperature, and includes all parts of the wall, floor, or roof, between the surface bounding the thermally-conditioned part of the building and the surface exposed to the external environment or to the other part of the building.

(2) Paragraph (1)(b)(iii) only applies if –

(a) the relevant building is not a dwelling; and
(b) the other part of the relevant building is used for a purpose that is not similar or identical to the purpose for which the thermally-conditioned part is used.

(3) In this bye-law –

(a) a reference to the external environment includes the ground;
(b) a reference to a wall, floor or roof does not include a window, door, roof-window or roof-light.

Requirements relating to building work.

Bye-law 5 is amended as follows:

(4) Despite paragraphs (1) and (2) and without affecting the operation of paragraph (3), if building work is only of a kind required by bye-law 5A, 5B or 17C and does not constitute a material alteration to a building, paragraphs (1)

and (2) shall not apply to or in relation to the building work so long as the requirements of bye-law 5A, 5B or 17C (as the case requires) are met in relation to the work.

Requirements relating to thermal elements.

A new bye-law 5A is added as follows:

(1) Where a thermal element is renovated, such building work shall be carried out as is necessary to ensure that the whole thermal element as so renovated complies with requirement 11.1(a)(i).

(2) Where a thermal element is replaced, the replacement thermal element shall comply with requirement 11.1(a)(i).

Requirements relating to a change to energy status.

A new bye-law 5B is added as follows:

(1) Where there is a change to a building's energy status, such building work shall be carried out as is necessary to ensure that the building complies with the requirements of Part 11 of Schedule 2.

(2) However, if the change concerns the energy status of only part of the building, being a part designed, or altered, to have fixed building services that are separate from those of other parts of the building, then it shall be sufficient compliance with paragraph (1) if the building work that is carried out ensures that the part complies with the requirements of Part 11 of Schedule 2.

Requirements relating to a material change of use.

Bye-law 6 is updated to take account of the changes to Part 11.

Application for a building permit.

Bye-law 10 is amended as follows:

For sub-paragraphs (a) and (b) of bye-law 10(1) the following sub-paragraphs have been substituted –

(a) to carry out building work;
(b) to replace or renovate a thermal element that forms part of a building in relation to which any of the energy efficiency requirements apply;
(c) to make a change to a building's energy status; or
(d) to make a material change of use.

ENERGY PERFORMANCE OF BUILDINGS

New bye-laws are added as follows:

17A Interpretation

In this Part, 'building' means an entire building or such part of a building as is designed, or altered, to have fixed building services that are separate from those of other parts of the building.

17B New buildings

(1) This bye-law applies where a new building is constructed.

(2) The building, once constructed, shall not exceed the target rate of the energy performance for the building that has been specified in the relevant technical guidance document.

(3) For the purposes of this bye-law, the relevant technical guidance document is one concerning minimum energy performance requirements for buildings and setting out a methodology of calculation for the energy performance of buildings.

17C Consequential improvements to energy performance

(1) Paragraph (2) applies to an existing building with a total useful floor area over 1000m^2 in respect of which building work is proposed if the proposed building work consists of or includes –

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

(2) Subject to paragraph (3), such work, if any, shall be carried out as is necessary to ensure that the building complies with Part 11 of Schedule 2.

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

17D Notice of energy performance to Minister

(1) This bye-law and bye-law 17E apply where a new dwelling is created by building work or by a material change of use in connection with which building work is carried out.

(2) The person carrying out the relevant building work shall calculate a rating of the energy

performance of the dwelling, once constructed, in accordance with the relevant technical guidance document and give notice of that rating to the Minister.

(3) For the purposes of this bye-law, the relevant technical guidance document is one concerning minimum energy performance requirements for buildings and setting out a methodology of calculation for the energy performance of buildings.

(4) The notice shall be given not later than –

(a) the date on which the notice required by bye-law 13(6) is given in relation to the building work; and
(b) at least 5 days before occupation of the dwelling.

17E Notice of energy performance to occupant

(1) The person carrying out the relevant building work shall affix, as soon as practicable, in a conspicuous place in the dwelling, a notice stating the rating of the energy performance of the dwelling, calculated as referred to in bye-law 17D.

(2) The notice shall be affixed not later than –

(a) the date on which the notice required by bye-law 13(6) is given in relation to the building work; and
(b) at least 5 days before occupation of the dwelling.

(3) This bye-law shall not apply in a case where the person carrying out the relevant building work intends to occupy, or occupies, the dwelling as a residence.

17F Calculations and targets

(1) This bye-law applies to a building in relation to which requirement 11.1(a)(i) applies.

(2) A person carrying out building work to construct the building shall ensure that pressure testing is carried out on the building in such circumstances, and in accordance with such procedures, as are set out in the relevant technical guidance document.

(3) The person carrying out the building work shall give notice of the results of the pressure testing to the Minister not later than 7 days after the testing is completed.

(4) The notice shall set out the results of the testing and the data on which they are based in the manner set out in the relevant technical guidance document.

(5) For the purposes of this bye-law, the relevant technical guidance document is one concerning pressure testing in a building in order to determine heat gains and losses in the building from its thermal elements and other parts of its building fabric.

17G Commissioning

(1) This bye-law applies to a building in relation to which requirement 11.1(b) applies and building work is carried out, but does not apply where the building work consists only of exempt electrical certifiable work (within the meaning of bye-law 15).

(2) The person carrying out the building work shall give to the Minister a notice confirming that the relevant fixed building services have been commissioned in accordance with the procedure set out in the relevant technical guidance document.

(3) The notice shall be given not later than –

(a) in every case, the date on which the notice required by bye-law 13(6) in relation to the building work is given; and
(b) in the case of certifiable building work (within the meaning of bye-law 15), not more than 30 days after completion of the work.

(4) For the purposes of this bye-law, the relevant technical guidance document is one concerning pressure testing in a building in order to determine heat gains and losses in the building from its pipes, ducts, and vessels, used for space heating, space cooling and hot water services.

17H Energy performance rate calculations

(1) A person carrying out building work to construct a new building shall give notice of the calculated energy performance rate for the building, as constructed, to the Minister.

(2) The notice shall be given not later than –

(a) the date on which the notice required by bye-law 13(6) is given in relation to the building work; and
(b) at least 5 days before occupation of the building.

Exempt building and work.

Schedule 1 is altered as follows:

For Class 6(1)(c) and (d) of Schedule 1 to the principal bye-laws the following sub-paragraphs have been substituted –

(c) its glazing satisfies requirement 10.1;
(d) it does not cause a contravention of these bye-laws in respect of the dwelling or any service or fitting; and
(e) in the case of an extension that is a conservatory –

(i) the extension is thermally separated from the dwelling with construction that achieves a maximum U-value of 2.0 W/m^2 K (where U represents how much thermal energy in watts (W) is transmitted through one square metre (m^2) of the construction at a temperature difference of one degree Kelvin (K) between the dwelling and the extension); and
(ii) the extension is constructed so that its external fabric achieves a maximum U-value of 2.0 W/m^2 K (where U represents how much thermal energy in watts (W) is transmitted through one square metre (m^2) of the external fabric at a temperature difference of one degree Kelvin (K) between the extension and the outside).

Section 0: General Guidance

CONVENTIONS USED IN THIS DOCUMENT

1 In this document the following conventions have been adopted to assist understanding and interpretation:

a Texts shown on a blue background are extracts from the Building Bye-laws as amended and convey the legal requirements that bear on compliance with Part 11. It should be remembered however that building works must comply with all the other relevant provisions.

b Key terms are printed in ***bold italic text*** and defined for the purposes of this Technical Guidance Document in Section 5 of this document.

c References given as footnotes and repeated as end notes are given as ways of meeting the requirements or as sources of more general information as indicated in the particular case. The Technical Guidance Document will be amended from time to time to include new references and to refer to revised editions where this aids compliance.

d Additional *commentary in italic text* appears after some numbered paragraphs. The commentary is intended to assist understanding of the immediately preceding paragraph or sub-paragraph, but is not part of the approved guidance.

TYPES OF WORK COVERED BY THIS TECHNICAL GUIDANCE DOCUMENT

2 This Technical Guidance Document is intended to give guidance on what, in ordinary circumstances, would be accepted as reasonable provision in fulfilment of the requirements of Part 11, Bye-laws 17B,17D,17F and 17G for those creating new ***dwellings*** through new construction works.

Buildings containing **rooms for residential purposes** *such as nursing homes, student accommodation and similar are not* ***dwellings****, and in such cases, Technical Guidance Document 11.2A would apply.*

3 If part of a unit that contains living accommodation also contains space to be used for commercial purposes (e.g. workshop or office), it should be treated as a ***dwelling*** if the commercial part could revert to domestic use on a change of ownership. This could be the case if:

a there is direct access between the commercial space and the living accommodation; and

b both are contained within the same thermal envelope; and

c the living accommodation occupies a substantial proportion of the total area of the building.

Sub para c. means the presence of (e.g.) a small manager's flat in a large non-domestic building would not result in the whole building being treated as a ***dwelling****.*

4 Technical Guidance Document 11.1B applies where a ***dwelling*** is being created as the result of a material change of use.

'Material change of use' is defined in Bye-law 2.

5 When constructing a ***dwelling*** as part of a larger building that contains other types of accommodation, this Technical Guidance Document 11.1A should be used for guidance in relation to the individual ***dwellings***. Technical Guidance Document 11.2A gives guidance relating to the non-dwelling parts of such buildings such as heated common areas, and in the case of mixed-use developments, the commercial or retail space.

TECHNICAL RISK

6 Building work must satisfy all the technical requirements set out in Bye-laws 5A, 5B, 17B, 17C, and Schedule 2 of the Building Bye-laws. Part 2 (Fire safety), Part 3 (Combustion appliances and fuel storage systems), Part 4 (Site preparation and resistance to moisture), Part 5 (Ventilation),Part 9 (Resistance to the passage of sound), and Part 12 (Electrical safety) are particularly relevant when considering the incorporation of energy efficiency measures.

7 The inclusion of any particular energy efficiency measure should not involve excessive technical risk. BR 262[5] provides general guidance on avoiding risks in the application of thermal insulation.

DEMONSTRATING COMPLIANCE

8 In the Minister's view, compliance with Part 11 and Bye-law 17B would be demonstrated by meeting the five criteria set out in the following paragraphs.

9 Criterion 1: the predicted energy requirements for the ***dwelling*** (the Dwelling Energy Rate ***DER***) is not greater than the Target Energy Rate (***TER***), which is determined by following the procedures set out in paragraphs 19 to 23; and

[5] BR 262 Thermal insulation: avoiding risks, BRE, 2001.

10 Criterion 2 the performance of the building fabric and the ***fixed building services*** should be no worse than the design limits set out in paragraphs 32 to 45; and

This is intended to place limits on design flexibility to discourage excessive and inappropriate trade-off – e.g. buildings with poor insulation standards offset by renewable energy systems with uncertain service lives.

11 Criterion 3: the ***dwelling*** has appropriate passive control measures to limit the effect of solar gains on indoor temperatures in summer. The guidance given in paragraphs 44 to 46 of this Technical Guidance Document provide a way of demonstrating that reasonable provisions have been made; and

The aim is to counter excessive internal temperature rise in summer to reduce or eliminate the need for air conditioners.

12 Criterion 4: the performance of the ***dwelling***, as built, is consistent with the ***DER***. The guidance in Section 2 should be used to demonstrate this criterion has been met; and

Pressure tests, commissioning etc.

13 Criterion 5: the necessary provisions for energy efficient operation of the ***dwelling*** are put in place. This would be achieved by following the guidance in Section 3.

Common areas in buildings with multiple dwellings

14 Any common areas of buildings containing multiple ***dwellings*** are not classified as dwellings, and therefore fall outside the scope of the five criteria outlined above. For such areas, reasonable provision would be:

a if they are heated, to follow the guidance in Technical Guidance Document 11.2A; or

b if they are unheated, to provide fabric elements that meet the fabric standards set out in paragraphs 31 to 34 of TGD 11.1A.

Conservatories and substantially glazed spaces

15 If a conservatory is built as part of the new ***dwelling***, then the performance of the ***dwelling*** should be assessed as if the conservatory were not there. The guidance in Technical Guidance Document 11.1B should be followed in respect of the construction of the conservatory itself.

*This means that the thermal separation between **dwelling** and conservatory must be constructed to a standard comparable to the rest of the external envelope of the **dwelling**. Note that conservatories with a floor area not exceeding 20m² and built at ground level are currently exempt from the Building Bye-laws, subject to certain criteria being met – See schedule 1 to the bye-laws*

16 If any substantially glazed space is integral with the ***dwelling*** (i.e. there is no thermal separation and by definition the space is therefore not a conservatory), then the space should be included as part of the new ***dwelling*** when checking against the five compliance criteria.

Section 1: Design Standards

17 Bye-law 17B states that:

17B New buildings

(1) This bye-law applies where a new building is constructed.

(2) The building, once constructed, shall not exceed the target rate of the energy performance for the building that has been specified in the relevant technical guidance document.

(3) For the purposes of this bye-law, the relevant technical guidance document is one concerning minimum energy performance requirements for buildings and setting out a methodology of calculation for the energy performance of buildings.

Target Energy Rate (TER)

18 The Target Energy Rate ***(TER)*** is the minimum energy performance requirement for new dwellings approved by the Minister in accordance with Bye-law 17B. It is expressed in terms of energy used in kilowatt hours per m² of floor area per year as a result of the provision of heating, hot water, ventilation and internal fixed lighting for a standardised household when assessed using approved calculation tools.

19 The ***TER*** for individual dwellings must be calculated in accordance with the 2005 edition of the UK Governments' Standard Assessment Procedure (SAP 2005)[6] using SAP calculator software approved by the Department.

20 The target is calculated in two stages:

(a) First calculate the energy requirements for a reference ***dwelling*** of the same size and shape as the actual ***dwelling*** and which is constructed according to the reference values as set out in Appendix A of TGD 11.1A. In the specific circumstances set out in paragraph 59 the ***air permeability*** used in the calculation of the ***TER*** may be varied from the value set out in Appendix A. No other values may be varied. The calculation tool will report the energy requirements arising from:

  (i) the provision of heating and hot water, E_H (which includes the energy used by pumps and fans); and

  (ii) the use of internal fixed lighting E_L.

(b) Secondly, determine the TER using the following formula:
TER = (E_H + E_L) x (1 – improvement factor)

The improvement factor for this revision of Part 11 is 0.2, i.e. 20%.

Buildings containing multiple dwellings

21 Where a building contains more than one dwelling (such as in a terrace of houses or in a block of flats), an average TER can be calculated for all the dwellings in the building. In such cases, the average TER is the floor-area-weighted average of all the individual TERs, and is calculated according to the following formula:

{(TER¹ x Floor area¹) + (TER² x Floor area²)

+ (TER³ x Floor area³) + …..)}

÷ {(Floor area¹ + Floor area² + Floor area³) + ….}

CRITERION 1 – ACHIEVING THE *TER*

22 Bye-law 17B states that:

New buildings

17B New buildings

(1) This bye-law applies where a new building is constructed.

(2) The building, once constructed, shall not exceed the target rate of the energy performance for the building that has been specified in the relevant technical guidance document.

(3) For the purposes of this bye-law, the relevant technical guidance document is one concerning minimum energy performance requirements for buildings and setting out a methodology of calculation for the energy performance of buildings.

Calculating the energy rate for the actual dwelling

23 To comply with bye-law 17B, the proposed Dwelling Energy Rate (***DER***) must be no worse than the ***TER*** calculated as set out in paragraphs 18 to 21. The final calculation produced in accordance with Bye-law 17D must be based on the building as constructed, incorporating:

a any changes to the performance specifications that have been made during construction.

b the measured ***air permeability***, ductwork leakage and fan performances as commissioned.

[6] The UK Government Standard Assessment Procedure for Energy Rating of Dwellings, SAP 2005 edition, Defra, 2005.

Energy rate calculations

24 Bye-law 17D states:

17D Notice of energy performance to Minister

(1) This bye-law and bye-law 17E apply where a new dwelling is created by building work or by a material change of use in connection with which building work is carried out.

(2) The person carrying out the relevant building work shall calculate a rating of the energy performance of the dwelling, once constructed, in accordance with the relevant technical guidance document and give notice of that rating to the Minister.

(3) For the purposes of this bye-law, the relevant technical guidance document is one concerning minimum energy performance requirements for buildings and setting out a methodology of calculation for the energy performance of buildings.

(4) The notice shall be given not later than –

(a) the date on which the notice required by bye-law 13(6) is given in relation to the building work; and
(b) at least 5 days before occupation of the dwelling.

25 In addition to this final calculation, a preliminary calculation based on the plans and specifications accompanying the building application should be provided at the time the building application is made. The calculation tool will give a firm indication of whether a design is compliant and it produces a list of those features that are critical to achieving compliance.

Secondary heating

26 When calculating the ***DER***, it shall be assumed that a secondary heating appliance meets part of space heat demand. The fraction provided by the secondary heating system shall be as defined by SAP 2005 for the particular combination of primary heating system and secondary heating appliance. The following secondary heating appliance shall be used when calculating the ***DER***:

a where a secondary heating appliance is fitted, the efficiency of the actual appliance with its appropriate fuel shall be used in the calculation of the ***DER***.

b where a chimney or flue is provided but no appliance is actually installed, then the presence of the following appliances shall be assumed when calculating the ***DER***:

i. if a gas point is located adjacent to the hearth, a decorative fuel effect fire open to the chimney or flue with an efficiency of 20%.

ii. if there is no gas point, then an open fire in grate with an efficiency of 37% burning multi-fuel.

c otherwise an electric room heater shall be taken as the **secondary heating appliance**

Lighting

27 In all cases the ***DER*** should be calculated using the actual number of fixed low energy lighting outlets which are proposed.

Buildings containing multiple dwellings

28 Where a building contains more than one ***dwelling*** (such as in a terrace of houses or in a block of flats), bye-law 17B is achieved if:

a EITHER every individual ***dwelling*** has a ***DER*** that is no greater than its corresponding ***TER***;

b OR the average ***DER*** is no greater than the average ***TER***. The average ***DER*** is the floor-area-weighted average of all the individual ***DER***s, is calculated in the same way as the average ***TER*** (see paragraph 21).

*When adopting the average **DER** approach, it will still be necessary to provide information for each individual **dwelling**, as required by bye-law 17D.*

Achieving the target

29 In appropriate circumstances, low and zero carbon (LZC) energy supply systems such as solar hot water, photo-voltaic power, biofuels (e.g. wood fuels and oil blends), combined heat and power (at the ***dwelling***, block or community levels), and heat pumps can make substantial and cost-effective contributions to meeting the ***TER***. *Low or Zero Carbon Energy Sources – Strategic Guide*[6] describes a range of possible systems and how their contribution to the ***DER*** can be assessed.

CRITERION 2 – LIMITS ON DESIGN FLEXIBILITY

30 Whilst the approach to complying with Criterion 1 allows considerable design flexibility, requirement 11.1(a)(i) states that reasonable provision should be made to limit heat gains and losses through the fabric of the building, and requirement 11.1(b) states energy efficient building services and effective controls should be provided. These requirements would be met by specifying performance standards that are no worse than those given in paragraphs 31 to 43.

[7] *Low or Zero Carbon Energy Sources:* Strategic Guide, NBS, 2006

Design Limits for envelope standards

*Note: To achieve the **TER**, the envelope standards for most of the elements will need to be significantly better than those set out in the following paragraphs.*

U-values

31 U-values shall be calculated using the methods and conventions set out in BR 443[8], 'Conventions for U-value calculations'.

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

For example: the limiting U-value for a rooflight in Table 1 is 2.2 W/m²·K. This is for the unit assessed in the vertical plane. The performance of a double glazed rooflight in the horizontal plane, based on the guidance given in BR 443, would be adjusted by

0.5 W/m²·K to 2.2 + 0.5 = 2.7

33 Table 1 sets out the reasonable limits for plane element U-values for each of the elements of building fabric:

a column (a) gives the reasonable limits for area-weighted average U-values for the elements of the stated type.

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

$$\{(U_1 \times A_1) + (U_2 \times A_2) + (U_3 \times A_3) + \ldots.)\}$$

$$\div \{(A_1 + A_2 + A_3 + \ldots.)\}$$

*This is to make the design robust for future changes in heating system type, e.g. if a **dwelling** has a large renewable energy system, it would not be appropriate to allow this to completely compensate for a poor envelope.*

b column (b) gives the reasonable limits for U-values for individual elements of the stated type.

To minimise condensation risk in localised parts of the envelope. An individual element is defined as those areas of the given element type that have the same construction details. In the case of windows, doors and rooflights, the assessment should be based on the whole unit (i.e. in the case of a window, the combined performance of the glazing and the frame).

34 When comparing against the values in Table 1, the U-value of a window, roof window or rooflight, or door unit can be taken as the value for either:

a the standard configuration set out in BR 443; or

b the particular size and configuration of the actual unit. In either case, the U-value should be determined with the unit in the vertical plane.

SAP 2005 Table 6e gives values for different window configurations that can be used in the absence of test data or calculated values.

Air permeability

35 A reasonable limit for the ***design air permeability*** is 10m³/h.m² at 50 Pa. Guidance on some ways of achieving this is given in Limiting thermal bridging and air leakage: Robust construction details for dwellings and similar buildings[9]

*Achieving the **TER** may need the design **air permeability** to be better than the limit value. Significantly better standards of **air permeability** are technically desirable in dwellings with mechanical ventilation, especially when using balanced systems with heat recovery.*

Table 1 **Limiting U-value standards (W/m²K)**

Element	a Area-weighted average U-Value	b Limiting U Value
Wall	0.35	0.70
Floor	0.25	0.70
Roof	0.25	0.35
Windows, roof windows, rooflights and doors[1]	2.2	3.3

Notes:
[1] See paragraph 32

[9] Limiting thermal bridging and air leakage: Robust construction details for dwellings and similar buildings, Amendment 1, TSO, 2002. See www.est.org.uk.

Table 2 **Limits on design flexibility for mechanical ventilation systems**

System type	Performance
Specific Fan Power (SFP) for continuous supply only and continuous extract only	0.8 litre/s.W
SFP for balanced systems	2.0 litre/s.W
Heat recovery efficiency	66%

Design Limits for fixed building services

Heating and hot water system(s)

36 Reasonable provision for the performance of heating and hot water system(s) would be

a the use of an appliance with an efficiency not less than that recommended for its type in the Domestic Building Services Compliance Guide[10] ; and

b the provision of controls that meet the minimum control requirements as given in the Domestic Building Services Compliance Guide for the particular type of appliance and heat distribution system.

37 Reasonable provision would be demonstrated by insulating pipes, ducts and vessels to standards that are not worse than those set out in the Domestic Building Services Compliance Guide.

The TIMSA Guide[11]*explains the derivation of the performance standards and how they can be interpreted in practice.*

Mechanical ventilation

38 Where the work involves the provision of a mechanical ventilation system or part thereof, reasonable provision would be to install systems no worse than those described in GPG 268[12] which also have specific fan powers and heat recovery efficiency not worse than those in Table 2.

GPG 268 also includes guidance on appropriate ***air permeability*** *standards for different ventilation strategies. See comments at paragraph 36.*

Mechanical cooling

39 Fixed air conditioners should have an energy efficiency classification equal to or better than class C in Schedule 3 of the labelling scheme adopted under The Energy Information (Household Air Conditioners) (No. 2) Regulations 2005[13].

[10] HM Government Domestic Building Services Compliance Guide 2010 Edition.

[11] *HVAC Guidance for Achieving Compliance with Part L of the Building Regulations,* TIMSA, 2006

[12] *GPG268 Energy efficient ventilation in dwellings – a guide for specifiers,* EST, 2006.

[13] Statutory Instrument SI 2005/1726, the Energy Information (Household Air Conditioners) (No. 2) Regulations 2005.

Fixed internal lighting

40 A way of showing compliance would be to provide lighting fittings (including lamp, control gear and an appropriate housing, reflector, shade or diffuser or other device for controlling the output light) that only take lamps having a luminous efficacy greater than 40 lumens per circuit-Watt. Circuit-Watts means the power consumed in lighting circuits by lamps and their associated control gear and power factor correction equipment.

Fluorescent and compact fluorescent lighting fittings would meet this standard. Lighting fittings for GLS tungsten lamps with bayonet cap or Edison screw bases, or tungsten halogen lamps would not.

41 Reasonable provision would be to provide in the areas affected by the building work, fixed energy efficient light fittings that number not less than 80% of all fixed light fittings.

A light fitting may contain one or more lamps.

Installing mains frequency fluorescent lighting in garages may cause dangers through stroboscopic interaction with vehicle engine parts or machine tools. Fluorescent lamps with high frequency electronic ballasts substantially reduce this risk.

42 Lighting fittings in less frequented areas like cupboards and other storage areas would not count. GIL 20[14] gives guidance on identifying suitable locations.

Fixed external lighting

Fixed external lighting means lighting fixed to an external surface of the ***dwelling*** *or any ancillary building supplied from the occupier's electrical system. It excludes the lighting in common areas in blocks of flats and other access-way lighting provided communally.*

43 Reasonable provision would be to enable effective control and/or the use of efficient lamps such that:

a EITHER: Lamp capacity does not exceed 150W per light fitting and the lighting automatically switches off:

i When there is enough daylight; and

ii When it is not required at night

[14] GIL20, Low energy domestic lighting, EST, 2006

b OR: the lighting fittings have sockets that can only be used with lamps having an efficacy greater than 40 lumens per circuit watt.

Compact fluorescent lamps would meet the standard in (b). GLS tungsten lamps with bayonet cap or Edison screw bases, or tungsten halogen lamps would not

CRITERION 3 – LIMITING THE EFFECTS OF SOLAR GAINS IN SUMMER

44 As required by Part 11.1 (a) (ii), provision should be made to limit internal temperature rise due to solar gains. This can be done by an appropriate combination of window size and orientation, solar protection through shading and other solar control measures, ventilation (day and night) and high thermal capacity. CE 129 Reducing overheating – a designer's guide[15] offers guidance on strategies to control overheating.

45 SAP 2005 Appendix P contains a procedure enabling designers to check whether solar gains are excessive. Reasonable provision would be achieved if the SAP assessment indicates the dwelling will not have a high risk of high internal temperatures.

Energy use for cooling is not addressed directly by SAP 2005. The procedure referred to here will help to identify the risk of excessive solar gains. This will help designers to limit peak temperatures in dwellings without mechanical cooling, and, together with the guidance in paragraph 39, should prevent excessive energy demand in dwellings with mechanical cooling.

Designers may wish to go beyond the requirements in the current Building Bye-laws to consider the impacts of future global warming on the risks of higher internal temperatures occurring more often. CIBSE TM 36 Climate Change and the indoor environment[16] gives guidance on this issue.

46 When seeking to limit solar gains, consideration should be given to the provision of adequate levels of daylight. BS8206 Part 2 Code of practice for daylighting[17] gives guidance on maintaining adequate levels of daylighting.

[15] CE129, Reducing overheating – a designer's guide, EST, 2006

[16] TM 36 Climate change and the indoor environment: impacts and adaptation, CIBSE, 2005

[17] BS 8206–2:1992 Lighting for buildings. Code of practice for daylighting.

Section 2: Quality of Construction and Commissioning

47 As required by Bye-law 17B, dwellings should be constructed and equipped so that performance is consistent with the predicted ***DER***. As indicated in paragraph 23, a final calculation of the ***DER*** is required to reflect any changes in performance between design and construction and to demonstrate that the building as constructed meets the ***TER***.

CRITERION 4 – BUILDING FABRIC

48 In accordance with Part 11 and Bye-law 7, the building fabric should be constructed to a reasonable quality of construction so that:

a the insulation is reasonably continuous over the whole building envelope; and

b the air permeability is within reasonable limits.

Continuity of insulation

49 The building fabric should be constructed so that there are no reasonably avoidable thermal bridges in the insulation layers caused by gaps within the various elements, at the joints between elements, and at the edges of elements such as those around window and door openings.

50 Reasonable provision would be to:

a adopt approved design details such as those set out in the reference in footnote[9] ; or

b to demonstrate that the specified details deliver an equivalent level of performance using the guidance in reference in footnote[18]

51 In addition, the builder would have to demonstrate that an appropriate system of site inspection is in place to give confidence that the construction procedures achieve the required standards of consistency. For those using the approved details approach (paragraph 50(a)) a way of achieving this would be to produce a report demonstrating that the construction checklists included in the reference at footnote[9] have been completed and show satisfactory results.

Air permeability and pressure testing

52 In order to demonstrate that the specified air permeability has been achieved, Bye-law 17F states:

17F Calculations and targets

(1) This bye-law applies to a building in relation to which requirement 11.1(a)(i) applies.

(2) A person carrying out building work to construct the building shall ensure that pressure testing is carried out on the building in such circumstances, and in accordance with such procedures, as are set out in the relevant technical guidance document.

(3) The person carrying out the building work shall give notice of the results of the pressure testing to the Minister not later than 7 days after the testing is completed.

(4) The notice shall set out the results of the testing and the data on which they are based in the manner set out in the relevant technical guidance document.

(5) For the purposes of this bye-law, the relevant technical guidance document is one concerning pressure testing in a building in order to determine heat gains and losses in the building from its thermal elements and otherparts of its building fabric.

53 The approved procedure for pressure testing is given in the ATTMA publication 'Measuring Air Permeability of Building Envelopes[19]. The manner approved for recording the results and the data on which they are based is given in section 4 of that document.

54 The approved circumstances under which the Minister requires pressure testing to be carried out are set out in paragraphs 55 to 61.

*This means that if a design adopted a low design air permeability in order to achieve a performance better than the **TER**, it would not fail to comply with Part 11 if the pressure test achieved the limit value and the **TER** was achieved.*

Dwellings that have adopted approved construction details

55 On each development, an air pressure test should be carried out on a unit of each ***dwelling*** type selected by the Department . For the purposes of this Technical Guidance Document, a block of flats should be treated as a separate development irrespective of the number of blocks on the site. The ***dwelling***(s) to be tested should be taken from the first completed batch of units of each ***dwelling type***, and the test should be completed prior to occupation of the dwelling.

Larger developments may include many dwelling types – and one of each type should be tested to confirm the robustness of the designs and the construction procedures.

[18] *Information Paper IP01/06 Assessing the effects of thermal bridging at junctions and around openings in the external elements of buildings*, BRE, 2006.

[19] Measuring Air Permeability of Building Envelopes, ATTMA, 2006.

Dwellings that have NOT adopted approved construction details

56 Air pressure tests should be carried out on each ***dwelling type*** in the development to the number specified in Table 3. For the purposes of this Technical Guidance Document, a block of flats should be treated as a separate development irrespective of the number of blocks on the site.

57 The specific dwellings making up the test sample may be selected by the ***Department*** in consultation with the builder. They should be selected so that about half of the scheduled tests for each ***dwelling type*** are carried out during construction of the first 25% of each ***dwelling type***.

The aim is to enable lessons to be learned and adjustments to design and/or site procedures made before the majority of the dwellings are built.

Consequences of failing a pressure test

58 Compliance with the requirements would be demonstrated if:

a the measured ***air permeability*** is not worse than the limit value set out in paragraph 35; and

b the ***DER*** calculated using the measured ***air permeability*** is not worse than the ***TER***.

*This means that if a design adopted a low design air permeability in order to achieve a performance better than the **TER**, it would not fail Part 11 if the pressure test achieved the limit value and the **TER** was achieved.*

59 If satisfactory performance is not achieved, then remedial measures should be carried out on the dwelling and a new test carried out until the dwelling achieves the criteria set out in paragraph 58. Alternatively, the TER can be revised by substituting the measured air permeability for the value set out in Appendix A of this TGD, to demonstrate that the DER is not worse than the revised TER.

60 In addition to the remedial work on a ***dwelling*** that failed the initial test, one additional ***dwelling*** of the same ***dwelling type*** should be tested, thereby increasing the overall sample size.

Alternative to pressure testing on small developments

61 As an alternative approach to specific pressure testing on development sites where no more than two dwellings are to be erected, reasonable provision would be:

a. to demonstrate that during the preceding 12 month period, a ***dwelling*** of the same ***dwelling type*** constructed by the same builder had been pressure tested according to the procedures given in paragraphs 53 to 58 and had achieved the specified ***air permeability***.

b. avoid the need for any pressure testing by using a value of 15m³/h.m² for the ***air permeability*** at 50 Pa when calculating the ***DER***.

*The effect of using this cautious value would then have to be compensated for by improved standards elsewhere in the **dwelling** design.*

CRITERION 4 – COMMISIONING OF HEATING AND HOT WATER SYSTEMS

62 The heating and hot water system(s) should be commissioned so that at completion, the system(s) and their controls are left in the intended working order and can operate efficiently for the purposes of the conservation of fuel and power. In order to demonstrate that the heating and hot water systems have been adequately commissioned, Bye-law 17G states that:

Commissioning

17G Commissioning

(1) This bye-law applies to a building in relation to which requirement 11.1(b) applies and building work is carried out, but does not apply where the building work consists only of exempt electrical certifiable work (within the meaning of bye-law 15).

(2) The person carrying out the building work shall give to the Minister a notice confirming that the relevant fixed building services have been

Table 3 **Number of pressure tests for dwellings that have not adopted accredited construction details**

Number of instances of the *dwelling type*	**Number of test to be carried out on the *dwelling type***
4 or less	One test of each ***dwelling type***
Greater than 4, but equal or less than 20	Two tests of each ***dwelling type***
More than 20	At least 10% of the ***dwelling type***, unless the first 5 units of the type that are tested achieve the ***design air permeability***, when the sampling frequency can be subsequently reduced to 5%

commissioned in accordance with the procedure set out in the relevant technical guidance document.

(3) The notice shall be given not later than –

(a) in every case, the date on which the notice required by bye-law 13(6) in relation to the building work is given; and

(b) in the case of certifiable building work (within the meaning of bye-law 15), not more than 30 days after completion of the work.

(4) For the purposes of this bye-law, the relevant technical guidance document is one concerning pressure testing in a building in order to determine heat gains and losses in the building from its pipes, ducts, and vessels, used for space heating, space cooling and hot water services.

63 The procedure approved by the Minister is set out in the Domestic Building Services Compliance Guide.

64 The notice should include a declaration signed by a suitably qualified person that the manufacturer's commissioning procedures have been completed satisfactorily.

One option would be to engage a member of an approved Competent Person scheme.

Section 3: Providing Information

CRITERION 5 – OPERATING AND MAINTENANCE INSTRUCTIONS

65 In accordance with Requirement 11.1(c), the owner of the building should be provided with sufficient information about the building, the ***fixed building services*** and their maintenance requirements so that the building can be operated in such a manner as to use no more fuel and power than is reasonable in the circumstances

66 A way of complying would be to provide a suitable set of operating and maintenance instructions aimed at achieving economy in the use of fuel and power in a way that householders can understand. The instructions should be directly related to the particular system(s) installed in the **dwelling**.

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

a. the making of adjustments to the timing and temperature control settings; and

b. what routine maintenance is needed to enable operating efficiency to be maintained at a reasonable level through the service live(s) of the system(s).

68 An energy rating shall be prepared and fixed in a conspicuous place in the dwelling as required by Bye-law 17D, which states that:

17D Notice of energy performance to Minister

(1) This bye-law and bye-law 17E apply where a new dwelling is created by building work or by a material change of use in connection with which building work is carried out.

(2) The person carrying out the relevant building work shall calculate a rating of the energy performance of the dwelling, once constructed, in accordance with the relevant technical guidance document and give notice of that rating to the Minister.

(3) For the purposes of this bye-law, the relevant technical guidance document is one concerning minimum energy performance requirements for buildings and setting out a methodology of calculation for the energy performance of buildings.

(4) The notice shall be given not later than –

(a) the date on which the notice required by bye-law 13(6) is given in relation to the building work; and

(b) at least 5 days before occupation of the dwelling.

69 The calculation procedure approved by the Minister is the UK Government's Standard Assessment Procedure for Energy rating of Dwellings – 2005 Edition (SAP 2005).

70 Guidance on the preparation of the notices is available from the Department.

Section 4: Model Designs

71 Some builders may prefer to adopt model design packages rather than to engage in design for themselves. These model packages of fabric U-values, boiler seasonal efficiencies, window opening allowances etc would have been shown to achieve compliant overall performance within certain constraints. The construction industry may develop model designs for this purpose, with information about such designs being made available at www.modeldesigns.info.

72 It will still be necessary to demonstrate compliance in the particular case by going through the procedures described in paragraphs 23 to 29.

Section 5: Definitions

73 ***Air permeability*** is the physical property used to measure airtightness of the building fabric. It is defined as air leakage rate per envelope area at the test reference pressure differential across the building envelope of 50 Pascal (50N/m$^{2)}$. The envelope area of the building, or measured part of the building, is the total area of all floors, walls and ceilings bordering the internal volume subject to the test. This includes walls and floors below external ground level. Overall internal dimensions are used to calculate this area and no subtractions are made for the area of the junctions of internal walls, floors and ceilings with exterior walls, floors and ceilings.

The envelope area of a terraced house includes the party wall(s). The envelope area of a flat in a multiple storey building includes the floors, walls and ceilings to adjacent apartments.

74 A ***conservatory*** is an extension which has:

a not less than three quarters of its roof area and not less than one half of its external wall area made from translucent material; and

b is thermally separated from the ***dwelling*** by walls, windows and doors with U-value and draught-stripping provisions as least as good as provided elsewhere in the ***dwelling***.

75 DER is the Dwelling Energy Rate.

76 The ***design air permeability*** is the value of air permeability selected by the dwelling designer for use in the calculation of the ***DER***.

77 ***Dwelling*** means a self-contained unit designed to accommodate a single household. ***Rooms for residential purposes*** are not dwellings so Technical Guidance Document 11.2A is applicable to their construction.

78 A ***dwelling type*** is defined as a group of dwellings on a site having the same generic form (detached, semi-detached including end-terrace, mid-terrace, mid-floor flat, ground-floor flat, top-floor flat) and where the same construction methods are used for each of the main elements (walls, floors, roofs etc). Small variations in floor area do not constitute a different dwelling type.

The use of a consistent set of accredited details would be a way of indicating the use of the same construction method.

Fixed building services means any part of, or any controls associated with:

a. fixed internal or external lighting systems, but does not include emergency escape lighting or specialist process lighting; or

b. fixed systems for heating, hot water service, air conditioning or mechanical ventilation.

79 TER is the Target Energy Rate.

Appendix A

This appendix provides a set of reference values for the parameters of a SAP calculation, which are used in connection with establishing a target Energy rate for the purposes of demonstrating compliance with the bye-law requirements for new dwellings. The Table below must be used to define a reference dwelling of the same size and shape as the actual dwelling. The energy requirements per unit floor area from the reference dwelling are adjusted as specified in this Technical Guidance Document to form the target energy rate for the actual dwelling. The SAP calculation should done using SAP calculator software approved by the Department.

Element or system	Value
Size and shape	Same as actual dwelling
Opening areas (windows and doors)	25% of total floor area (or, if total exposed façade area is less 25% of the total floor area, the total exposed façade area)The above includes one opaque door of area 1.85 m2, any other doors are fully glazed
Walls	U = 0.35 W/m2K
Floors	U = 0.25 W/m2K
Roofs	U = 0.16 W/m2K
Opaque door	U = 2.0 W/m2K
Windows and glazed doors	U = 2.0 W/m2K Double glazed, low-E hard coat Frame factor 0.7 Solar energy transmittance 0.72 Light transmittance 0.80
Living area fraction	Same as actual dwelling
Shading and orientation	All glazing orientated E/W; average overshading
Number of sheltered sides	2
Allowance for thermal bridging	0.11 x total exposed surface area (W/K)
Ventilation system	Natural ventilation with intermittent extract fans
Air permeability	10 m^3/m2h at 50 Pa
Chimneys	None
Open flues	None
Extract fans	3 for dwellings with floor area greater than 80 m^2, 2 for smaller dwellings
Primary heating fuel (space and water)	Same as actual dwelling
Heating system	Boiler and radiators, water pump in heated space
Boiler	SEDBUK 86%, room-sealed, fanned flue
Heating system controls	Programmer + room thermostat + TRVs, boiler interlock
Hot water system	Stored hot water, electric immersion heater with cylinder thermostat, separate time control for space and water heating
Hot water cylinder	150 litre cylinder insulated with 35 mm of factory applied foam
Secondary space heating	Same as actual dwelling
Low energy light fittings	100% of fixed outlets

Documents referred to

Air Tightness Testing and Measurement Association (ATTMA) www.attma.org

Measuring Air Permeability of Building Envelopes, 2006.

BRE www.bre.co.uk

BR 262 *Thermal insulation: avoiding risks*, 2001. ISBN 1 86081 515 4

BR 443 *Conventions for U-value calculations*, 2006. (Available at www.bre.co.uk/uvalues.)

Information Paper IP1/06 *Assessing the effects of thermal bridging at junctions and around openings in the external elements of buildings*, 2006. ISBN 1 86081 904 4

Delivered energy emission factors for 2003. (Available at www.bre.co.uk/filelibrary/ 2003emissionfactorupdate.pdf.)

CO_2 emission figures for policy analysis, July 2005. (Available at www.bre.co.uk/filelibrary/ co2emissionfigures2001.pdf.)

Simplified Building Energy Model (SBEM) user manual and Calculation Tool. (Available at www. odpm.gov.uk.)

CIBSE www.cibse.org

TM 36 *Climate change and the indoor environment: impacts and adaptation*, 2005. ISBN 1 90328 750 2

Department of the Environment, Food and Rural Affairs (Defra) www.defra.gov.uk

The Government's Standard Assessment Procedure for energy rating of dwellings, SAP 2005. (Available at www.bre.co.uk/sap2005.)

Department of Transport, Local Government and the Regions (DTLR)

Limiting thermal bridging and air leakage: Robust construction details for dwellings and similar buildings, Amendment 1. Published by TSO, 2002. ISBN 0 11753 631 8 (Available to download from Energy Saving Trust (EST) website on http://portal. est.org.uk/ housingbuildings/calculators/ robustdetails/.)

Energy Saving Trust (EST) www.est.org.uk

CE129 *Reducing overheating – a designer's guide*, 2006.

GPG268 Energy efficient ventilation in dwellings – *a guide for specifiers*, 2006.

GIL20 *Low energy domestic lighting*, 2006.

Health and Safety Executive (HSE) www.hse.gov.uk

L24 *Workplace Health, Safety and Welfare: Workplace (Health, Safety and Welfare) Regulations 1992, Approved Code of Practice and Guidance, The Health and Safety Commission*, 1992. ISBN 0 71760 413 6

NBS (on behalf of ODPM) www.thebuildingregs.com

HM Government Domestic Building Services Compliance Guide 2010 Edition

Low or Zero Carbon Energy Sources: Strategic Guide, 2006. ISBN 1 85946 224 3

Thermal Insulation Manufacturers and Suppliers Association (TIMSA) www.timsa.org.uk

HVAC Guidance for Achieving Compliance with Part L of the Building Regulations, 2006.

Legislation

I 1991/1620 Construction Products Regulations 1991.

SI 1992/2372 Electromagnetic Compatibility Regulations 1992.

SI 1994/3051 Construction Products (Amendment) Regulations 1994.

SI 1994/3080 Electromagnetic Compatibility (Amendment) Regulations 1994.
SI 1994/3260 Electrical Equipment (Safety) Regulations 1994.

SI 2001/3335 Building (Amendment) Regulations 2001.

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

SI 2006/652 Building And Approved Inspectors (Amendment) Regulations 2006.

Standards referred to

BS 8206-2:1992 Lighting for Buildings. Code of practice for daylighting.