L1A

Work in new dwellings (2006 edition)

Please note: this is the current working draft of ADL1A. We recognise the importance of making stakeholders aware in advance of the changes that are due to come into effect on 06 April 2006. We have therefore released this draft document to ensure that stakeholders have adequate time to consider its contents. It is not, however, a final document and it may be subject to change. When the final AD is published, we intend to publish a summary of any changes made to this draft.

Text giving an introduction to the main changes to be inserted here.

Requirement

L1.- Reasonable provision shall be made for the conservation of fuel and power in buildings by:

a. limiting
   i. heat losses through the fabric of the building;
   ii. excessive solar gains; and
   iii. heat gains and losses from pipes, ducts and vessels used for space heating, space cooling and hot water storage;
b. providing energy efficient and properly commissioned fixed building services with effective controls;
c. providing to the owner sufficient information about the building and its building services so that the building can be operated and maintained in such a manner as to use no more fuel and power than is reasonable in the circumstances.

Limits on application

With respect to the provision of services or fittings in existing dwellings, this Part applies only to:

a. the provision of a window, rooflight, roof window, or door (being a door which together with its frame has more than 50% of its internal face area glazed); and
b. the provision of a space heating or hot water service boiler,

but this limit on application does not apply to the provision of any services or fittings in an extension to an existing dwelling.

General

Typefaces used in this document

1 In the following text, certain key terms are printed in ***bold italicised text***. The meanings of these terms for the purpose of this Approved Document are given in section 5.

2 In the following text, commentaries are given in smaller italicised font. These commentaries are not part of the approved guidance, but provided to assist understanding.

Types of work covered by this AD

3 This Approved Document is intended to give guidance on what, in ordinary circumstances, would be accepted as reasonable provision in fulfilment of the requirements of Part L, Regulations 17A, 17B, 17C, 20B and 20C for those creating new dwellings through new construction works.

4 Buildings containing *rooms for residential purposes* such as nursing homes, student accommodation and similar are not considered as dwellings, and in such cases, ADL2A would apply.

The term "rooms for residential purposes" is defined in Regulation 2(2).

5 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.

6 ADL1B applies where a dwelling is being created as the result of a *material change of use*.

"Material Change of Use" is defined in Regulation 5.

7 When constructing a dwelling as part of a larger building that contains other types of accommodation, this Approved Document L1A should be used for guidance in relation to the individual dwellings, with ADL2A giving guidance relating to the non-dwelling parts of the building such as heated common areas, and in the case of mixed-use developments, the commercial or retail space.

Technical risk

8 Building work must satisfy all the requirements set out in Schedule 1 of the Building Regulations. However the requirements in Part E (Resistance to the passage of sound), Part F (Ventilation), Part C (Site preparation and resistance to moisture), and Part J (Combustion appliances and fuel storage systems) are particularly relevant when considering the incorporation of energy efficiency measures.

9 The inclusion of any particular energy efficiency measure should not involve excessive technical risk. BR 262[1] provides general guidance on avoiding risks in the application of thermal insulation.

Demonstrating compliance

10 In the Secretary of State's view, compliance with Part L and regulation 17C would be demonstrated by meeting the five criteria set out in the following paragraphs. Appendix A contains a checklist that can be used to confirm that all the provisions have been met satisfactorily.

The checklist can benefit both developers and building control.

11 Criterion 1: the predicted rate of carbon dioxide emissions from the dwelling (the Dwellings Emission Rate ***DER***) is not greater than the Target Emissions Rate (***TER***), which is determined by following the procedures set out in paragraphs 20 to 23 AND

The results of showing compliance with this criterion will provide the information needed to prepare the Energy Performance Certificate required by the Energy Performance of Buildings Directive.

12 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 31 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.

1 Thermal insulation: avoiding risks, BR 262, BRE, 2001

13 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 46 to 47 of this Approved Document provide a way of demonstrating that suitable 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.

14 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.

15 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

16 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 ADL2A OR

b. if they are unheated, to provide fabric elements that meet the U-value standards set out in paragraphs 33 to 35.

Conservatories

17 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 ADL1B 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 30m^2 are currently exempt from the Building Regulations (see class VII of Schedule 2).

18 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.

Design standards

Regulations 17A and 17 B

19 Regulation 17A and 17B implement Articles 3 and 4 of the Energy Performance of Buildings Directive and state that:

17A.–(1) The Secretary of State shall approve a methodology of calculation of the energy performance of buildings.

(2) The methodology shall comply with the requirements of the Directive.

17B. The Secretary of State shall approve minimum energy performance requirements for new buildings in the form of target CO_2 emission rates, which shall be based upon the methodology approved pursuant to regulation 17A.

Target carbon dioxide Emission Rate *(TER)*

20 The Target CO_2 Emission Rate (***TER***) is the minimum energy performance requirement for new dwellings approved by the Secretary of State in accordance with Regulation 17B. It is expressed in terms of the mass of CO_2, in units of kg per m^2 of floor area per year emitted 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.

21 In accordance with the methodology approved by the Secretary of State in ODPM Circular 200n/nn, the ***TER*** must be calculated using the following approved calculation tools:

a. for individual dwellings no greater than 450m^2 total floor area, the Government's Standard Assessment Procedure (SAP)[2] dated ***mm*** 2005.

b. for individual dwellings larger than the above threshold, the Simplified Building Energy Model (SBEM)[3].

22 The target is calculated in two stages:

a. First calculate the CO_2 emissions from a notional 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 R1 of SAP 2005[2], unless the specific circumstances set out in paragraph 63 apply, when the ***air permeability*** used in the calculation of the ***TER*** may be varied from the value set out in Appendix R of SAP2005. No other values may be varied under any circumstance. The calculation tool will report the CO_2 emissions arising from

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

   ii. the use of internal fixed lighting C_L.

b. Secondly, determine the ***TER*** using the following formula:

TER = (C_H x fuel factor +C_L) x (1 – improvement factor)

Where the fuel factor[4] is taken from Table 1 in accordance with the guidance in paragraph 23. The improvement factor for this revision of Part L is 20%.

Table 1 **Fuel factor**

Heating fuel	Fuel factor
Mains gas	1.00
LPG	1.10
Oil	1.17
Grid electricity (for direct acting, storage and electric heat pump systems)	1.47
Solid mineral fuel **	1.28
Renewable energy including bio-fuels such as wood pellets **	1.00
Solid multi-fuel **	1.00

** The specific fuel factor should be used for those appliances that can only burn the particular fuel. Where an appliance is classed as multi-fuel, the multi-fuel factor should be used, except where the dwelling is in a smoke control area, when the solid mineral fuel figure should be used.

2 The Governments Standard Assessment Procedure for Energy Rating of Dwellings, 2005 edition, Defra, 2005

3 SBEM – final publication details to be decided

4 The fuel factor is the greater of 1.0 and the square root of the ratio of the CO_2 emission factor for the fuel to the emission factor for mains gas rounded to two decimal places. The derivation of the emission factors is described in the Defra paper available at <<to be added>>

23 The fuel factor used to calculate the ***TER*** should be based on the following fuel:

a. Where all the heating appliances are served by the same fuel, the fuel used in those appliances.

b. Where a dwelling has more than one heating appliance and these are served by different fuels

   i. the fuel should be mains gas if any of the heating appliances are fired by mains gas; otherwise

Designers could choose (e.g.) solid fuel central heating if they wish but the target performance should be based on gas because it is available.

   ii. the fuel used in the main heating system.

c. Where a dwelling is served by a community heating scheme, the principal fuel used by the community heating system.

Buildings containing multiple dwellings
24 Where a building contains more than one dwelling (such as in a terrace of houses or in a block of apartments), an overall ***TER*** can be calculated for all the dwellings in the building. In such cases, the building ***TER*** is the floor area-weighted average of all the individual ***TER***s, and is calculated according to the following equation:

$$\frac{(TER_1 \times Floorarea_1) + (TER_2 \times Floorarea_2) + (TER_3 \times Floorarea_3)}{(Floorarea_1 + Floorarea_2 + Floorarea_3)}$$

Criterion 1 – Achieving the TER

25 Regulation 17C states that:

> 17C. Any new building shall meet the target CO_2 emission rate for the building.

Calculating the CO_2 emissions from the actual dwelling
26 To comply with Regulation 17C, the proposed Dwelling carbon dioxide Emission Rate (***DER***) must be no worse than the ***TER*** calculated as set out in paragraphs 20 to 24.

27 The ***DER*** must be calculated using the same calculation tool as is used to establish the target (see paragraph 21). Two calculations of the ***DER*** may be required as follows:

a. A preliminary calculation as part of the design submission. This calculation will therefore be based on plans and specifications. The report produced by SAP software will indicate those features of the design that are critical to the dwelling attaining the TER and should be provided to the building control body at this stage. Appendix B lists those features that should be reported.

This would either be provided as part of the full plans submission, or requested by the BCB under regulation 13(5) where a Building Notice is given. Making the key features report available at this stage will help BCB's during the construction phase by alerting them to focus on the critical features of the dwelling

b. A final calculation as part of demonstrating that the actual dwelling complies with Regulation 17C. This calculation must be based on the dwelling as constructed, incorporating any changes to the performance specifications that have been made during construction.

BCBs can use discretion in deciding whether the credentials of the person carrying out these calculations are such that the submission can be accepted at face value. The information used for the as-built calculation could be used to prepare the Energy Performance Certificate (EPC). Builders may therefore wish to engage such experts as are required to produce the EPC to also produce this Part L submission.

Secondary heating
28 When calculating the ***DER*** it must be assumed that 10% of the space heat demand will be met by a secondary heating appliance as follows:

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 a gross efficiency of 20%.

   ii. If there is no gas point, then an open solid mineral fuel fire with a gross efficiency of 37%.

c. Otherwise an electric room heater shall be taken as the secondary heating appliance.

Buildings containing multiple dwellings
29 Where a building contains more than one dwelling (such as in a terrace of houses or in a block of apartments), regulation 17C is achieved if:

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

b. OR the building ***DER*** is no greater than the building ***TER***. The building ***DER*** is the floor area-weighted average of all the individual ***DER***s, and is calculated in the same way as the building ***TER*** (see paragraph 24)

When adopting the building DER approach, it will still be necessary to provide the information for each dwelling so that individual energy performance certificates can be produced.

Achieving the target

30 In appropriate circumstances, low and zero carbon energy supply systems such as solar hot water, photovoltaic 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*[5] describes a range of possible systems and how their contribution to the ***DER*** can be assessed.

Criterion 2 – Limits on design flexibility

31 Whilst the approach to complying with Criterion 1 allows considerable design flexibility, requirement L1(a)(i) states that reasonable provision should be made to limit heat gains and losses through the fabric of the building , and requirement L1(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 33 to 45.

Criterion 2 – 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.*

32 This section sets out the design limits for the building fabric to meet requirements L1(a)(i).

U-values

33 U-values shall be calculated using the methods and conventions set out in BR 443, "Conventions for U-value calculations"[6]. They should include allowances for any repeating thermal bridges, but should not make any allowance for non-repeating thermal bridges, as these are dealt with separately in paragraphs 51 to 53.

34 Table 2 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 average is calculated by the following equation, where U is the U-value and A the area of the individual elements:

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

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. An individual element means an element of the given type that has a U-value different from other elements in the dwelling. In the case of windows, doors and rooflights, only the whole window element (comprising the glazing, frame and sub-frames that fill the opening in the fabric) need be considered. As an example, the U-value for a builder's recess for a meter cupboard should not exceed 0.70W/m²K.

Table 2 **Limiting U-value standards (W/m²K)**

Element	(a) Area-weighted dwelling average.	(b) Worst individual sub-element.
Wall	0.35	0.70
Floor	0.25	0.70
Roof	0.25	0.35
Windows, roof windows, rooflights & doors	2.2	3.3

5 Low or Zero Carbon Energy Sources – Strategic Guide, interim publication on ODPM website

6 Conventions for U-value calculations, BR443, BRE, 2002 (under review)

35 When comparing against the values in Table 2, 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 BR443[6] OR

b. the particular size and configuration of the actual unit.

In either case, the U-value should be 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

36 A reasonable limit for the ***design air permeability*** is 10 $m^3/(h.m^2)$ @ 50 Pa. Guidance on some ways of achieving this is given in *<title>*[7].

*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.*

Criterion 2: Design Limits for fixed building services.

37 This section sets out the design limits for fixed building services and controls to meet requirement L1(b).

Heating and hot water system(s)

38 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 Heating Compliance Guide*[8], AND

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

Insulation of pipes, ducts and vessels

39 Reasonable provision would be demonstrated by insulating pipes, ducts and vessels to standards that are not less than those set out in the Domestic Heating Compliance Guide[8].

Mechanical ventilation

40 Reasonable provision would be install systems that perform no worse than those described in GPG 268[9].

*GPG 268 also includes guidance on appropriate **air permeability** standards for different ventilation strategies. See comments at paragraph 34.*

Mechanical cooling

41 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[10].

Fixed internal lighting

42 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.

43 Reasonable provision would be to install fixed energy efficient light fittings in the most frequented locations in the dwelling to a number not less than:

a. one per $25m^2$ of dwelling floor area (excluding garages) or part thereof AND

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

b. one per four fixed light fittings.

A light fitting may contain one or more lamps.

44 Lighting fittings in less frequented areas like cupboards and other storage areas would not count. GIL 20[11] gives guidance on identifying suitable locations.

Fixed external lighting

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

7 Update of existing Part L robust details.

8 Domestic Heating Compliance Guide, ODPM, (in preparation).

9 GPG268 Energy efficient ventilation in housing. A guide for specifiers on requirements and options for ventilation (revision as CE124/GPG268 in preparation)

10 Statutory Instrument 2005 No. 1726, The Energy Information (Household Air Conditioners) (No. 2) Regulations 2005

11 GIL 20, Low energy domestic lighting, BRECSU, 1995 (a new edition is in preparation)

45 A way of keeping within reasonable design limits 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
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

46 As required by L1(a)(ii), provision should be made to prevent high internal temperatures due to excessive 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. CE129 *Reducing overheating – a designer's guide*[12] offers guidance on strategies to control overheating.

47 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 SAP2005. The procedure referred to here will help to identify the likelihood of excessive solar gains. This will help designers to limit peak temperatures in dwellings without mechanical cooling, and together with the guidance on reasonably efficient cooling systems in paragraph 41, should prevent excessive energy demand in dwellings with mechanical cooling.

Designers may wish to go beyond the requirements in the current Building Regulations to consider the impacts of future global warming on the risks of higher internal temperatures occurring more often. CIBSE TM36 Climate Change and the internal environment[13] *gives guidance on this issue.*

48 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*[14] gives guidance on maintaining adequate levels of daylighting.

The Building Regulations do not specify minimum daylight requirements. However, reducing window area has differing impacts on the predicted CO_2 emissions, through reduced solar gain and increased use of electric lighting.

12 Reducing overheating – a designer's guide, CE129 HEEBPp, 2005
13 Climate change and the internal environment: impacts and adaptation, TM36, CIBSE, 2005.
14 BS 8206 Part 2 Code of practice for daylighting

Criterion 4 – Quality of construction and commissioning

49 As required by Regulation 17C, dwellings should be constructed and equipped so that performance is consistent with the predicted ***DER***. As specified in paragraph 27b), 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***.

The report referred to in paragraph 27a) will assist BCBs in checking the key features of the design are included as specified during the construction process.

Building fabric

50 In accordance with Part L and Regulation 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

51 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.

52 Reasonable provision would be to:

a. adopt accredited design details such as those set out in <*Title*>[7], OR

Reference 7 is one such catalogue of accredited details. A list of additional approved accreditation schemes may be provided in due course on the ODPM website.

b. to demonstrate that the specified details deliver an equivalent level of performance using the guidance in BRE IP 17/01: "Assessing the effects of thermal bridging at junctions and around openings in the external elements of buildings"[15].

53 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 accredited details approach (paragraph 52a)) a way of achieving this would be to produce a report demonstrating that the construction checklists included in <*Title*>[7] have been completed and show satisfactory results.

It could be helpful to builders and building control bodies if such reports are signed by a suitably qualified person.

Air permeability and air pressure testing

54 The ***DER*** should be calculated using the ***design air permeability*** as specified by the designer. In order to demonstrate that the specified ***design air permeability*** has been achieved, Regulation 20B states:

20B.–(1) This regulation applies to the erection of a building.

(2) Where this regulation applies, the person carrying out the work shall, for the purpose of ensuring compliance with Regulation 17C and paragraph L1(a)(i) of Schedule 1–

a. ensure that, in such circumstances as are approved by the Secretary of State, appropriate air pressure testing is carried out in accordance with a procedure approved by the Secretary of State; and

b. give a copy of the results of the testing to the local authority.

(3) The results of the testing referred to in paragraph (2)(a) shall be–

a. recorded in a manner approved by the Secretary of State; and

b. given to the local authority in accordance with paragraph (2)(b) not later than the date on which the notice required by regulation 15(4) or regulation 16A(3) is given.

55 The procedure approved by the Secretary of State for air pressure testing is set out in the ATTMA publication *Air permeability measurement*[16]. The tests should be carried out by a suitably qualified person.

A way of demonstrating that the testing organisation is suitably qualified is for them to be members of the Air Tightness Testing and Measurement Association – see www.attma.org. It could be helpful to demonstrating compliance for the testing organisation to sign the certificate.

56 The manner approved by the Secretary of State for the reporting of the test would be a declaration signed by a suitably qualified person

a. confirming that the test had been carried out in accordance with the approved procedure (paragraph 55) AND

b. recording the values of both the measured ***air permeability*** and the ***design air permeability***.

15 Assessing the effects of thermal bridging at junctions and around openings in the external elements of buildings, IP17/01, BRE, (being updated)

16 Air permeability measurement, ATTMA, in preparation

57 The approved circumstances under which the Secretary of State requires pressure testing to be carried out are set out in paragraphs 58 to 61.

Dwellings that have adopted accredited construction details (paragraph 52a))

58 On each development, an air pressure test should be carried out on a unit of each ***dwelling type*** selected by the building control body. For the purposes of this Approved 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***.

Most larger developments will include many types of unit including terraced (end and centre), semi-detached, flats etc – and one of each type should be tested to confirm the robustness of the designs and the construction procedures.

Dwellings that have NOT adopted accredited construction details (paragraph 52a))

59 Air pressure tests should be carried out on the greater number of

a. 2 units of each ***dwelling type*** in the development
b. 5% of each ***dwelling type*** in the development. If the first 5 dwellings tested all meet the airtightness standard, the sampling frequency can subsequently be reduced from 5% to 2%.

For the purposes of this Approved Document, a block of flats should be treated as a separate development irrespective of the number of blocks on the site.

60 The specific dwellings making up the test sample may be selected by the building control body 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.

Dwellings that have been registered with a third party monitoring scheme

61 Where the performance of the dwelling is being monitored as part of a third party scheme approved by the Secretary of State, sample air pressure testing should be carried out in accordance with the scheme requirements.

Such third party monitoring schemes would normally be expected to provide a mechanism for understanding the performance of the dwelling as part of a feedback and improvement cycle. Consequently, the nature of the testing is likely to include more diagnostic testing than would be required just to demonstrate compliance.

Consequences of failing a pressure test

62 If a dwelling fails to achieve the ***design air permeability*** then remedial measures should be carried out on the dwelling such that on re-test:

a. the measured ***air permeability*** is not worse than the limit value set out in paragraph 36 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 L if the pressure test achieved the limit value and the **TER*** was achieved.

63 In the period up to 31 October 2007, if the initial test result on a dwelling is unsatisfactory, reasonable provision would be to:

a. carry out remedial measures such that on retest, a result was achieved that showed
   i. an improvement of 75% of the difference between the initial test result and the ***design air permeability.***
   ii. OR if less demanding, a test result within 15% of the required ***design air permeability***.
b. revise the ***TER*** by substituting the measured ***air permeability*** from step 63a) above for the value set out in Appendix R of SAP2005[2], and demonstrate that the ***DER*** is not worse than the revised ***TER***.

This allows some time for builders to develop the techniques for constructing to reasonable standards of airtightness, but the poorer airtightness will be reflected in the Energy Performance Certificate, which will impact on the value of the dwelling.

To illustrate the revised target following an initial failure, if the initial test result was 18.0, and the air permeability target was 8.0, the revised pass level to reach in tests following remedial action would be [18.0-0.75x(18.0-8.0)] = 10.5 $m^3/(h.m^2)$ at 50 Pa. However, if the initial test result was 9.5, the pass level to be achieved in tests following remedial action would be 8.0x1.15 = 9.2.

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

Alternative to pressure testing on small developments

65 The Secretary of State approves the following alternative approach to specific pressure testing for development sites of no more than 2 dwellings. The developer should either

a. 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 paragraph 55 and had achieved the required ***design air permeability.***

b. Avoid the need for any pressure testing by using a value of 15 $m^3/(h.m^2)$ 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.

Commissioning of heating and hot water systems

66 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, Regulation 20C states that

20C.–(1) This regulation applies to building work in relation to which paragraph L1(b) 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 paragraph L1(b) of Schedule 1, provide to the local authority a notice confirming that all fixed building services have been properly commissioned in accordance with a procedure approved by the Secretary of State.

(3) The notice shall be given to the local authority not later than the date on which the notice required by regulation 15(4), or regulation 16A(3) is given.

67 The procedure approved by the Secretary of State is set out in the Domestic Heating Compliance Guide[8].

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

Membership of an appropriate Competent person scheme would be a way of showing suitable qualifications. This declaration will eventually form part of the Home Information Pack.

Criterion 5 – Providing information

69 In accordance with requirement L1(c), the owner of the dwelling should be provided with sufficient information, including operating and maintenance instructions, enabling the building and the building services to be operated and maintained in such a manner as to consume no more fuel and power than is reasonable in the circumstances.

70 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.

The aim is that this information will eventually form part of the Home Information Pack.

71 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).

Model designs

72 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 has developed model designs for this purpose and they are registered on the Internet at www.modeldesigns.info (to be confirmed).

73 It will still be necessary to demonstrate compliance in the particular case by going through the procedures described in paragraphs 10 to 15.

Definitions as used in Part L

74 ***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. For the purposes of this Approved Document, the test reference pressure differential is 50 Pa. The envelope area of the building, or measured part of the building, is the total area of all floor, wall and ceiling elements bordering the internal volume subject to the test. This includes elements below external ground level. Overall internal dimensions shall be used to calculate this area. No subtractions shall be made for the area at junction 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 an apartment in a multiple story building includes the floors, walls and ceilings to adjacent apartments.

75 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.

76 ***DER*** is the Dwelling carbon dioxide Emission Rate. Criterion 1 requires the ***DER*** to be no greater than the TER (see paragraph 11).

77 The ***design air permeability*** is the value of air permeability selected by the dwelling designer for use in the calculation of the ***DER***. Paragraph 36 sets an upper limit for this value.

78 ***Dwelling type*** means a dwelling of the same generic form (detached, semi-detached, 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.

79 ***Fixed building services*** is defined in Regulation 2 as

"fixed building services" means/includes heating systems, hot water systems, fixed internal and external lighting, cooling systems and mechanical ventilation systems.

80 ***TER*** is ***the Target carbon dioxide Emission Rate*** as calculated for comparison with the ***DER*** in order to meet Criterion 1 as described in paragraph 11.

Checklist

The following table provides a checklist of the evidence that could be compiled to facilitate for builders and building control bodies the processes of demonstrating compliance with Part L. The checklist gives the evidence that needs to be provided to allow the check to be made, and who could produce the evidence. For most steps, the evidence could be provided by a suitably qualified person acting for the builder and may be accepted at face value at the discretion of the building control body dependent upon the credentials of the person making the declaration. Examples of checks where this could apply and who might be suitably qualified are indicated using bold italicised text in the “Produced by” column, but BCBs have the discretion to accept evidence from other groups of appropriately qualified and/or experienced individuals or to decline to accept at face value. The final two columns allow the design to be checked, often based on the outputs of a SAP assessment, with the final column being used to confirm that the design features have been installed in practice.

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Site reference		Plot reference		
Builder		Contact		☎
Building Control body		Contact		☎

No.	Check	Evidence	Produced by	Design OK ?	As built OK?
	Criterion 1 – Predicted carbon dioxide emission from proposed dwelling does not exceed the target				
1	***TER*** (kg $CO_2/m^2.a$)	Standard output from SAP calculation	***SAP assessment***		
2	***DER*** for dwelling as designed (kg $CO_2/m^2.a$)	Standard output from SAP calculation	***SAP assessment***		N/A
3	Are emissions from dwelling as designed less than or equal to the target?	Compare TER and DER as designed	***SAP assessment***		N/A
4	***DER*** for dwelling as constructed (kg $CO_2/m^2.a$)	Standard output from SAP calculation	***SAP assessment***	N/A	
5	Are emissions from actual dwelling less than or equal to the target?	Compare TER and DER as constructed	***SAP assessment***	N/A	
	Criterion 2: the performance of the building fabric and the heating, hot water and fixed lighting systems should be no worse than the design limits				
	Fabric Uvalues				
6	Are all U-values better than the design limits?	Schedule of U-values produced as standard output from SAP	***SAP assessment***		
	Heating and hot water systems				
7	Are all building services standards acceptable?	Schedule of appliance efficiencies as standard output from SAP	***SAP assessment***		
8	Do controls meet the minimum controls provision set out in the Domestic Heating Compliance Guide?	Controls specification as output from SAP	***SAP assessment***		
9	Does any hot water cylinder meet the standards set out in the Domestic Heating Compliance Guide?	Cylinder specification as output from SAP	***SAP assessment***		
	Fixed internal and external lighting				
10	Does fixed internal lighting comply with paragraphs 42 and 44	Schedule of installed fixed internal lighting	Builder or Electrical contractor who could be a Part P ***Approved Competent Person***		
11	Does the external lighting comply with paragraph 45	Schedule of installed external lighting	Builder or Electrical contractor who could be a Part P ***Approved Competent Person***		
	Criterion 3: the dwelling has appropriate passive control measures to limit solar gains.				
12	Does the dwelling have a strong tendency to high summertime temperatures?	Prediction produced as standard output from SAP	***SAP assessment***		

No.	Check	Evidence	Produced by	Design OK ?	As built OK?
	Criterion 4: the performance of the dwelling, as built, is consistent with the *DER*				
13	Have the key features of the design been included (or bettered) in practice?	List of key features produced as standard output from SAP to facilitate sample checking by BCB and enable builder to control construction on site.	***SAP assessment***	N/A	
	Fabric construction				
14	Have accredited details been used?	Schedule of details used and their reference codes.	Builder's submission.		
15	Have non-accredited details been used?	Evidence that details conform to standards set out in IP17/01	Builder's submission		
16	Has satisfactory documentary evidence of site inspection checks been produced?	Completed pro-formas showing checklists have been completed.	Builder's submission.	N/A	
17	***Design air permeability*** ($m^3/(h.m^2)$ at 50Pa)	Standard output from SAP calculation	***SAP assessment***		
18	Has evidence been provided that demonstrates that the ***design air permeability*** has been achieved satisfactorily (see paragraph 56)	Sample pressure test results in comparison to design value. *(Note that thesampling regime depends on whether accredited details have been used or not).*	***ATTMA member or similar accredited tester.***	N/A	
	Commissioning heating and hot water systems				
19	Evidence that the heating and hot water systems have been commissioned satisfactorily	Commissioning completion certificate	***Approved Part J or Part P competent person***	N/A	
	Criterion 5: the necessary provisions for energy efficient operation of the dwelling are put in place				
20	Has all the relevant information been provided?	O&M instructions Data for Energy Performance Certificate	Builder's submission	N/A	
	Common areas in buildings with multiple dwellings (where relevant)				
21	If the common areas are un-heated, are all U-values better than limits in Table 2?	Schedule of U-values	Builder's submission		
	Otherwise, use ADL2A				

Important features of the design

1 A design submission should include a report from a SAP assessment that indicates if any of the following apply:

a. A wall U-value less than 0.28 W/m^{2}K

b. A floor U-value less than 0.20 W/m^{2}K

c. A roof U-value less than 0.15 W/m^{2}K

d. A window or door U-value less than 1.8 W/m^{2}K

e. Thermal bridging less than the default value for accredited details

f. A design air permeability less than 7 m^2/m^2.h

g. A main heating system efficiency more that 4 percentage points better than that recommended for its type in the Heating Compliance Guide.

h. The use of any low carbon or renewable energy technology such as

   i. bio-fuel used for the main heating system (including multi-fuel appliances).

   ii. CHP or community heating

   iii. Heat pumps

   iv. A solar panel

   v. A photovoltaic array

i. Any item involving the application of SAP 2005 Appendix Q.

Reference values
NOT TO BE INCLUDED IN FINAL AD

Appendix R1: Reference values

This appendix provides a set of reference values for the parameters of a SAP calculation, which are used in connection with establishing a target CO_2 emissions rate for the purposes of demonstrating compliance with regulations for new dwellings. Table R1 is used to define a notional dwelling of the same size and shape as the proposed dwelling.

The CO_2 emissions per unit floor area from the notional dwelling are adjusted as specified in the applicable regulatory document to form the target CO_2 emission rate for the proposed dwelling.

CO_2 emissions associated with internal lighting should be recorded separately. CO_2 emissions associated with electricity consumption for pumps and fans are included with those for heating and hot water.

Table R1 **Reference factor**

Element or system	Value
Size and shape	Same as proposed dwelling
Opening areas (windows and doors)	25% of total floor area (or, if less, the exposed façade area) One opaque door of area 1.85 m?, any other doors fully glazed
Walls	U = 0.35 W/m^{2}K
Floors	U = 0.25 W/m^{2}K
Roofs	U = 0.16 W/m^{2}K
Opaque door	U = 2.0 W/m^{2}K
Windows and glazed doors	U = 2.0 W/m^{2}K Double glazed, low E hard coat Frame factor 0.7 Solar energy transmittance 0.72 Light transmittance 0.80
Living area fraction	Same as proposed dwelling
Shading and orientation	All glazing orientated E/W; average over-shading
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	10m^3/m^2/h 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)	Mains gas
Heating system	Boiler and radiators Water pump in heated space
Boiler	SEDBUK 78% room-sealed fanned flue
Heating system controls	Programmer + room thermostat + TRVs boiler interlock
Hot water system	Stored hot water, heated by boiler separate time control for space and water heating
Hot water cylinder	150 litre cylinder insulated with 35 mm of factory applied foam
Primary water heating losses	Primary pipework not insulated, cylinder temperature controlled by thermostat
Secondary space heating	10% electric
Low energy light fittings	30% of fixed outlets