Communities and Local Government

Domestic Heating Compliance Guide

December 2008
2nd Edition

Communities and Local Government

The Building Regulations 2000
As amended 2006

DOMESTIC HEATING COMPLIANCE GUIDE

COMPLIANCE WITH APPROVED DOCUMENTS L1A: NEW DWELLINGS AND L1B: EXISTING DWELLINGS

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Section 1 Introduction

Part L of Schedule 1 to the Building Regulations[1] is concerned with the conservation of fuel and power in buildings. For dwellings, Part L is supported by two Approved Documents, Approved Document L1A (ADL1A) and Approved Document L1B (ADL1B). In addition to Part L, other Building Regulations also bear on the energy performance of dwellings and their heating systems.

ADL1A gives guidance on how to satisfy the energy performance provisions of the Building Regulations for new dwellings. ADL1B gives guidance on how to satisfy the energy performance provisions of the Building Regulations for work in existing dwellings. Both Approved Documents repeat the relevant regulatory requirements verbatim in various places, distinguished by a green background, with the aim of making them complete references for ordinary purposes. In cases of doubt, however, it may be necessary to refer directly to the Building Regulations as amended.

ADL1A and ADL1B were published in 2006 in support of the amendment to the Building Regulations, SI 2006/652. The amendment came into force on 6 April 2006.

These new Approved Documents are more strategic in nature and rely on 'second-tier' documents to provide detailed information on the minimum provisions necessary to comply with the requirements of the Regulations.

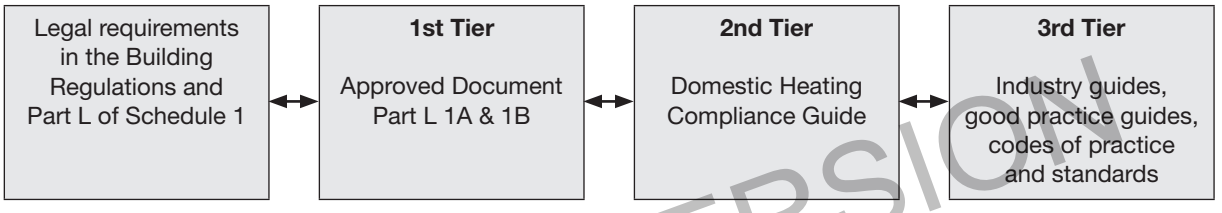
This Domestic Heating Compliance Guide is a second-tier document referred to in ADL1A and ADL1B as a source of guidance on the means of complying with the requirements of the Building Regulations for space heating systems and hot water systems. The guide was prepared with the assistance of industry bodies. It covers conventional means of providing primary and secondary space heating and domestic hot water for dwellings in use in England and Wales at the time of writing.

The guide identifies standards of provision that meet the requirements for systems in new build and those in existing buildings when work is being undertaken.

For new dwellings, guidance is provided on the *design limits for fixed building services* referred to in ADL1A. For existing dwellings, guidance is provided on *reasonable provision* for the installation or replacement of *controlled services* as referred to in ADL1B.

The levels of performance for new and existing dwellings differ only where practical constraints arise in existing dwellings.

Figure 1 Status of the Domestic Heating Compliance Guide



The Domestic Heating Compliance Guide covers a range of frequently occurring situations but alternative means of achieving compliance may be possible. The status of alternative provisions is explained in the 'Use of Guidance' sections at the front of the Approved Documents.

The guide also refers to third-tier publications which include information on good practice for design and installation over and above the minimum regulatory provision.

[1] The Building Regulations, SI 2006:652, including Part L of Schedule 1, apply in England and Wales. Separate regulations apply in Scotland and Northern Ireland and may require different provisions than those signalled in this guide as the minimum regulatory requirement.

1.1 How to use this guide

The Domestic Heating Compliance Guide provides guidance on the means of complying with the requirements of the Building Regulations Part L for conventional space heating systems and hot water systems in dwellings.

The guide comprises four self-contained fuel-based sections and five specialist technology-specific sections. Each fuel-based section addresses the requirements applicable to primary and secondary space heating and hot water technologies for the particular fuel. The specialist technology-specific sections provide further guidance on the minimum provisions for particular specialised space heating and hot water technologies. The structure of the guide is illustrated in Figure 2 and is as follows:

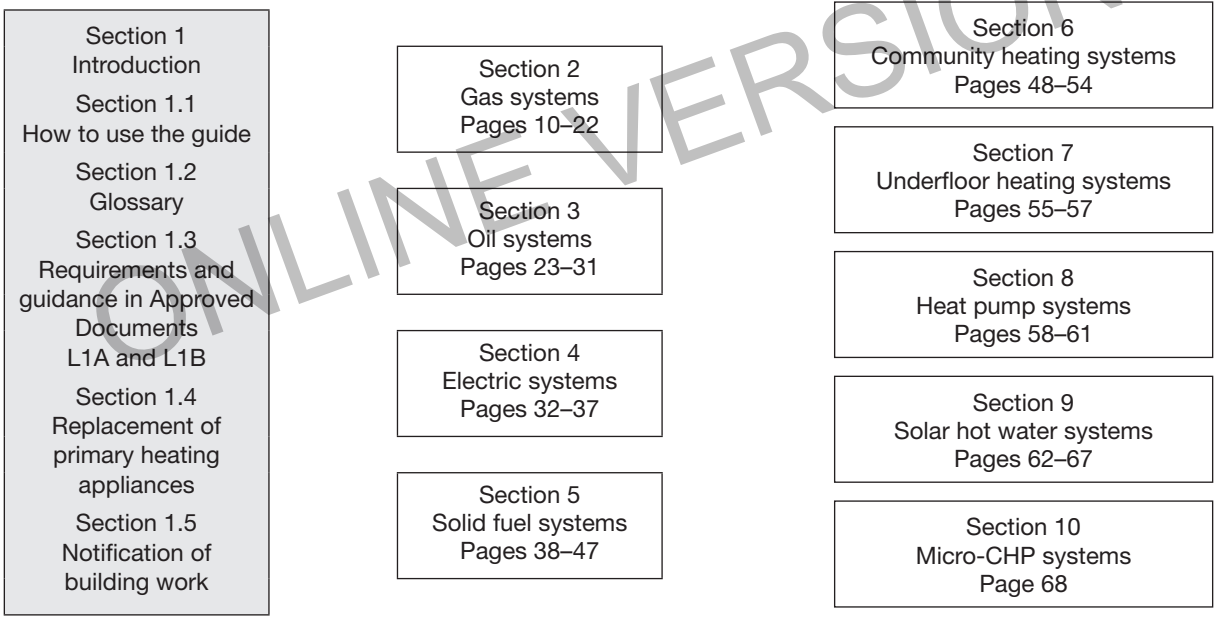
- Fuel-based sections:
  - Section 2: Gas-fired primary and secondary space heating and hot water
  - Section 3: Oil-fired primary and secondary space heating and hot water
  - Section 4: Electric primary and secondary space heating and hot water
  - Section 5: Solid fuel primary and secondary space heating and hot water
- Specialist technology-specific sections:
  - Section 6: Community heating
  - Section 7: Underfloor heating
  - Section 8: Heat pumps
  - Section 9: Solar water heating
  - Section 10: Micro-CHP (Combined Heat and Power)

For any particular application, the relevant fuel-based section and/or specialist technology-specific section must be read in conjunction with this introduction and the following generic sections:

- Section 1 Introduction
- Section 1.1 How to use this guide
- Section 1.2 Glossary
- Section 1.3 The Building Regulations requirements and the guidance in Approved Documents L1A and L1B
- Section 1.4 Replacement of primary heating appliances
- Section 1.5 Notification of building work

For each type of space heating or hot water system, guidance on the minimum provisions needed to comply with Part L is supported by commentaries in *italic* font with a shaded background. These commentaries are labelled 'Supplementary Information' and may be useful when interpreting the minimum provisions and, in some cases, provide links to best practice guidance. They do not specify minimum provisions.

Figure 2 Structure of the Domestic Heating Compliance Guide



Section 1.2 Glossary

Approved Document L1A	ADL1A	Approved Document L1A gives guidance on how to satisfy the Building Regulations energy efficiency requirements when building new dwellings. Effective from 6 April 2006.
Approved Document L1B	ADL1B	Approved Document L1B gives guidance on how to satisfy the Building Regulations energy efficiency requirements when carrying out work in existing dwellings. Effective from 6 April 2006.
The Building Regulations		Statutory Instrument SI2000-531. The Building Regulations ensure the health, safety, welfare and convenience of people in and around buildings and reasonable provision for the conservation of fuel and power and access to and use of buildings by providing functional requirements for building design and construction.
Department for Communities and Local Government	CLG	The government department responsible for producing and revising the Building Regulations.
Domestic Heating Compliance Guide		This second-tier document in support of Approved Documents L1A and L1B sets out the minimum provisions for all conventional space heating and hot water systems provided in new dwellings and for work in existing dwellings to comply with the Building Regulations energy efficiency requirements.
Minimum provision		In this document 'minimum provisions' refers to the provisions needed to demonstrate compliance of space heating and hot water systems installed in dwellings with the Building Regulations energy efficiency requirements.
Supplementary information		The commentaries labelled 'Supplementary Information' may be useful when interpreting the minimum provisions and, in some cases, provide links to best practice guidance.
SAP 2005		The Government's Standard Assessment Procedure for Energy Rating of Dwellings (2005 edition).

Section 1.3 The Building Regulations requirements and the guidance in Approved Documents L1A and L1B

The Building Regulations that bear on energy efficiency are repeated for easy reference at the front of both Approved Document L1A and Approved Document L1B before the sections giving technical guidance on compliance. The Approved Documents can be viewed at: www.communities.gov.uk/planningandbuilding/buildingregulations/

For new dwellings, the provision of heating and hot water services systems has to be considered as part of the overall design of the building. For works on heating and hot water services systems in existing dwellings, provision can be considered in isolation. Both Approved Documents refer to this publication as the source of detailed guidance on what is reasonable provision.

Section 1.4 Replacement of primary heating appliances

In order to comply with the energy efficiency requirements of the Building Regulations, *replacement appliances* providing primary space heating and/or hot water in existing dwellings should meet the following conditions.

Replacement not involving fuel or energy switch

Where the primary heating appliance is replaced by one using the same fuel or energy supply, the (seasonal) efficiency of the new equipment should be:

a. as stated in the relevant fuel-based section of this guide; AND

b. not worse than two percentage points lower than the efficiency of the controlled service being replaced. If the efficiency of the appliance to be replaced is not known, efficiency values may be taken from Table 4a or 4b of SAP 2005.

Replacement involving fuel or energy switch

If the new heating appliance uses a different fuel, the efficiency of the new service should be multiplied by the ratio of the CO_2 emission factor of the fuel used in the service being replaced to that of the fuel used in the new service, to obtain the carbon equivalent efficiency. The checks described in paragraphs a and b above should then be made. The CO_2 emission factors should be taken from Table 12 of SAP 2005[2].

The aim is to discourage replacement of an existing appliance by a significantly less carbon efficient one.

Examples

1. An old oil-fired boiler with an efficiency of 72% is to be replaced by a dual solid fuel boiler with an efficiency of 65% as required by paragraph a above and Table 16.

The carbon equivalent efficiency of the dual solid fuel boiler should be greater than 70% to meet the requirement in paragraph b above. Its carbon equivalent efficiency is actually:

$65\% \times (0.265 \div 0.187) = 92.1\%$

where 0.265 and 0.187 kg CO_2/kWh are the emission factors for oil and dual fuel appliances respectively.

2. An LPG-fired boiler of 81% efficiency is to be replaced with an oil boiler. The new oil boiler should have:

a. an efficiency of not less than 86% (see Table 9); and

b. a carbon equivalent efficiency greater than 79% (the efficiency of the existing LPG boiler less 2 percentage points).

The efficiency of the proposed new oil boiler should therefore be greater than

$79\% \div (0.234 \div 0.265) = 79\% \div 0.883 = 89.5\%$

where 0.234 and 0.265 kg CO_2/kWh are the emission factors of LPG and oil respectively.

[2] The relevant column in Table 12 of SAP 2005 is the one entitled 'Emissions, kg CO_2/kWh.'

Section 1.5 Notification of building work

Work covered by requirement L1 in the 2006 amendment of Part L must make reasonable provision to achieve energy efficiency. In most instances, this will require the building control body to be notified of the intended work before the work commences, either by deposit of full plans or by a building notice. The execution of the work is then subject to checking and inspections by the building control body, with a completion certificate being issued on satisfactory completion of the work. In certain situations, other procedures apply. These include:

a. Where the work is being carried out under the terms of an authorised Competent Person (CP) self-certification scheme, no advance notification to the building control body is needed. At the completion of the work, the registered CP provides the building owner with a certificate confirming that the installation has been carried out in accordance with the requirements of the relevant regulations, and the scheme operator notifies the local authority to that effect.

b. Where the work involves an emergency repair, e.g. a failed boiler or a leaking hot water cylinder, there is no need to delay making the repair in order to make an advance notification to the building control body. However, in such cases it will still be necessary for the work to comply with the requirements and to give a notice to the building control body at the earliest opportunity, unless an installer registered under an appropriate CP scheme carries out the work. A completion certificate can then be issued in the normal way.

c. Where the work is of a minor nature as detailed in Schedule 2B of the Building Regulations (see page 14 of ADL1B), the work must comply with the relevant requirements, but need not be notified to building control.

Section 2: Gas-fired space heating and hot water systems

This section provides guidance on the specification of gas-fired space heating and hot water systems in dwellings.

All gas appliances must be installed by a competent person in accordance with the current issue of the Gas Safety (Installation and Use) Regulations. The installation should follow the manufacturer's instructions and should comply with all other relevant parts of the Building Regulations and, for wet systems, the Water Regulations.

2.1 Scope of guidance

The guidance in this section applies to systems fuelled by natural gas and liquid petroleum gas (LPG); any requirements specific to either fuel type are identified.

The following types of gas-fired heating systems are addressed:

- Wet central heating systems
- Range cookers with integral central heating boilers
- Warm-air heating systems
- Fixed independent space heating devices

Where appropriate, it may be necessary to refer to other sections in this guide covering community heating, underfloor heating, heat pumps, solar water heating and micro-CHP.

2.2 Gas-fired wet central heating systems

This section provides guidance on the specification of gas-fired wet central heating systems for dwellings that, if followed, will satisfy the requirements of Part L of the Building Regulations.

Terminology and applicability of guidance to different scenarios in new and existing dwellings

The guidance in this section applies to the following situations:

a. The specification of central heating systems in new dwellings – this situation is referred to in this section as a ***new system***.

b. The specification of central heating systems in existing dwellings where previously space heating was not provided by central heating – this situation is also referred to in this section as a ***new system***.

c. The specification of a replacement central heating system and/or component in existing dwellings where central heating is already installed – this situation is referred to in this section as a ***replacement system***.

In situations (a) and (b) above the guidance for compliance of ***new systems*** (in new and existing dwellings) with Part L is the same.

In situation (c) above, that is for ***replacement systems*** in existing dwellings, in most cases the guidance for compliance with Part L is as for ***new systems***, unless otherwise stated in the relevant section.

In order to comply with the requirements of Part L, gas-fired central heating systems which are provided as ***new systems*** or ***replacement systems*** in dwellings should meet the following conditions:

a. The boiler should have a minimum efficiency (as defined by its SEDBUK value) as given in Table 1 (row a); AND

b. The minimum provisions for system circulation as given in Table 1 (row b) need to be met; AND

c. The minimum provisions for hot water storage and labelling of storage vessels as given in Table 1 (row c) need to be met; AND

d. The minimum provisions for system preparation and water treatment as given in Table 1 (row d) should be met; AND

e. The system should be commissioned in accordance with the minimum provisions given in Table 1 (row e); AND

f. The minimum provisions for boiler interlock, zoning and time control and temperature control of the heating and hot water circuits as described in Table 2 should be met. An acceptable alternative to these is any boiler management system that delivers the specified zoning, timing and temperature and boiler interlock control provisions. When gas boilers are installed as part of a ***replacement system***, the minimum level of system controls should be provided, as described in Table 2, unless they are already installed and fully operational. If an individual component of the control system is being replaced in an existing system, for example a room thermostat, it is not necessary to upgrade the system to meet the minimum requirements; AND

g. Pipework should be insulated as described in Table 3.

Table 1 Minimum provisions for boiler efficiency, system circulation, hot water storage, system preparation and commissioning of gas-fired central heating

	Minimum provision for *new systems* in new and existing dwellings	Minimum provision for *replacement systems* in existing dwellings	Supplementary information
a. Minimum acceptable efficiency	a. The boiler efficiency should be not less than 86% (SEDBUK value); OR b. In existing dwellings, in the exceptional circumstances defined in Appendix A of this document, the boiler efficiency (SEDBUK value) should be not less than 78% if natural gas-fired, or not less than 80% if LPG-fired; OR c. The boiler efficiency for heating boilers that are combined with range cookers should be as defined in Section 2.3, *'Gas-fired range cookers with central heating boilers for space heating and hot water'*.	**Replacements not involving a fuel or energy switch** The seasonal efficiency of the new equipment should be: • as defined for ***new systems***; AND • not worse than two percentage points lower than the seasonal efficiency of the controlled service being replaced. If the efficiency of the system or appliance to be replaced is not known, efficiency values may be taken from Table 4a or 4b of SAP 2005. **Replacement involving fuel or energy switch** If the new heating system or heat generating appliance uses a different fuel, the efficiency of the new service should be multiplied by the ratio of the CO_2 emission factor of the fuel used in the service being replaced to that used in the new service before making this check. The CO_2 emission factors should be taken from Table 12 of SAP 2005 (the column headed 'Emissions kg CO_2 per kWh').	***Guidance on identifying the SEDBUK efficiency for an appliance*** *The Boiler Efficiency Database is available online (www.boilers.org.uk) and includes regularly updated information on most available boilers as well as many which are no longer in production. Manufacturers' literature provides SEDBUK values in an agreed form of words to avoid confusion with other efficiency values. Manufacturers will also supply SEDBUK values for their products on request.* ***Appendix A** gives the approved procedure for establishing where exceptional circumstances exist, as set out in the Guide to the Condensing Boiler Installation Assessment Procedure for Dwellings.*
b. System circulation	a. Systems for space heating and domestic hot water primary circuits should have fully pumped circulation. b. If the boiler manufacturer's instructions advise installation of a bypass, an automatic bypass valve should be provided in conjunction with any requirements for a minimum pipe length specified in the manufacturer's instructions.	As defined for ***new systems***. When boilers are replaced, existing systems with semi-gravity circulation should be converted to fully pumped circulation.	

Table 1 *(continued)*

	Minimum provision for *new systems* in new and existing dwellings	Minimum provision for *replacement systems* in existing dwellings	Supplementary information
c. Hot water storage	a. Vented copper hot water storage vessels should comply with the heat loss and heat exchanger requirements of BS 1566:2002. b. Unvented hot water storage system products should: i. comply with BS EN 12897; OR ii. be certified by the British Board of Agrément, the Water Research Council; OR iii. be certified by another accredited body as complying with the Building Regulations. c. Primary storage systems should meet the insulation requirements of sections 4.3.1 or 4.3.2 of the Water Heater Manufacturers' Association performance specifications for thermal stores. d. Combination cylinders should comply with BS 3198 and in addition have a heat loss not exceeding $1.6 \times [0.2 + 0.51V^{2/3}]$ kWh/day where V is the volume of the hot water part of the cylinder. e. All hot water storage vessels should carry a label with the following information: • type of vessel • nominal capacity in litres • standing heat loss in kWh/day • heat exchanger performance in kW • vented copper hot water cylinders should carry clear labelling on the product such as a BSI Kitemark, registered firm status or reference to an equivalent quality control scheme • vented cylinders that are not of copper construction should be labelled as complying with the heat loss and heat exchanger requirements of BS 1566.	As defined for ***new systems***.	***Insulation of primary stores*** *Due to the higher than normal storage temperatures in primary stores it is very important that these are well insulated.* ***Water Heater Manufacturers' Association Performance Specification for Thermal Stores.*** *www.waterheating.fsnet.co.uk/wma.htm* ***British Standards*** ***BS 1566:2002*** *Copper indirect cylinders for domestic purposes. Open vented copper cylinders. Requirements and test methods.* ***BS EN 12897*** *Water supply. Specification for indirectly heated unvented (closed) storage water heaters.*
d. System preparation and water treatment	a. Central heating systems should be thoroughly cleaned and flushed out before installing a new boiler. b. During final filling of the system, a chemical water treatment formulation should be added to the primary circuit to control corrosion and the formation of scale and sludge. Reasonable provision would be to follow the guidance on how to prepare and commission systems given in BS 7593. c. Installers should also refer to the boiler manufacturer's installation instructions for appropriate treatment products and special requirements for individual boiler models. d. Where the mains total water hardness exceeds 200 parts per million, provision should be made to treat the feed water to water heaters and the hot water circuit of combination boilers to reduce the rate of accumulation of limescale.	As defined for ***new systems***.	***British Standards*** ***BS 7593:2006*** *Code of practice for treatment of water in domestic hot water central heating systems.* *Note should also be made of the manufacturer's instructions for advice on appropriate action.*

Table 1 *(continued)*

	Minimum provision for *new systems* in new and existing dwellings	Minimum provision for *replacement systems* in existing dwellings	Supplementary information
e. Commissioning	a. On completion of the installation of a boiler or a hot water storage system, together with associated equipment such as pipework, pumps and controls, the equipment should be commissioned in accordance with the manufacturer's instructions. These instructions will be specific to the particular boiler and/or hot water storage system. b. The installer should give a full explanation of the system and its operation to the user, including the manufacturer's user manual where provided. c. Once the installation of a gas-fired boiler is complete, the CORGI installer should notify CORGI, who will send a Building Regulations Compliance Certificate to the builder, or householder in the case of work in an existing dwelling, and notify building control on their behalf. d. If not registered with a 'Competent Person' scheme for the purposes of self-certifying compliance with the Building Regulations, the installer or the person commissioning the work should notify building control prior to the commencement of the work.	As defined for ***new systems***.	***The Benchmark System*** • *The Benchmark Commissioning Checklist can be used to show that commissioning has been carried out satisfactorily. Benchmark licence-holders provide a checklist with the appliance for completion by the persons commissioning the system so that they can record that all the checks have been made and the results show efficient operation of the equipment in compliance with Part L. The Benchmark checklist should be provided to the builder, or the householder in the case of work in existing dwellings, an appointed agent or the end user.* • *A Benchmark Commissioning Checklist will be included in all HHIC gas boiler manufacturer members' installation manuals to help installers record information about the installation in order to assist with servicing and repairs. For example, details of system cleaners and inhibitors can be recorded.* • *Only manufacturing companies who hold a Benchmark licence will be eligible to use the Benchmark logo and the approved log book wording and layout. (Benchmark is registered as a European Collective Mark by the Heating and Hotwater Information Council Ltd, and the content is copyright.)*

Table 2 Minimum provisions for control of gas-fired central heating systems*

System control	Minimum provision for *new systems*	Minimum provision for *replacement systems*
Boiler interlock	• Boiler-based systems should have boiler control interlock in which controls are wired so that when there is no demand for either space heating or hot water, the boiler and pump are switched off. • The use of thermostatic radiator valves (TRVs) alone does not provide interlock.	As defined for ***new systems***.
Space heating zones	• **Dwellings with a total usable floor area up to 150m^2** should be divided into at least two space heating zones with independent temperature control, one of which is assigned to the living area. • **Dwellings with a total usable floor area greater than 150m^2** should be provided with at least two space heating zones, each having separate timing and temperature controls. • **Single-storey open-plan dwellings in which the living area is greater than 70% of the total floor area** – sub-zoning of temperature control is not appropriate.	As defined for ***new systems***, except where the boiler only is replaced reasonable provision for a space heating system would be to control as one zone.
Water heating zones	• **All dwellings** should have a separate hot water zone in addition to space heating zones. • A separate hot water zone is not required if the hot water is produced instantaneously, such as with a combination boiler.	As defined for ***new systems***.
Time control of space and water heating	Time control of space and water heating should be provided by: i. a full programmer with separate timing to each circuit; OR ii. two or more separate timers providing timing control to each circuit; OR iii. programmable room thermostat(s) to the heating circuit(s), with separate timing of the hot water circuit. **For dwellings with a total usable floor area greater than 150m^2** timing of the separate space heating zones can be achieved by: i. multiple heating zone programmers; OR ii. a single multi-channel programmer; OR iii. programmable room thermostats; OR iv. separate timers to each circuit; OR v. a combination of (iii) and (iv) above. Where the hot water is produced instantaneously, such as with a combination boiler, time control is only required for space heating zones.	As defined for ***new systems*** unless only the hot water cylinder is being replaced and separate time control for the hot water circuit is not present. In this case it is acceptable to have a single timing control for both space heating and hot water.
Temperature control of space heating	Separate temperature control of zones within the dwelling should be provided using: i. Room thermostats or programmable room thermostats in all zones; OR ii. A room thermostat or programmable room thermostat in the main zone, and individual radiator controls such as thermostatic radiator valves (TRVs) on all radiators in the other zones; OR iii. a combination of (i) and (ii) above.	As defined for ***new systems***.
Temperature control of domestic hot water	• Domestic hot water systems should be provided with a cylinder thermostat and a zone valve or three-port valve to control the temperature of stored hot water. • **In dwellings with a total floor area greater than 150m^2** it could be reasonable to provide more than one hot water circuit each having separate timing and temperature controls. This can be achieved by: i. multiple heating zone programmers; OR ii. a single multi-channel programmer; OR iii. separate timers to each circuit. • The use of non-electric hot water controllers does not meet this requirement. Also, in some circumstances, such as thermal stores, a zone valve is not appropriate; a second pump could be substituted for the zone valve.	As defined for new systems for planned replacement of hot water cylinders on all fully pumped installations and on gravity circulation installations. In exceptional circumstances, such as emergency replacement or where the cylinder or installation is of a type that precludes the fitting of electric controls, a thermo-mechanical cylinder thermostat should be installed as a minimum provision.

Supplementary information
More details on control systems can be found in manufacturers' literature and on the The Association of Controls Manufacturers (TACMA) website www.heatingcontrols.org.uk

*An acceptable alternative to these controls is any boiler management control system that meets the specified zoning, timing and temperature and boiler interlock control requirements.

Table 3 Minimum provisions for insulation of pipes serving gas-fired central heating systems

Minimum provision	Supplementary information
In ***new systems*** pipes should be insulated to comply with the maximum permissible heat loss indicated in the Supplementary Information column, and labelled accordingly, as follows: • Primary circulation pipes for heating and hot water circuits should be insulated wherever they pass outside the heated living space or through voids which communicate with and are ventilated from unheated spaces. • Primary circulation pipes for domestic hot water circuits should be insulated throughout their length, subject only to practical constraints imposed by the need to penetrate joists and other structural elements. • All pipes connected to hot water storage vessels, including the vent pipe, should be insulated for at least 1 metre from their points of connection to the cylinder (or they should be insulated up to the point where they become concealed). • If secondary circulation is used, all pipes kept hot by that circulation should be insulated. For ***replacement systems***, whenever a boiler or hot water storage vessel is replaced in an existing system, any pipes that are exposed as part of the work or are otherwise accessible should be insulated as recommended above – or to some lesser standard where practical constraints dictate.	***Insulation for pipework in unheated areas*** *Extra provision may need to be made to protect central heating and hot water pipework in unheated areas against freezing. Further guidance is available in:* • *BS 5422:2001 Method for specifying thermal insulating materials for pipes, tanks, vessels, ductwork and equipment operating within the temperature range of –40°C to +700°C.* • *BRE Report No 262 Thermal insulation: avoiding risks, 2002 Edition.* *Where insulation is labelled as complying with the Domestic Heating Compliance Guide it must not exceed the following heat loss levels:* ***Pipe diameter (OD) mm*** / ***Maximum permissible heat loss* (W/m)*** *8* / *7.06* *10* / *7.23* *12* / *7.35* *15* / *7.89* *22* / *9.12* *28* / *10.07* *35* / *11.08* *42* / *12.19* *54* / *14.12* **In assessing the thickness of insulation required to meet the provision, standardised conditions should be used in all compliance calculations based, in this instance, on a horizontal pipe at 60°C in still air at 15°C.* *Further assistance in converting these heat loss limits to levels (thickness) of insulation for specific thermal conductivities is found in the 'TIMSA HVAC Guidance for Achieving Compliance with Part L of the Building Regulations'.*

2.3 Gas-fired range cookers with integral central heating boiler

This section provides guidance on the specification of gas-fired range cookers with integral central heating boilers for space heating and hot water in dwellings.

In order to comply with the requirements of Part L, gas-fired range cookers with an integral central heating boiler which are provided in new or existing dwellings should meet the following conditions:

a. The appliance should have two independently controlled burners (one for the cooking function and one for the boiler); AND

b. The boiler should have a Seasonal Efficiency (SEDBUK[3]) value in excess of 75%. The manufacturer's declaration of appliance performance and SEDBUK value should include the following words:

[3] SEDBUK efficiency values can be found in the Government's Standard Assessment Procedure for Energy Rating of Dwellings (2005 edition) www.bre.co.uk/sap2005

- Seasonal Efficiency (SEDBUK) = xx %
- Case heat emission value = yy kW
- Heat transfer to water at full load = zz kW
- The values are used in the UK Government's Standard Assessment Procedure (SAP) for the energy rating of dwellings. The test data from which they have been calculated has been certified by {insert name and/or identification of Notified Body}.

AND

c. The minimum provisions for gas-fired central heating systems should be met with respect to the integral central heating boilers as given in Table 1 (rows B–E); AND

d. The minimum provisions for boiler interlock, zoning and time control and temperature control of the heating and hot water circuits should be met with respect to the integral central heating boilers as given in Table 2 for gas-fired central heating systems. An acceptable alternative to these is any boiler management system that delivers the specified zoning, timing and temperature provisions. When gas boilers are installed as a replacement for existing boilers, the minimum level of system controls should be provided, as described in Table 2, unless they are already installed and fully operational. If an individual component of the control system is being replaced in an existing system, for example a room thermostat, it is not necessary to upgrade the system to meet the minimum requirements; AND

e. Pipework should be insulated as described in Table 3.

2.4 Gas-fired warm air heating

This section provides guidance on the specification of gas-fired warm air heating systems for dwellings.

Terminology and applicability of guidance to different scenarios in new and existing dwellings

The guidance in this section applies to the following situations:

a. The specification of gas-fired warm air heating systems in new dwellings – this situation is referred to in this section as a ***new system***.

b. The specification of gas-fired warm air heating systems in existing dwellings where previously space heating was not provided by a warm air system – this situation is also referred to in this section as a ***new system***.

c. The specification of a replacement warm air heating system and/or component in existing dwellings where warm air heating is already installed – this situation is referred to in this section as a ***replacement system***.

In order to comply with the energy efficiency requirements of the Building Regulations, gas-fired warm air heating which is provided as a ***new system*** or ***replacement system*** in new or existing dwellings should meet the following conditions:

a. The system should meet the provisions for efficiency and installation set out in Table 4; AND

b. The system should be zoned and incorporate the timing and temperature controls for space heating and, where relevant, domestic hot water, as set out in Table 5.

Table 4 Minimum provisions for efficiency and installation of gas-fired warm air heating systems

	Minimum provision	Supplementary information
Efficiency	a. Gas-fired warm air units should meet the requirements, as appropriate to the design of the appliance, of: • BS EN 778: 1998; OR • BS EN 1319: 1999. b. If a gas-fired circulator is incorporated in the warm air unit to provide domestic hot water, it should be able to deliver full and part load efficiency at least equal to that prescribed by BS EN 483. c. The manufacturer's declaration of appliance performance should include the following words: ***Combined warm air unit and circulator*** *This product has been assessed against the test methods set out in BS EN 778:1998* or BS EN 1319:1999* {*deleted as appropriate} and BS EN 483*, and certified as meeting those minimum requirements by {insert name and/or identification of Notified Body}.* ***Warm air unit alone*** *This product has been assessed against the test method set out in BS EN 778:1998* or BS EN 1319:1999* {*deleted as appropriate} and certified as meeting the minimum requirements by {insert name and/or identification of Notified Body}.*	***British standards*** *BS EN 778:1998 Domestic gas-fired forced convection air heaters for space heating not exceeding a net heat input of 70 kW, without a fan to assist transportation of combustion air and/or combustion products.* *BS EN 1319:1999 Domestic gas-fired forced convection air heaters for space heating, with fan-assisted burners not exceeding a net heat input of 70 kW.* *BS EN 483:2000 Gas-fired central heating boilers. Type C boilers of nominal heat input not exceeding 70kW.*
Installation	a. The system should be installed in accordance with BS 5864:2004. b. Ductwork that is newly installed or replaced should be insulated in accordance with the recommendations of BS 5422:2001.	*BS 5864:2004 Installation and maintenance of gas-fired ducted air heaters of rated input not exceeding 70 kW net (second and third family gases). Specification.* *BS 5422:2001 Method for specifying thermal insulating materials for pipes, tanks, vessels, ductwork and equipment operating within the temperature range of –40°C to +700°C*

Table 5 Minimum provisions for system controls for gas-fired warm air heating

System	Minimum provision	
Warm air systems without water heating	**i. Time and temperature control**	Time and temperature control should be provided by either: i. Controls external to heater: time switch/programmer and room thermostat, or programmable room thermostat; OR ii. Controls integrated in the heater – time-switch/programmer and room temperature sensor linked to heater firing and fan speed control.
	ii. Zoning	• **New dwellings with a total usable floor area up to 150m^2** should be divided into at least two space heating zones with independent timing controls, one of which is assigned to the living area. • **New dwellings with a total usable floor area greater than 150m^2** should be provided with at least two space heating zones, each having separate timing and temperature controls. Timing of the separate space heating zones can be achieved by: i. multiple heating zone programmers; OR ii. a single multi-channel programmer; OR iii. programmable room thermostats; OR iv. separate timers to each circuit; OR v. a combination of (iii) and (iv) above. The provisions for zoning for ***replacement systems*** in existing dwellings should be as for new dwellings where practical.
Combined warm air and domestic hot water systems for installations	**iii. Independent time control of both the heating and hot water circuits**	
	iv. Pumped primary circulation to the hot water cylinder	
	v. Independent control of hot water production	a. For ***new systems:*** Independent control of the hot water circuit should be achieved by means of a cylinder thermostat and a timing device, wired such that when there is no demand for hot water both the pump and the circulator are switched off. b. For ***replacement systems:*** Independent control of the hot water circuit should be achieved, where practicable, for circulator water heaters of less than 6kW output by means of a cylinder thermostat and a timing device, wired such that when there is no demand for hot water both the pump and the circulator are switched off.
	vi. Time control	Time control should be provided by use of either: • A full programmer with separate timing to each circuit; OR • Two or more separate timers providing timing control to each circuit; OR • Programmable room thermostat(s) to the heating circuit(s), with separate timing of the hot water; OR • A time switch/programmer (two-channel) and room thermostat.
	vii. Space heating zoning	• **New dwellings with a total usable floor area up to 150m^2** should be divided into at least two space heating zones with independent timing controls, one of which is assigned to the living area. • **New dwellings with a total usable floor area greater than 150m^2** should be provided with at least two space heating zones, each having separate timing and temperature controls. The provisions for zoning for ***replacement systems*** in existing dwellings should be as for new dwellings where practical.

2.5 Gas-fired fixed independent space heating appliances

This section provides guidance on the specification of gas-fired fixed independent space heating appliances for dwellings.

Fixed independent space heating appliances may be installed as a means of primary or secondary space heating.

Gas-fired fixed independent appliances for primary space heating

In order to comply with the Building Regulations energy efficiency requirements, gas-fired fixed independent space heating appliances in new and existing dwellings which are provided as the primary heat source should meet the following conditions:

a. The appliance should be one of the types described in Table 6; AND

b. The efficiency of the appliance (gross calorific value) should be no less than 58%. The appliance manufacturer's declaration of appliance performance shall include the following words:

The efficiency of this appliance has been measured as specified in {insert appropriate entry from Table 6} and the result is [x]%. The gross calorific value of the fuel has been used for this efficiency calculation. The test data from which it has been calculated has been certified by {insert name and/or identification of Notified Body}. The efficiency value may be used in the UK Government's Standard Assessment Procedure (SAP) for energy rating of dwellings.

AND

c. In new dwellings, each appliance should be capable, either independently or in conjunction with room thermostats or other suitable temperature sensing devices, of controlling the temperatures independently in areas that have different heating needs (e.g. separate sleeping and living areas). In existing dwellings, wherever practical, temperature controls should be upgraded to the standards required for new dwellings.

Table 6 Acceptable appliance types for fixed natural gas and LPG gas-fired space heaters for use as a primary heat source

British Standard designation (appliance type)
BS EN 1266:2002 Independent gas-fired convection heaters incorporating a fan to assist transportation of combustion air and/or flue gases.
BS 7977-1:2002 Specification for safety and rational use of energy of domestic gas appliances. Radiant/convectors.
BS EN 613:2001 Independent gas-fired convection heaters.
BS EN 13278:2003 Open fronted gas-fired independent space heaters.

Gas-fired fixed independent appliances for secondary space heating

In order to comply with the requirements of Part L, gas-fired fixed independent space heating appliances which are provided as the secondary heat source in new or existing dwellings should meet the following conditions:

a. The appliance should be one of the types described in Table 7; AND

b. The efficiency (gross calorific value) of the appliance should be no less than the value in Table 7 for that type of appliance. The appliance manufacturer's declaration of appliance performance shall include the following words:

The efficiency of this appliance has been measured as specified in {insert appropriate entry from Table 7} and the result is [x]%. The gross calorific value of the fuel has been used for this efficiency calculation. The test data from which it has been calculated has been certified by {insert name and/or identification of Notified Body}. The efficiency value may be used in the UK Government's Standard Assessment Procedure (SAP) for energy rating of dwellings.

Table 7 Acceptable appliance types and minimum appliance efficiencies for independent fixed natural gas and LPG gas-fired space heaters used as a secondary heat source

British Standard designation (appliance type)	Minimum efficiency % (gross calorific value)	
	Gas	LPG
BS EN 1266:2002 Independent gas-fired convection heaters incorporating a fan to assist transportation of combustion air and/or flue gases.	72	73
(All types except inset live fuel effect) BS 7977-1:2002 Specification for safety and rational use of energy of domestic gas appliances. Radiant/convectors.	63	64
BS EN 613:2001 Independent gas-fired convection heaters.	58	60
BS EN 13278:2003 Open fronted gas-fired independent space heaters.	45	46
(Inset live fuel-effect) BS 7977-1:2002 Specification for safety and rational use of energy of domestic gas appliances. Radiant/convectors.	40	41
(Flue-less) prEN 14829[4]:2003 (Draft) Independent gas-fired flueless space heaters for nominal heat input not exceeding 6 kW.	Thermal efficiency requirements for this type of appliance are not specified as all the heat produced by the combustion process is released into the space to be heated. In SAP 2005 the efficiency of these appliances is classed as 90% and an adjustment is made for ventilation in the space heating requirement calculation.	
(Flue-less) BS EN 449:2002 Specification for dedicated liquefied petroleum gas appliances. Domestic flueless space heaters (including diffusive catalytic combustion heaters).		

2.6 Gas-fired fixed decorative fuel-effect fires

This type of appliance is intended for decorative purposes and therefore a minimum thermal efficiency is not specified. Note that for the purposes of SAP 2005 the efficiency of decorative fuel-effect fires is classed as 20% for use in the space heating requirement calculation. See Table 4a of SAP 2005.

In order to comply with the requirements of Part L, gas-fired decorative fires in new and existing dwellings should meet the following conditions:

a. The appliance should meet the product standards specified in BS EN 509:2000 Decorative fuel-effect gas appliances; AND

b. No more than one appliance should be installed per 100m^2 of dwelling floor area.

2.7 Gas fire for secondary space heating provided as part of a combined fire and back boiler unit

A combined fire and back boiler unit can only be installed as a replacement for an existing combined fire and back boiler unit, and then only when the criteria of the Condensing Boiler Installation Assessment Procedure are satisfied as outlined in Appendix A of this document. In order to comply with the requirements of the Building Regulations, the gas fire provided as a secondary heat source as part of a combined fire and back boiler unit, when provided as a replacement system in existing dwellings, should meet the following conditions:

[4] At the time of writing prEN 14829 is in draft but it may not appear as a European standard. The type of appliance for which this standard is proposed is on the market having been certified as complying with the essential requirements of the Gas Appliance Directive. The BSI is producing a parallel UK safety installation standard for appliances designed to comply with prEN 14829.

a. The appliance should be one of the types described in Table 8; the appliance manufacturer's declaration of appliance performance shall include the following words:

The efficiency of this appliance has been measured as specified in {insert appropriate entry from Table 8} and the result is [x]%. The gross calorific value of the fuel has been used for this efficiency calculation. The test data from which it has been calculated has been certified by {insert name and/or identification of Notified Body}. The efficiency value may be used in the UK Government's Standard Assessment Procedure (SAP) for energy rating of dwellings.

AND

b. The efficiency (gross calorific value) of the appliance should be no less than the value in Table 8 for that type of appliance.

Table 8 Minimum appliance efficiencies for gas fires used with back boilers

British Standard designation (appliance type)	Minimum efficiency % (Gross Calorific Value)	
	Natural gas	LPG
(Inset live fuel-effect) BS 7977-2:2003 Specification for safety and rational use of energy of domestic gas appliances. Combined appliances. Gas fire/back boiler	40	41
(All types except inset live fuel-effect) BS 7977-2:2003 Specification for safety and rational use of energy of domestic gas appliances. Combined appliances. Gas fire/back boiler	63	64

Supplementary information – further guidance on gas-fired heating

Further guidance on gas-fired heating systems is available in the following publications:

Energy Efficiency Best Practice in Housing publications
- *CE30 Domestic heating by gas boiler systems*
- *CE51 Central heating system specifications (CHeSS)*
- *CE54 Whole house boiler sizing method for houses and flats*

SBGI publications on gas boilers and gas fires under development at the time of writing. See www.sbgi.org.uk for updates.

CORGI publications
- *Essential Gas Safety (GID1)*
- *Gas Cookers and Ranges (GID2)*
- *Gas Fires and Space Heaters (GID3)*
- *Water Heaters (GID5)*
- *Central Heating – Wet and Dry (GID7)*
- *Wet Central Heating System Design Guide (WCH1)*
- *Warm Air Heating System Design Guide (WAH1)*

Requirements relating to various aspects of the installation of condensing boilers are given in British Standards, BS 5440 Parts 1 and 2, BS 5449 and BS 6798.

Section 3: Oil-fired space heating and hot water systems

This section provides guidance on the specification of oil-fired space heating and hot water systems in dwellings to meet the Building Regulations energy efficiency requirements.

All oil appliances must be installed by a competent person and the installation should follow the manufacturer's instructions and comply with all other relevant parts of the Building Regulations and, for wet systems, the Water Regulations.

3.1 Scope of guidance

The guidance in this section applies to systems fuelled by oil. The following types of oil-fired heating systems are addressed:

- Wet central heating systems
- Range cookers with integral central heating boilers
- Vaporising appliances providing secondary heating or hot water
- Fixed independent space heating devices

Where appropriate, it may be necessary to refer to the sections in this guide covering community heating, under-floor heating, heat pumps, solar water heating and micro-CHP.

3.2 Oil-fired wet central heating systems

This section provides guidance on the specification of oil-fired wet central heating systems for dwellings that, if followed, will satisfy the energy efficiency requirements of the Building Regulations.

Terminology and applicability of guidance to different scenarios in new and existing dwellings

The guidance in this section applies to the following situations:

a. The specification of central heating systems in new dwellings – this situation is referred to in this section as a ***new system***.

b. The specification of central heating systems in existing dwellings where previously space heating was not provided by central heating – this situation is also referred to in this section as a ***new system***.

c. The specification of a replacement central heating system and/or component in existing dwellings where central heating is already installed – this situation is referred to in this section as a ***replacement system***.

In situations (a) and (b) above the guidance for compliance of ***new systems*** (in new and existing dwellings) with Part L is the same.

In situation c) above, that is for ***replacement systems*** in existing dwellings, in most cases the guidance for compliance with Part L is as for ***new systems***, unless otherwise stated in the relevant section.

In order to comply with the requirements of Part L, oil-fired central heating systems which are provided as ***new systems*** or ***replacement systems*** in dwellings should meet the following conditions:

a. The boiler should have a minimum efficiency (as defined by its SEDBUK value) as given in Table 9 (row a); AND

b. The minimum provisions for system circulation as given in Table 9 (row b) need to be met; AND

c. The minimum provisions for hot water storage and labelling of storage vessels as given in Table 9 (row c) need to be met; AND

d. The minimum provisions for system preparation and water treatment as given in Table 9 (row d) should be met; AND

e. The system should be commissioned in accordance with the minimum provisions given in Table 9 (row e); AND

f. The minimum provisions for boiler interlock, zoning and time control and temperature control of the heating and hot water circuits as described in Table 10 should be met. An acceptable alternative to these is any boiler management system that delivers the specified zoning, timing and temperature and boiler interlock control provisions. When oil boilers are installed as part of a ***replacement system***, the minimum level of system controls should be provided, as described in Table 10 unless they are already installed and fully operational. If an individual component of the control system is being replaced in an existing system, for example a room thermostat, it is not necessary to upgrade the system to meet the minimum requirements; AND

g. Pipework should be insulated as described in Table 11.

Table 9 Minimum provisions for boiler efficiency, system circulation, hot water storage, system preparation and commissioning of oil-fired central heating systems in new dwellings (and in existing dwellings where appropriate)

	Minimum provision for *new systems* in new and existing dwellings	Minimum provision for *replacement systems* in existing dwellings	Supplementary information
a. Minimum acceptable efficiency	**1. For boilers installed before 1 April 2007:** a. The boiler efficiency should be not less than 85% (SEDBUK value); OR b. In existing dwellings, compliance with the requirements for boiler efficiency can be demonstrated by following the guidance in Appendix A of this document. **2. For boilers installed on or after 1 April 2007:** a. The boiler should be a condensing type; AND b. The boiler efficiency should be not less than 86% (as expressed by its SEDBUK value). c. In existing dwellings, compliance with the requirements for boiler efficiency can be demonstrated by following the guidance in Appendix A of this document. (Note that for oil-fired appliances the qualifying period can be five years from the original installation date, not three as indicated in Box X of Table L1.) **3. For combination boilers** See 2 above. **4. For range cooker boilers** The boiler efficiency for heating boilers that are combined with range cookers should be as defined in Section 3.3 of this guide, 'Oil-fired cookers with integral central heating boilers'.	**Replacements not involving a fuel or energy switch** The seasonal efficiency of the new equipment should be: • as defined for new systems; AND • not worse than two percentage points lower than the seasonal efficiency of the controlled service being replaced. If the efficiency of the system or appliance to be replaced is not known, efficiency values may be taken from Table 4a or 4b of SAP 2005. **Replacement involving fuel or energy switch** If the new heating system or heat generating appliance uses a different fuel, the efficiency of the new service should be multiplied by the ratio of the CO_2 emission factor of the fuel used in the service being replaced to that used in the new service before making this check. The CO_2 emission factors should be taken from Table 12 of SAP 2005, column 'Emissions kg CO_2 per kWh').	***Guidance on identifying the SEDBUK efficiency for an appliance*** *The Boiler Efficiency Database is available online (www.boilers.org.uk) and includes regularly updated information on most available boilers, as well as many which are no longer in production. Manufacturers' literature provides SEDBUK values in an agreed form of words to avoid confusion with other efficiency values.* *Manufacturers will also supply SEDBUK values for their products on request.* *Appendix A gives the approved procedure for establishing where exceptional circumstances exist, as set out in the Guide to the Condensing Boiler Installation Assessment Procedure for Dwellings. The OFTEC exceptions form CD30 can also be used for this purpose.*
b. System circulation	a. Systems for space heating and domestic hot water primary circuits should have fully pumped circulation. b. If the boiler manufacturer's instructions advise installation of a bypass, an automatic bypass valve should be provided in conjunction with any requirements for a minimum pipe length specified in the manufacturer's instructions.	As defined for new systems. When boilers are replaced, existing systems with semi-gravity circulation should be converted to fully pumped circulation.	

Table 9 *(continued)*

	Minimum provision for *new systems* in new and existing dwellings	Minimum provision for *replacement systems* in existing dwellings	Supplementary information
c. Hot water storage	a. Vented copper hot water storage vessels should comply with the heat loss and heat exchanger requirements of BS 1566:2002. b. Unvented hot water storage system products should: i. comply with BS EN 12897; OR ii. be certified by the British Board of Agrément, the Water Research Council; OR iii. be certified by another accredited body as complying with Building Regulations. c. Primary storage systems should meet the insulation requirements of sections 4.3.1 or 4.3.2 of the Water Heater Manufacturers' Association performance specifications for thermal stores. d. Combination cylinders should comply with BS 3198 and in addition have a heat loss not exceeding $1.6 \times [0.2 + 0.51V^{2/3}]$ kWh/day where V is the volume of the hot water part of the cylinder. e. All hot water storage vessels should carry a label with the following information: • type of vessel • nominal capacity in litres • standing heat loss in kWh/day • heat exchanger performance in kW f. Vented copper hot water cylinders should carry clear labelling on the product such as a BSI Kitemark, registered firm status or reference to an equivalent quality control scheme g. Vented cylinders which are not of copper construction should be labelled as complying with the heat loss and heat exchanger requirements of BS 1566.	As defined for ***new systems***.	***Insulation of primary stores*** *Because of the higher than normal storage temperatures in primary stores it is very important that these are well insulated.* ***Waterheater Manufacturers' Association*** *Performance Specification for Thermal Stores. www.waterheating.fsnet.co.uk/wma.htm* ***British Standards*** *BS 1566:2002 Copper indirect cylinders for domestic purposes. Open vented copper cylinders. Requirements and test methods.* *BS EN 12897 Water supply. Specification for indirectly heated unvented (closed) storage water heaters.*

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Table 9 *(continued)*

	Minimum provision for *new systems* in new and existing dwellings	Minimum provision for *replacement systems* in existing dwellings	Supplementary information
d. System preparation and water treatment	a. Central heating systems should be thoroughly cleaned and flushed out before installing a new boiler. b. During final filling of the system, a chemical water treatment formulation should be added to the primary circuit to control corrosion and the formation of scale and sludge. Reasonable provision would be to follow the guidance on how to prepare and commission systems given in BS 7593. c. Installers should also refer to the boiler manufacturer's installation instructions for appropriate treatment products and special requirements for individual boiler models. d. Where the mains total water hardness exceeds 200 parts per million, provision should be made to treat the feed water to water heaters and the hot water circuit of combination boilers to reduce the rate of accumulation of limescale.	As defined for ***new systems***.	***British Standards*** *BS 7593:2006 Code of practice for treatment of water in domestic hot water central heating systems.* *Note should be made of the manufacturer's instructions for advice on appropriate action.*
e. Commissioning	a. On completion of the installation of a boiler or a hot water storage system, together with associated equipment such as pipework, pumps and controls, the equipment should be commissioned in accordance with the manufacturer's instructions. These instructions will be specific to the particular boiler and/or hot water storage system. b. The installer should give a full explanation of the system and its operation to the user, including the manufacturer's user manual where provided. c. If not registered with a 'Competent Person' scheme for the purposes of self-certifying compliance with Part L1 of the Building Regulations, the installer, or the person commissioning the work, should notify building control prior to the commencement of the work.	As defined for ***new systems***.	*Site commissioning of oil-fired appliances should always be carried out as it is critical for efficient operation. OFTEC-registered commissioning engineers should use form CD11, leaving a copy on site for the householder. OFTEC registered installers should use form CD10 to signify that the installation is compliant with Building Regulations.*

Table 10 Minimum provisions for system controls for oil-fired central heating systems in new dwellings*

System control	Minimum provision for *new systems*	Minimum provision for *replacement systems*
Boiler interlock	• Boiler-based systems should have boiler control interlock in which controls are wired so that when there is no demand for either space heating or hot water, the boiler and pump are switched off. • The use of thermostatic radiator valves (TRVs) alone does not provide interlock.	As defined for ***new systems.***
Space heating zones	• **Dwellings with a total usable floor area up to 150m^2** should be divided into at least two space heating zones with independent temperature control, one of which is assigned to the living area. • **Dwellings with a total usable floor area greater than 150m^2** should be provided with at least two space heating zones, each having separate timing and temperature controls. • **Single-storey open-plan dwellings in which the living area is greater than 70% of the total floor area** – sub-zoning of temperature control is not appropriate.	As defined for ***new systems***, except where the boiler only is replaced reasonable provision for a space heating system would be to control as one zone.
Water heating zones	• **All dwellings** should have a separate hot water zone in addition to space heating zones. • A separate hot water zone is not required if the hot water is produced instantaneously, such as with a combination boiler.	As defined for ***new systems.***
Time control of space and water heating	Time control of space and water heating should be provided by: i. a full programmer with separate timing to each circuit; ii. two or more separate timers providing timing control to each circuit; or iii. programmable room thermostat(s) to the heating circuit(s), with separate timing of the hot water circuit. **For dwellings with a total usable floor area greater than 150m^2** timing of the separate space heating zones can be achieved by: i. multiple heating zone programmers; OR ii. a single multi-channel programmer; OR iii. programmable room thermostats; OR iv. separate timers to each circuit; OR v. a combination of (iii) and (iv) above. Where the hot water is produced instantaneously, such as with a combination boiler, time control is only required for space heating zones.	As defined for ***new systems*** unless only the hot water cylinder is being replaced and separate time control for the hot water circuit is not present. In this case, it is acceptable to have a single timing control for both space heating and hot water.
Temperature control of space heating	Separate temperature control of zones within the dwelling should be provided using: i. room thermostats or programmable room thermostats in all zones; OR ii. a room thermostat or programmable room thermostat in the main zone, and individual radiator controls such as thermostatic radiator valves (TRVs) on all radiators in the other zones; OR iii. a combination of (i) and (ii) above.	As defined for ***new systems.***
Temperature control of domestic hot water	• Domestic hot water systems should be provided with a cylinder thermostat and a zone valve or three-port valve to control the temperature of stored hot water. • **In dwellings with a total floor area greater than 150m^2** it could be reasonable to provide more than one hot water circuit each having separate timing and temperature controls. This can be achieved by: i. multiple heating zone programmers; OR ii. a single multi-channel programmer; OR iii. separate timers to each circuit. • The use of non-electric hot water controllers does not meet this requirement. Also, in some circumstances, such as thermal stores, a zone valve is not appropriate; a second pump could be substituted for the zone valve.	As defined for new systems for planned replacement of hot water cylinders on all fully pumped installations and on gravity circulation installations. In exceptional circumstances, such as emergency replacement or where the cylinder or installation is of a type that precludes the fitting of electric controls, a thermo-mechanical cylinder thermostat should be installed as a minimum provision.

Supplementary information
More details on control systems can be found in manufacturers' literature and on The Association of Controls Manufacturers (TACMA) website www.heatingcontrols.org.uk

* Note: an acceptable alternative to these controls is any boiler management control system that meets the specified zoning, timing and temperature and boiler interlock requirements.

Table 11 Minimum provisions for insulation of pipes serving oil-fired central heating systems

Minimum provision	Supplementary information
In ***new systems*** pipes should be insulated to comply with the maximum permissible heat loss indicated in the Supplementary Information column, and labelled accordingly, as follows: • Primary circulation pipes for heating and hot water circuits should be insulated wherever they pass outside the heated living space or through voids which communicate with and are ventilated from unheated spaces. • Primary circulation pipes for domestic hot water circuits should be insulated throughout their length, subject only to practical constraints imposed by the need to penetrate joists and other structural elements. • All pipes connected to hot water storage vessels, including the vent pipe, should be insulated for at least 1 metre from their points of connection to the cylinder (or they should be insulated up to the point where they become concealed). • If secondary circulation is used, all pipes kept hot by that circulation should be insulated. For ***replacement systems***, whenever a boiler or hot water storage vessel is replaced in an existing system, any pipes that are exposed as part of the work or are otherwise accessible should be insulated as recommended above – or to some lesser standard where practical constraints dictate.	***Insulation for pipework in unheated areas*** *Extra provision may need to be made to protect central-heating and hot water pipework in unheated areas against freezing. Further guidance is available in:* • *BS 5422:2001 Method for specifying thermal insulating materials for pipes, tanks, vessels, ductwork and equipment operating within the temperature range of –40°C to +700°C.* • *BRE Report No 262 Thermal insulation: avoiding risks, 2002 Edition.* *Where insulation is labelled as complying with the Domestic Heating Compliance Guide it must not exceed the following heat loss levels:* ***Pipe diameter (OD) mm*** / ***Maximum permissible heat loss* (W/m)*** *8* / *7.06* *10* / *7.23* *12* / *7.35* *15* / *7.89* *22* / *9.12* *28* / *10.07* *35* / *11.08* *42* / *12.19* *54* / *14.12* **In assessing the thickness of insulation required to meet the provision, standardised conditions should be used in all compliance calculations based in this instance on a horizontal pipe at 60°C in still air at 15°C.* *Further assistance in converting these heat loss limits to levels (thickness) of insulation for specific thermal conductivities is found in the 'TIMSA HVAC Guidance for Achieving Compliance with Part L of the Building Regulations'.*

3.3 Oil-fired range cookers with integral central heating boilers

This section provides guidance on the specification of oil-fired range cookers with integral central heating boilers for space heating and hot water in dwellings.

Note that the guidance applies only to twin-burner cooker boilers which should not be confused with the type of range cooker described as a single-burner 'dry heat' range cooker. The latter is intended only to provide a cooking function, is not included in SAP 2005 calculations, and does not come within the scope of the Building Regulations energy efficiency requirements.

In order to comply with the Building Regulations energy efficiency requirements, oil-fired range cookers with an integral central heating boiler which are provided in new or existing dwellings should meet the following conditions:

a. The appliance should have two independently controlled burners (one for the cooking function and one for the boiler); AND

b. The boiler should have a Seasonal Efficiency (SEDBUK[5]) value in excess of 75%. The appliance manufacturer's declaration of appliance performance shall include the following words:

- Seasonal efficiency (SEDBUK) = xx%
- Case heat emission value = yy KW
- Heat transfer to water at full load = zzkW
- The efficiency values may be used in the UK Government's Standard Assessment Procedure (SAP) for energy rating of dwellings. The test data from which they have been calculated has been certified by {insert name and/or identification of Notified Body}. See www.rangeefficiency.org.uk

AND

c. The minimum provisions for oil-fired central heating systems should be met with respect to the integral central heating boilers as given in Table 9 (rows b–e); AND

d. The minimum provisions for boiler interlock, zoning and time control and temperature control of the heating and hot water circuits should be met with respect to the integral central heating boilers as given in Table 10 for oil-fired central heating systems. An acceptable alternative to these is any boiler management system that delivers the specified zoning, timing and temperature provisions. When oil boilers are installed as a replacement for existing boilers, the minimum level of system controls should be provided, as described in Table 10, unless they are already installed and fully operational. If an individual component of the control system is being replaced in an existing system, for example a room thermostat, it is not necessary to upgrade the system to meet the minimum requirements; AND

e. Pipework should be insulated as described in Table 11.

3.4 Continually burning oil-fired vaporising appliances providing secondary heating or hot water

This section provides guidance on the specification of oil-fired vaporising appliances providing heating or hot water for dwellings that, if followed, will satisfy the Building Regulations energy efficiency requirements.

The guidance does not apply to appliances that have been converted from another fuel (for example from solid fuel to oil).

In order to comply with the Building Regulations energy efficiency requirements, oil-fired vaporising appliances in new and existing dwellings should be provided with the minimum controls given in Table 11a:

Table 11a: Minimum provision of controls for continually burning oil-fired vaporising appliances

Appliance type	Minimum provision	Supplementary information
Manually operated appliance, e.g. room heater	The integral manual controls as provided by appliance manufacturer	*Information about the use of controls should be clearly stated in the manufacturers' literature.*
Electrically operated (modulating) appliance, e.g. room heater	The integral and/or remote thermostatic controls as provided (or specified) by the appliance manufacturer	
Automatic ON/OFF vaporising appliances		
a. Room heater providing (secondary) room space heating	The integral thermostatic controls as provided by the appliance manufacturer	
b. Room heater providing domestic hot water and (secondary) room space heating	The integral and/or remote thermostatic controls as provided (or specified) by the appliance manufacturer	

[5] SEDBUK efficiency values can be found in the Government's Standard Assessment Procedure for Energy Rating of Dwellings (2005 edition) www.bre.co.uk/sap2005

3.5 Oil-fired fixed independent space heating appliances

This section provides guidance on the specification of oil-fired fixed independent space heating appliances for dwellings.

Fixed independent space heating appliances may be installed as a means of primary or secondary space heating.

Oil-fired fixed independent appliances for primary heating

In order to comply with Part L, oil-fired fixed independent space heating appliances in new dwellings which are provided as the primary heat source should meet the following conditions:

a. The efficiency of the appliance (gross calorific value) should be not less than 60%. The appliance manufacturer's declaration of appliance performance shall include the following words:

The net efficiency of this appliance has been measured and the result is [x]%. The test data from which it has been calculated has been certified by {insert name and/or identification of Notified Body}. The efficiency value when converted to gross by use of the appropriate conversion factor from Table E3 in SAP 2005 may be used in the UK Government's Standard Assessment Procedure (SAP) for energy rating of dwellings.

AND

b. Each appliance should be capable, either independently or in conjunction with room thermostats or other suitable temperature sensing devices, of controlling the temperatures independently in areas that have different heating needs (e.g. separate sleeping and living areas).

Oil-fired fixed independent appliances for secondary heating

In order to comply with the Building Regulations energy efficiency requirements, oil-fired fixed independent space heating appliances in new dwellings which are provided as the secondary heat source should have a minimum efficiency (gross calorific value) of not less than 60%.

Supplementary Information

Further guidance on oil-fired heating systems is available in the following publications:

- *Energy Efficiency Best Practice in Housing publications (see www.oftec.org)*
- *CE29 Domestic heating by oil: boiler systems*
- *CE51 Central heating system specifications (CHeSS)*
- *CE54 Whole house boiler sizing method for houses and flats*
- *OFTEC Technical Books 2, 3, 4 and 5 (see www.oftec.org)*
- *BS 5410*

Section 4: Electric heating systems

This section provides guidance on the specification of fixed electric heating systems for dwellings.

4.1 Scope of guidance

The guidance given in this section covers the following types of fixed electric heating systems:

- Electric boilers serving central heating systems
- Electric warm air systems
- Electric panel heaters
- Electric storage systems including integrated storage/direct systems

Portable, plug-in appliances are not covered by the Building Regulations or by this guide. It should be noted that fixed electrical installations in dwellings should comply also with Part P.

Where appropriate, it may also be necessary to refer to the other sections in this guide covering under-floor heating and solar water heating.

4.2 Electric boilers serving central heating systems in new and existing dwellings

This section provides guidance on the specification of electric boilers serving wet central heating systems for dwellings.

Terminology and applicability of guidance to different scenarios in new and existing dwellings

The guidance in this section applies to the following situations:

a. The specification of central heating systems in new dwellings – this situation is referred to in this section as a ***new system***.

b. The specification of central heating systems in existing dwellings where previously space heating was not provided by central heating – this situation is also referred to in this section as a ***new system***.

c. The specification of a replacement central heating system and/or component in existing dwellings where central heating is already installed – this situation is referred to in this section as a ***replacement system***.

In situations (a) and (b) above the guidance for compliance of ***new systems*** (in new and existing dwellings) with Part L is the same.

In situation (c) above, that is for ***replacement systems*** in existing dwellings, in most cases the guidance for compliance with Part L is as for ***new systems***, unless otherwise stated in the relevant section.

In order to comply with the requirements, electric boilers serving central heating which is provided as a ***new system*** or ***replacement system*** in dwellings should meet the following conditions:

a. The minimum provisions for system circulation given in Table 12 (row a) should be met; AND

b. The minimum provisions for system preparation and water treatment given in Table 12 (row b) should be met; AND

c. The system should be commissioned in accordance with the minimum provisions given in Table 12 (row c); AND

d. The minimum provisions for boiler interlock, zoning and time control and temperature control of the heating and hot water circuits as given in Table 12 (row d) should be met. An acceptable alternative is any boiler management control system that meets the specified temperature, timing, zoning (and if applicable, boiler interlock) control provisions. When electric boilers are installed as a replacement for existing boilers, the minimum level of system controls should be installed, as described in Table 12, unless they are already installed and fully operational. If an individual component of the control system is being replaced in an existing system, for example a room thermostat, it is not necessary to upgrade the system to meet the minimum provisions; AND

e. The minimum provisions for hot water storage systems and labelling of storage vessels, as given in Table 13, should be met; AND

f. Pipework should be insulated in accordance with the minimum provisions described in Table 14.

Table 12: Minimum provisions for system circulation, system preparation and commissioning and system controls for electric wet central heating systems*

	Minimum provision for *new systems*	Minimum provision for *replacement systems*	Supplementary information
a. System circulation	a. Systems for space heating and domestic hot water primary circuits in new dwellings should have fully pumped circulation. b. If the boiler manufacturer's instructions advise installation of a bypass, then an automatic bypass valve should be used.	As defined for ***new systems***. When boilers are replaced, existing systems with semi-gravity circulation should be converted to fully pumped circulation.	
b. System preparation and water treatment	a. Central heating systems should be thoroughly cleaned and flushed before installing a new boiler. b. During final filling of the system a chemical water treatment formulation should be added to the primary circuit to control corrosion and the formation of scale and sludge. Reasonable provision would be to follow the guidance on how to prepare and commission systems given in BS 7593:2006. c. Installers should also refer to the boiler manufacturer's installation instructions for appropriate treatment products and special requirements for individual boiler models. d. Where the mains total water hardness exceeds 200 parts per million, provision should be made to treat the feed water to water heaters and the hot water circuit of combination boilers to reduce the rate of accumulation of limescale and the consequent reduction in energy efficiency.	As defined for ***new systems***.	*Note should be made of the manufacturer's instructions for advice on appropriate action.*
c. Commissioning	a. Manufacturer's instructions for commissioning should be followed, and a commissioning record should be completed to show compliance. b. The installer should give a full explanation of the system and its operation to the user, including the manufacturer's user manual where provided.	As defined for ***new systems***.	
d. Controls			*More details on control systems can be found in manufacturers' literature and on the TACMA website www.heatingcontrols.org.uk*
d1. Boiler temperature control	The boiler should be fitted with a flow temperature control and be capable of modulating the power input to the primary water depending on space heating conditions.	As defined for ***new systems***.	
d2. Boiler interlock	If the boiler also supplies DHW, the system should have boiler control interlock in which controls are wired so that when there is no call for heat from either the space heating or hot water circuits (where appropriate) then the boiler and pump are switched off. The use of thermostatic radiator valves (TRVs) alone does not provide interlock.	As defined for ***new systems***.	

Table 12 *(continued)*

d3. Zoning	• **Dwellings with a total usable floor area up to 150m^2** should be divided into at least two space heating zones with independent temperature control, one of which is assigned to the living area. • **Dwellings with a total usable floor area greater than 150m^2** should be provided with at least two space heating zones, each having separate timing and temperature controls. • **Single-storey open-plan dwellings in which the living area is greater than 70% of the total floor area** – sub-zoning of temperature control is not appropriate.	As defined for ***new systems***.	
d4. Temperature control of space heating	Separate temperature control of zones within the building should be provided, using: i. Room thermostats or programmable room thermostats in all zones; OR ii. A room thermostat or programmable room thermostat in the main zone and individual radiator controls such as thermostatic radiator valves (TRVs) on all radiators in the other zones; OR iii. a combination of (i) and (ii) above.	As defined for ***new systems***.	
d5. Time control of space and water heating	Time control of space and water heating should be provided by: i. a full programmer with separate timing to each circuit; OR ii. two or more separate timers providing timing control to each circuit; OR iii. programmable room thermostat(s) to the heating circuit(s), with separate timing of the hot water circuit.	As defined for ***new systems***.	

*An acceptable alternative to this is any boiler management control system that meets the specified zoning, timing and temperature (and, if appropriate, boiler interlock) requirements.

Table 13 Minimum provisions for hot water storage for electric wet central heating systems

	Minimum provision for *new systems* and *replacement systems*	Supplementary information
Vented systems – including cylinders heated primarily by electricity	i. Vented copper hot water storage vessels should comply with BS 1566 or BS 3198. ii. Vented cylinders in materials other than copper should also be labelled as complying with the heat loss requirements of BS 1566. iii. Cylinders heated primarily by electricity should be insulated such that the heat loss does not exceed the value given by the formula $1.28 \times (0.2 + 0.051V^{2/3})$ kWh per 24 hours, where V is the nominal cylinder capacity in litres. This applies to electrically heated combination units as well as other electrically heated cylinders.	***British Standards*** ***BS 1566:2002*** *Copper indirect cylinders for domestic purposes. Open vented copper cylinders. Requirements and test methods*. ***BS 3198:1981*** *Specification for copper hot water storage combination units for domestic purposes*. ***BS EN 12897*** *Water supply. Specification for indirectly heated unvented (closed) storage water heaters*.
Unvented systems – including cylinders heated primarily by electricity	iv. Products should either comply with BS EN 12897; OR be certified by the British Board of Agrément, Water Research Council or other accredited body as complying with Building Regulations. v. Cylinders heated primarily by electricity should be insulated such that their heat loss does not exceed the value given by the formula $1.28 \times (0.2 + 0.051V^{2/3})$ kWh per 24 hours, where V is the nominal cylinder capacity in litres. This applies to electrically heated combination units as well as other electrically heated cylinders.	
Vented and unvented systems	vi. Cylinders should either be factory fitted with, or have provision for, two thermostatically controlled electrical heating elements or immersion heaters. vii. The lower element should be capable of heating up at least 85% of the cylinder contents. viii. The upper element should be capable of heating at least 60 litres of water. ix. The lower element should be connected so as to utilise the 'off-peak' electricity tariff and the upper for boost operation. x. The vessel should be designed such that following reheating to 60°C from the off-peak element, at least 80% of the contents can be drawn off at 45°C or above at a flow rate of 0.25 l/s.	
Primary stores	Primary stores designed for electrical heating should have a standing heat loss at least 15% lower than that specified by the insulation requirements of sections 4.3.1 or 4.3.2 of the Water Heater Manufacturers' Association performance specification for thermal stores. ***Labelling*** *All hot water storage vessels should carry a label with the following information*: • *type of vessel* • *nominal capacity in litres* • *standing heat loss in kWh/day* • *heat exchanger performance in kW*	*Water Heater Manufacturers' Association Performance Specification for Thermal Stores.* *www.waterheating.fsnet.co.uk/wma.htm* ***Insulation of primary stores*** *Due to the higher than normal storage temperatures in primary stores it is very important that these are well insulated.*

Table 14 Minimum provisions for insulation of pipes serving central heating systems with electric boilers

Minimum provision	Supplementary information
In ***new systems*** pipes should be insulated to comply with the maximum permissible heat loss indicated in the Supplementary Information column, and labelled accordingly, as follows: • Primary circulation pipes for heating and hot water circuits should be insulated wherever they pass outside the heated living space or through voids which communicate with and are ventilated from unheated spaces. • Primary circulation pipes for domestic hot water circuits should be insulated throughout their length, subject only to practical constraints imposed by the need to penetrate joists and other structural elements. • All pipes connected to hot water storage vessels, including the vent pipe, should be insulated for at least 1 metre from their points of connection to the cylinder (or they should be insulated up to the point where they become concealed). • If secondary circulation is used, all pipes kept hot by that circulation should be insulated. For ***replacement systems***, whenever a boiler or hot water storage vessel is replaced in an existing system, any pipes that are exposed as part of the work or are otherwise accessible should be insulated as recommended above – or to some lesser standard where practical constraints dictate.	***Insulation for pipework in unheated areas*** *Extra provision may need to be made to protect central-heating and hot water pipework in unheated areas against freezing. Further guidance is available in:* • *BS 5422:2001 Method for specifying thermal insulating materials for pipes, tanks, vessels, ductwork and equipment operating within the temperature range of –40°C to +700°C.* • *BRE Report No 262 Thermal insulation: avoiding risks, 2002 Edition.* *Where insulation is labelled as complying with the Domestic Heating Compliance Guide, it must not exceed the following heat loss levels:*

Pipe diameter (OD) mm	***Maximum permissible heat loss* (W/m)***
8	*7.06*
10	*7.23*
12	*7.35*
15	*7.89*
22	*9.12*
28	*10.07*
35	*11.08*
42	*12.19*
54	*14.12*

**In assessing the thickness of insulation required to meet the provision, standardised conditions should be used in all compliance calculations based, in this instance, on a horizontal pipe at 60°C in still air at 15°C.*

Further assistance in converting these heat loss limits to levels (thickness) of insulation for specific thermal conductivities is found in the 'TIMSA HVAC Guidance for achieving compliance with Part L of the Building Regulations'.

4.3 Electric heating systems (other than central heating using electric boilers)

The guidance given in this section covers the following types of fixed electric heating systems:

- Electric warm air systems
- Electric panel heaters
- Electric storage systems including integrated storage/direct systems

Portable, plug-in appliances are not covered by this guide.

In order to comply with the requirements, fixed electric heating systems (other than electric boilers) in new and existing dwellings should meet the following conditions:

a. Electric warm air systems should meet the minimum requirements for zone control and time and temperature control of the heating system as set out in Table 15 (row a).

b. Panel heaters should meet the minimum requirements for local time and temperature control of the heating system as set out in Table 15 (row b).

c. Storage heaters should meet the minimum requirements for charge control and temperature control of the heating system as set out in Table 15 (row c).

Table 15: Minimum provisions for primary and secondary electric heating systems (other than electric boilers)

Electric Heating System	Minimum provision		Supplementary information
a. Electric warm air systems	1. Time and temperature control, either integral to the heater or external	Provide either: i. A time switch/programmer and room stat; OR ii. a programmable room thermostat.	
	2. Zone control	**Dwellings with a total usable floor area up to 150m^2** should be divided into at least two space heating zones with independent temperature control, one of which is assigned to the living area. **Dwellings with a total usable floor area greater than 150m^2** should be provided with at least two space heating zones, each having separate timing and temperature controls. Time control should be provided using either: i. multiple heating zone programmers; OR ii. a single multi-channel programmer; OR iii. programmable room thermostats; OR iv. separate timers to each circuit; OR v. a combination of (iii) and (iv) above. **Single-storey open-plan dwellings in which the living area is greater than 70% of the total floor area** – sub-zoning of temperature control is not appropriate.	
b. Panel heaters	Local time and temperature control	Time control provided by a programmable time switch integrated into the appliance or a separate time switch. Individual temperature control provided by integral thermostats or by separate room thermostats or programmable room thermostats.	*Panel heater systems provide instantaneous heat.*
c. Storage heaters	1. Charge control	Automatic control of input charge should be provided.	*Charge control is the ability to detect the internal temperature and adjust the charging of the heater accordingly.*
	2. Temperature control	Controls for adjusting the rate of heat release from the appliance should be provided such as adjustable damper or some other thermostatically controlled means.	

Section 5: Solid fuel heating systems

This section provides guidance on the specification of solid fuel heating systems for dwellings.

5.1 Scope of guidance

The guidance given in this section covers the following types of solid fuel heating appliances and systems used to deliver primary and secondary heating:

- Batch-fed open fires
- Batch-fed and automatic-feed dry room-heaters/stoves
- Batch-fed log and multi-fuel appliances
- Automatic-feed pellet stoves
- Batch-fed and automatic-feed room-heaters with boilers
- Batch-fed cookers with boilers not exceeding 7.5kW
- Batch-fed independent boilers and automatic-feed anthracite, wood pellet, wood chip and wood log fired independent boilers
- Central heating systems using certain types of solid fuel appliances.

Where appropriate, it may also be necessary to refer to the sections of this guide on community heating, underfloor heating, solar water heating and micro-CHP.

5.2 Solid fuel appliances for primary heating

In order to comply with the requirements, solid fuel appliances that are provided in new and existing dwellings for primary heating should have a minimum efficiency (gross calorific value) no less than specified in Table 16 for that category of appliance.

Table 16 Solid fuel appliance categories and minimum efficiencies

Category	Appliance description	Minimum efficiency % (gross calorific value)	Feed
B1	Open fire – inset	37	Batch
B2	Open fire – freestanding convector	47	Batch
B3	Open fire – inset convector	45 (mineral fuels) 43 (wood)	
C1/2	Open fire and boiler (inset or freestanding)	50	Batch
D1/2/3	Open fire + high output boiler (trapezium)	63	Batch
D4	Open fire + high output boiler (rectangle)	63	Batch
E1	Dry room heater (often known as dry stove)	65	Batch/automatic
E2	Logs only	65	Batch
E3	Multi-fuel	65	Batch
E4	Pellet stove	65	Auto
F	Room heater with boiler	67	Batch/automatic
G1	Cooker with boiler not exceeding 3.5kW	50 (boiler only)	Batch
G2	Cooker with boiler 3.5 to 7.5kW	60 (boiler only)	Batch
J1/2/3	Independent boiler (batch fed)	65	Batch
J4	Independent boiler – anthracite	70 rising to (above 20.5kW) 75	Auto
J5	Independent boiler – wood logs/pellets/chips	65	Auto

Supplementary information on solid fuel appliances

Minimum efficiencies

The minimum efficiencies for solid fuel appliances are published by the Heating Equipment Testing and Approval Scheme (HETAS) in the Official Guide to Approved Solid Fuel Products and Services and on the website www.HETAS.co.uk. Individual manufacturers' efficiency figures may be higher than those indicated and should be used where independently certified against the harmonised European Standards now in place.

Carbon emission factors

Solid fuels include wood in various forms, different types of coal, and manufactured solid fuels, and consequently there is a range of associated CO_2 emission factors. These factors are as important as appliance efficiency when selecting a boiler. Table 17 shows the CO_2 emission factors for generic types of solid fuel recognised in SAP.

Table 17 CO_2 emission factors for generic types of solid fuel

Solid fuel	***CO_2 emission*** *kg CO_2/kWh*	***Notes***
House coal	*0.291*	*Traditional British coal – burns with smoky flame*
Anthracite	*0.317*	*A mineral fuel with high carbon content – burns very cleanly*
Manufactured smokeless fuel	*0.392*	*Mineral fuel usually made from anthracite*
Wood logs	*0.025*	*Renewable wood logs either purchased or from own land*
Wood pellets in bags	*0.025*	*Mechanically compressed sawdust*
Bulk wood pellets	*0.025*	*As above, delivered in bulk*
Multi-fuel	*0.187*	*A UK 'typical blend' of logs and mineral fuel as burnt by a typical householder on a multi-fuel stove*
Wood chips	*0.025*	*Chipped wood, processed on site*

Some appliances can only burn a single type of fuel while others may be able to burn a range of types. The 'multi-fuel' category in Table 17 allows for the latter group, basing its CO_2 emissions on a typical blend of fuels used in that case.

Smoke Control Areas

Within local authority smoke control areas only anthracite or other authorised smokeless fuels may be used, unless the property is fitted with an exempted appliance.

An exempted appliance is one that has been approved by parliamentary statutory instrument for installation in smoke control areas, and prospective purchasers should check that the appliance and intended fuel are permitted. A list of currently authorised fuels and exempted appliances is given on the website: www.uksmokecontrolareas.co.uk

Outside a smoke control area, house coal or wood can be burnt on non-exempted appliances. Wood should always be seasoned to a moisture content not exceeding 20% to ensure maximum performance and limit the occurrence of condensation and deposits in the chimney system.

All solid fuel appliances require appropriate soot-fire resistant chimneys discharging at high level locations defined within Approved Document J (ADJ). Details of HETAS approved chimney products independently tested and approved to accepted standards can be found on the HETAS website. The natural ventilation rates of these chimneys may be less than the default values listed within SAP2005; the use of these more accurate values will also reduce SAP values. More details are available on the HETAS website.

5.3 Central heating systems using certain types of solid fuel appliances

This section provides guidance on the specification of fixed solid fuel heating systems for dwellings.

The guidance given in this section covers the following types of solid fuel appliances used to deliver primary heating as part of a central heating system:

- Batch-fed open fires with high output boilers (appliance types D1–D4 in Table 16)
- Batch-fed and automatic-feed room heaters and stoves with boilers (appliance type F in Table 16)
- Batch-fed cookers with boilers not exceeding 7.5kW (appliance types G1 and G2 in Table 16)
- Batch-fed independent boilers and automatic-feed anthracite and wood-pellet independent boilers (appliance types J1–J5 in Table 16).

Unless stated otherwise, the guidance in this section applies equally to appliances that burn wood, wood pellets, house-coal, manufactured smokeless fuels and anthracite.

Where appropriate, it will also be necessary to refer to the sections on community heating, under-floor heating, solar water heating and micro-CHP.

Terminology and applicability of guidance to different scenarios in new and existing dwellings

The guidance in this section applies to the following situations:

a. The specification of central heating systems in new dwellings – this situation is referred to in this section as a ***new system***.

b. The specification of central heating systems in existing dwellings where previously space heating was not provided by central heating – this situation is also referred to in this section as a ***new system***.

c. The specification of a replacement central heating system and/or component in existing dwellings where central heating is already installed – this situation is referred to in this section as a ***replacement system***.

In situations (a) and (b) above the guidance for compliance of ***new systems*** (in new and existing dwellings) with Part L is the same.

In situation (c) above, that is for ***replacement systems*** in existing dwellings, in most cases the guidance for compliance with Part L is as for ***new systems***, unless otherwise stated in the relevant section.

In order to comply with the requirements of Part L, a central heating system using a solid fuel appliance which is provided as a ***new system*** or ***replacement system*** in dwellings should meet all of the following conditions:

a. The appliance should be from the HETAS categories D, F, G and J as defined in Table 16; AND

b. The appliance should have a minimum efficiency (gross calorific value) of no less than that specified in Table 16 for that category of appliance; AND

c. The installer should confirm that the ratio of heat to room and heat to water is appropriate for the room and total property. This will require reference to installation practice guidelines including calculation of room and property heat loss. Advice on this is given in the HETAS Guide and website; AND

d. The minimum provisions for system circulation should be met as given in Table 18 (row a); AND

e. The minimum provisions for fuel storage should be met as given in Table 18 (row b); AND

f. The minimum provisions for hot water storage systems and labelling of storage vessels should be met as given in Table 18 (row c); AND

g. The minimum provisions for system preparation and water treatment should be met as given in Table 18 (row d); AND

h. The system should be commissioned in accordance with the minimum provisions given in Table 18 (row e); AND

i. The minimum provisions for control of the heating and hot water circuits, as given in Table 19, should be met. An acceptable alternative to these is any boiler management control system that meets the specified zoning, timing and temperature requirements; AND

j. Pipework should be insulated according to the minimum provisions given in Table 20.

Supplementary information

Turn-down values (i.e. the ratio of high to low output)

- *Turn-down ratios are generally very good (>10:1) for automatic-feed appliances with small firebeds.*
- *Turn-down ratios are less good with large batch-fed appliances unless the latter are used in conjunction with a hot water accumulator.*
- *Automatic appliances are likely to require less frequent refuelling. Automatic (e.g. electric or gas) ignition is now available for certain designs and reduces energy usage at times of low demand allowing boiler interlock.*
- *Some boilers have both auto-ignition and fire-extinguishing features.*

Link-up systems

It is possible to connect together two or more heating appliances with boilers (at least one of which can be solid fuel-fired), to maximise flexibility and efficiency. For example, an oil or gas boiler could be combined with a wood burning stove with boiler, sited in the living room. This combination with wood burning appliances will reduce overall carbon emissions. Both systems should be designed to appropriate installation codes.

Table 18 Minimum provisions for system circulation, fuel storage, hot water storage, system preparation and commissioning of solid fuel central heating

	Minimum provision for *new systems*	Minimum provision for *replacement systems*	*Supplementary information*
a. System circulation	a. Where boiler interlock is available, fully pumped circulation should be chosen. b. The manufacturer's instructions on the sizing and positioning of heat leak radiators should be followed. c. Solid fuel appliances should not be fitted to sealed heating systems with expansion vessels, except where specifically permitted by the manufacturer or where a thermal storage interface device is used.	As defined for ***new systems***	*Most solid fuel central heating systems require a heat leak radiator to dissipate heat from the smouldering fire bed. This is commonly the bathroom towel-rail and a thermosiphon system may be used for this circuit. In some cases, a fully pumped system reduces efficiency and should not be used.*
b. Fuel storage	Provision should be made for storage of reasonable quantities of fuel in a convenient and dry location. For wood, a fuel storage capacity of at least 1.5m^3 is required.	As defined for ***new systems***	*No minimum quantity of fuel is specified for solid mineral fuel but bunkers greater than 250 kg are preferred – below this householders are likely to pay a delivery premium.*
c. Hot water storage	a. Vented copper hot water storage vessels should comply with the heat loss and heat exchanger requirements of BS 1566-1:2000 or BS 3198. b. Vented cylinders in materials other than copper should comply with the heat loss and heat exchanger requirements of BS 1566. c. Unvented hot water storage system products should: • comply with BS EN 12897; OR • be certified by the British Board of Agrément, the Water Research Council; OR • be certified by another accredited body as complying with Building Regulations. d. Unvented systems should not be used with gravity circulation. e. Primary storage systems should meet the insulation requirements of sections 4.3.1 or 4.3.2 of the Water-heating Manufacturers' Association performance specifications for thermal stores. f. Combination cylinders should comply with BS 3198 and, in addition, have a heat loss not exceeding 1.6 × [0.2 + 0.51V$^{2/3}$] kWh/day where V is the volume of the hot water part of the cylinder. **Labelling of hot water storage vessels** g. All hot water storage vessels should carry a label with the following information: • type of vessel • nominal capacity in litres • standing heat loss in kWh/day • type of vessel • heat exchanger performance in kW h. Vented copper hot water cylinders should carry clear labelling on the product such as a BSI Kitemark, registered firm status or reference to an equivalent quality control scheme.	As defined for ***new systems***	***Primary hot water stores*** *These can have a major role to play in the installation of solid fuel. The main reason for their use is to store the heat generated during slumber periods but where unvented storage cylinders are used they also provide mains pressure hot water and possible frost protection (via electric immersion heaters) from a solid fuel system. Domestic hot water outlet temperature is to be controlled at a safe level. Because of the higher than normal storage temperatures it is very important that these are well insulated.* *Hot Water Association Performance Specification for Thermal Stores: www.hotwater.org.uk* ***British Standards*** ***BS 1566:2002*** *Copper indirect cylinders for domestic purposes. Open vented copper cylinders. Requirements and test methods.* ***BS 3198:1981*** *Specification for copper hot water storage combination units for domestic purposes.* ***BS EN 12897*** *Water supply. Specification for indirectly heated unvented (closed) storage water heaters.*

Table 18 *(continued)*

d. System preparation and water treatment	a. Central heating systems should be thoroughly cleaned and flushed out before installing a new boiler. b. During final filling of the system a chemical water treatment formulation should be added to the primary circuit to control corrosion and the formation of scale and sludge. Reasonable provision would be to follow the guidance on how to prepare and commission systems given in BS 7593:2006. c. Installers should also refer to the boiler manufacturer's installation instructions for appropriate treatment products and special requirements for individual boiler models. d. Where the mains total water hardness exceeds 200 parts per million, provision should be made to treat the feed water to water heaters and the hot water circuit of combination boilers to reduce the rate of accumulation of limescale and the consequent reduction in energy efficiency.	As defined for ***new systems***	*Note should be made of the manufacturer's instructions for advice on appropriate action.*
e. Commissioning	a. On completion of the installation of a boiler or a hot water storage system, together with associated equipment such as pipework, pumps and controls, the equipment should be commissioned in accordance with the manufacturer's instructions. These instructions will be specific to the particular boiler and/or hot water storage system. b. The installer should give a full explanation of the system and its operation to the user, including the manufacturer's user manual where provided.	As defined for ***new systems***	• *A Competent Person should carry out the installation i.e. an installer who is registered by HETAS under the Government's Competent Persons Scheme which covers the requirements of ADF, ADJ and ADL1A and ADL1B. Such a person will certify, within their competency, that they have carried out installation and commissioning in accordance with Building Regulations and the manufacturer's instructions (where these contain more stringent criteria) and that they have explained and handed over the operating instructions, specific to the particular boiler and/or hot water storage system, to the householder.* • *For exempted appliances, care should be taken when notifying building control because the delivery of wood or coal into a smoke-control area, without appropriate documentation, is an offence under the Clean Air Act.*

Table 19 Minimum provisions for system controls for solid fuel central heating systems in new dwellings*

System control	Minimum provision for *new systems*	Minimum provision for *replacement systems*	Supplementary information
All appliances, except open fires	Thermostatic control of the burning rate.	Thermostatic control of the burning rate based on temperature of water in the boiler where the appliance uses a boiler.	
Automatic-feed appliances			
Zoning	• **Dwellings with a total usable floor area up to 150m^2** should be divided into at least two space heating zones with independent temperature control, one of which is assigned to the living area. • **Dwellings with a total usable floor area greater than 150m^2** should be provided with at least two space heating zones, each having separate timing and temperature controls. • **Single-storey open-plan dwellings in which the living area is greater than 70% of the total floor area** – sub-zoning of temperature control is not appropriate.	No minimum requirement but, as far as it is practicable and economic to do so, controls should be upgraded to the levels defined for ***new systems***.	
Time control of space and water heating	Time control of space and water heating should be provided by: i. a full programmer with separate timing to each circuit; OR ii. two or more separate timers providing timing control to each circuit; OR iii. programmable room thermostat(s) to the heating circuit(s), with separate timing of the hot water circuit.	No minimum requirement but, as far as it is practicable and economic to do so, controls should be upgraded to the levels defined for ***new systems***.	*The level of sophistication should generally be appropriate to and compatible with that of the appliance. The highest levels are only appropriate to appliances with automatic ignition.*
Temperature control of space heating	Separate temperature control of zones within the dwelling should be provided, using: i. Room thermostats or programmable room thermostats in all zones; OR ii. A room thermostat or programmable room thermostat in the main zone and individual radiator controls such as thermostatic radiator valves (TRVs) on all radiators in the other zones; OR iii. a combination of (i) and (ii) above.	No minimum requirement but, as far as it is practicable and economic to do so, controls should be upgraded to the levels defined for ***new systems***.	
Temperature control of domestic hot water	• A cylinder thermostat and a zone valve or three-port valve to control the temperature of stored hot water should be fitted. • The use of non-electric hot water controllers does not meet this requirement. • Where permitted by the manufacturer, the cylinder thermostat should be wired to provide a boiler interlock.	A method of temperature control should be provided to prevent excessive tap water temperatures. As far as it is practicable and economic to do so, controls should be upgraded to the levels defined for ***new systems***.	*In some circumstances, such as thermal stores, a zone valve is not appropriate; a second pump could be substituted for the zone valve.*

*An acceptable alternative to these is any boiler management control system that meets the specified zoning, timing, temperature and boiler interlock control requirements.

Supplementary information – controls for solid fuel central heating

- *Boiler interlock, provided by a wiring arrangement, to prevent the system from operating when there is no demand for heat, should only be fitted if recommended by the manufacturer.*
- *In some simple batch-fed or automatic appliances (without heat stores and/or without automatic ignition), it is not possible to switch off the heat output completely, but the appliance output can be lowered to a minimum to reduce fuel consumption.*
- *In most solid fuel systems the room thermostat will switch off the pump, which in turn will cause the boiler to operate at minimum output.*
- *Some automatic solid fuel systems can be fitted with weather compensation, and incorporate multi-zone control. It is important to seek guidance from the manufacturer, especially if the heating package is to include other fuels.*

Table 20 Minimum provisions for insulation of pipes serving solid fuel central heating systems

<table>
<tr><th>Minimum provision</th><th colspan="2">Supplementary information</th></tr>
<tr><td rowspan="11">In new systems pipes should be insulated to comply with the maximum permissible heat loss indicated in the Supplementary Information column, and labelled accordingly, as follows:

• Primary circulation pipes for heating and hot water circuits should be insulated wherever they pass outside the heated living space or through voids which communicate with and are ventilated from unheated spaces.
• Primary circulation pipes for domestic hot water circuits should be insulated throughout their length, subject only to practical constraints imposed by the need to penetrate joists and other structural elements.
• All pipes connected to hot water storage vessels, including the vent pipe, should be insulated for at least 1 metre from their points of connection to the cylinder (or they should be insulated up to the point where they become concealed).
• If secondary circulation is used, all pipes kept hot by that circulation should be insulated.

For replacement systems, whenever a boiler or hot water storage vessel is replaced in an existing system, any pipes that are exposed as part of the work or are otherwise accessible should be insulated in accordance with the recommendations above – or to some lesser standard where practical constraints dictate.</td><td colspan="2">Insulation for pipework in unheated areas
Extra provision may need to be made to protect central-heating and hot water pipework in unheated areas against freezing. Further guidance is available in:
• BS 5422:2001 Method for specifying thermal insulating materials for pipes, tanks, vessels, ductwork and equipment operating within the temperature range of –40°C to +700°C.
• BRE Report No 262 Thermal insulation: avoiding risks, 2002 Edition.</td></tr>
<tr><td colspan="2">Where insulation is labelled as complying with the Domestic Heating Compliance Guide it must not exceed the following heat loss levels:</td></tr>
<tr><td>Pipe diameter (OD) mm</td><td>Maximum permissible heat loss* (W/m)</td></tr>
<tr><td>8</td><td>7.06</td></tr>
<tr><td>10</td><td>7.23</td></tr>
<tr><td>12</td><td>7.35</td></tr>
<tr><td>15</td><td>7.89</td></tr>
<tr><td>22</td><td>9.12</td></tr>
<tr><td>28</td><td>10.07</td></tr>
<tr><td>35</td><td>11.08</td></tr>
<tr><td>42</td><td>12.19</td></tr>
<tr><td>54</td><td>14.12</td></tr>
<tr><td colspan="2">*In assessing the thickness of insulation required to meet the provision, standardised conditions should be used in all compliance calculations based in this instance on a horizontal pipe at 60°C in still air at 15°C.

Further assistance in converting these heat loss limits to levels (thickness) of insulation for specific thermal conductivities is found in the 'TIMSA HVAC Guidance for achieving compliance with Part L of the Building Regulations'.</td></tr>
</table>

5.4 Solid fuel appliances for secondary heating

In order to comply with the requirements of Part L, solid fuel appliances in new and existing dwellings that are provided for secondary heating, and that are not part of a central heating system, should have a minimum efficiency (gross calorific value) no less than specified in Table 16 for that category of appliance.

Supplementary information – solid fuel appliances providing secondary heating

Minimum efficiencies

The minimum efficiencies for solid fuel appliances are published by HETAS in the Official Guide to Approved Solid Fuel Products and Services and on the website (www.HETAS.co.uk). HETAS also certifies and publishes actual appliance efficiencies following type testing in a notified laboratory to a harmonised European Standard to enable an installer/specifier to meet these regulations.

Appliance types

Appliances which are most suitable for secondary space heating are summarised in the table below:

Appliance type	Notes
a. Open-fires with high output boiler, when used with 'link-up'	
b. Small solid fuel room heaters (stoves), especially wood-fired	*These can be a dedicated wood burner or burn logs in a multi-fuel appliance or use pellets. They can be matched with a main heating system fired by the same or a different primary fuel or off-peak electricity to reduce carbon emissions, especially wood-fired, with or without thermostatic control. Many designs can provide heating during power-cuts. Mineral fuel appliances can be chosen but the attention of designers is drawn to the probable need to supply additional measures, as the carbon emission values of these tend to be high. Mineral fuel appliances may often have slightly higher efficiencies than their wood burning counterparts. Multi-fuel room heaters can enable the user to burn renewable wood as well as an alternative to mineral fuels outside smoke control areas.*
c. Small solid fuel stoves with boilers	*The efficiency of these can be higher than for dry appliances. They can be integrated with the primary wet heating system. Multi-fuel appliances enable the householder to burn renewable wood outside smoke control areas.*
d. Range cookers	*Typically, appliances are installed in a living area and are designed to provide some useful heat from their case into the space in which they are located. They are available in a variety of shapes and sizes and can incorporate a boiler which can be connected to dual-fuel integrated systems (e.g. link-up). Multi-fuel versions are also available.*
Where requested, open fires (HETAS categories B1, B2 and B3) can be fitted	*These do not have thermostatic control of the burning rate and have lower efficiencies. However, they are able to burn wood logs with correspondingly low net carbon emissions. It must be stressed that large open fires with large free face areas (see Note 1) usually have ventilation requirements well in excess of that available in a property built to modern standards of air-tightness. This is likely to lead to severe operational problems unless special steps are taken to provide the required air supply. The use of such large (simple) open fires is penalised in the SAP calculations.* *Note 1: The free face area of an open fire is its opening width times opening height (see Approved Document J for further details).*

Controls for solid fuel appliances providing secondary heating

Wherever possible, solid fuel appliances should have thermostatic control (these are usually integral to appliances in categories E, F and G). Controls should be appropriate to the level of sophistication of the appliance; automatic appliances can benefit from advanced controls.

Provision of fuel storage for solid fuel appliances providing secondary heating

The quantity of fuel consumed by secondary heating appliances is likely to be less than 1 tonne per year. However, it should be stored in a dry and convenient location.

Smoke control areas

The location of the appliance within or without a smoke control area is critical to the process of optimising the choice of appliance and fuel.

For further information on solid fuel appliances see Energy Efficiency Best Practice in Housing – Domestic Heating by Solid Fuel: Boiler Systems (CE47).

Section 6: Community heating systems

This section provides guidance on the specification of Community Heating (CH) systems in dwellings, which, if followed, will satisfy the minimum requirements of Part L of the Building Regulations. Although specific reference to CH is not made in ADL1A and ADL1B, the paragraphs in each document dealing with central heating and hot water systems apply to CH. Procedures for calculating the energy use and carbon emissions associated with CH are included in the Standard Assessment Procedure (SAP).

6.1 Scope of guidance

The guidance in this section applies to CH systems. It covers CH using boilers as the heat source as well as those that use low-carbon heat sources such as Combined Heat and Power (CHP), biofuels, heat pumps and solar panels.

Guidance is provided for two scenarios:

- where dwellings will be connected to a new CH scheme; and
- where dwellings will be connected to an existing CH scheme.

Requirements for the central heat source should be in accordance with the Non-Domestic Heating, Cooling and Ventilation Compliance Guide, in support of Part L, except where specified in this section.

Guidance given in the warm-air heating or underfloor heating sections is also relevant to CH where these types of space heating systems are used with CH. The remainder of this section providing guidance on CH assumes that a radiator system is employed similar to that for gas-fired central heating systems.

6.2 Definition of community heating

A community heating (CH) system is one that supplies heat to a number of dwellings from a common heat source. It may comprise, for example, a system heating a block of flats or a larger-scale system heating many buildings. Systems that supply fewer than 15 dwellings from a central boiler system are not covered in this section of the guidance, and the guidance given for individual dwelling heating systems should be followed for these applications where appropriate.

The guidance in this document assumes that the CH distribution system uses hot water as the energy carrier. Hot water service systems may be generated centrally within each building or in individual dwellings.

Minimum provisions for connection of dwellings to a new CH scheme

In order to comply with the requirements of Part L, new CH systems to supply both new and existing dwellings should meet the following conditions:

a. The minimum provisions for system design to maximise the efficiency of heat generation and minimise energy use by pumps should be met as given in Table 21; AND

b. Where the system uses low-carbon heat sources (e.g. CHP, biofuels or heat pumps), the minimum provisions for the lead heat generator should be met, as defined in Table 22; AND

c. Where heating systems are to be installed for new dwellings, the minimum provisions for control of the system should be met as given in Table 23; AND

d. The minimum provisions for hot water production, storage and treatment should be met as in Table 24 (rows d1 and d2); AND

e. The minimum provisions for the installation of heat meters should be met as given in Table 24 (row e); AND

f. The minimum provisions for commissioning of the system should be met as given in Table 24 (row f); AND

g. The minimum provisions for insulation of pipework should be met as given in Table 25.

Minimum provisions for connection of dwellings to an existing CH scheme

In order to comply with the requirements of Part L, when new or existing dwellings are connected to an existing CH scheme the following conditions should be met:

a. Where existing CH systems are in need of replacement or improvement, a specific study should be carried out to assess the economic and environmental benefits of a range of options, including the use of CHP and other low-carbon heat sources, especially where individual heating systems are being considered as an alternative to continuing with the CH system; AND

b. Where boilers will be replaced in existing CH systems, the requirements of the Part L Non-Domestic Heating, Cooling and Ventilation Guide should be followed for replacement boilers with respect to boiler efficiency; AND

c. If thermal energy is purchased from an existing district or community heating system, an assessment of the carbon intensity of the scheme should be carried out. Emission factors should be determined based on the particular details of the scheme, but should take account of the annual average performance of the whole system (i.e. the distribution circuits and all the heat generating plant, including any CHP, and any waste heat recovery or heat dumping). The calculation of the Dwelling CO_2 Emission Rate should be carried out by a suitably qualified person, detailing how the emission factors were derived; AND

d. The minimum provisions for system controls within dwellings should be met as given in Table 23; AND

e. The minimum provisions for insulation of pipework should be met as given in Table 25.

Table 21 Minimum provisions for the design of new community heating systems to maximise efficiency of heat generation and minimise energy use by pumps

	Minimum provision	Supplementary information
1. Boilers for CH	• Boiler-only community heating systems for new dwellings may be used provided that the carbon emissions calculated comply with the target carbon emissions rate. • Boilers should be selected to comply with the boiler efficiency requirements of the Part L Non-Domestic Heating, Cooling and Ventilation Compliance Guide.	• *When calculating the carbon emissions rate, the type and quantity of fuel used and also the electricity needed to operate the central plant and pumps should be taken into account.* • *For systems using condensing boilers:* *a. To achieve high boiler efficiency, return temperatures from radiator circuits should be selected lower than 50°C* *b. Where instantaneous plate heat exchangers are used to produce hot water in individual dwellings the return temperature selected should be less than 40°C.* *c. Where hot water cylinders are used, the coil size should be such as to require a flow rate that results in a nominal return temperature of less than 40°C while meeting the required heat-up time.* *d. Where hot water is produced centrally (e.g. in each block of dwellings) return temperatures lower than 40°C should be achieved.*
2. Controlling the sequencing and firing of boilers	Controls for boilers should be in accordance with the requirements of the Part L Non-Domestic Heating, Cooling and Ventilation Compliance Guide, except for optimum start controls which are not required.	• *Setting occupation times is not generally possible for a group of dwellings and so optimum start controls are not a requirement.*
3. Minimising energy used by pumps	• For new CH systems, the design temperature difference for the CH primary circuit should be greater than 20ºC. • Variable volume control systems should be used to reduce the volume of water and the pressure difference required from the pumps under part load.	• *Pumping energy can be minimised by optimising operating temperatures and pipe sizes to reduce installed pump power.* • *To take full advantage of variable volume systems, variable speed pumps should be installed and controlled to deliver the required pressure difference to suit the load.* • *Further guidance is provided in BSRIA Application Guide AG 16/2002 – Variable-flow water systems: design, installation and commissioning guidance.*

Table 22 Minimum provisions for design of low-carbon heat sources where these are included in community heating systems

	Minimum provision	Supplementary information
1. Low-carbon heat sources	No minimum requirement, but see supplementary information.	*CH systems can be designed to use low-carbon heat sources to meet all or part of the heat demand, which may enable some relaxation of the U-values that would otherwise be required (subject to the limits of design stated in ADL1A).*
2. Biofuels	No minimum requirement, but see supplementary information.	*a. Biofuels can be used to provide heat from boiler systems or as a fuel for CHP systems.* *b. Consideration should be given to operation and maintenance of the plant to ensure a long life and to prevent a later replacement by a conventional fuel system.* *c. Where a biofuel boiler is to be used in conjunction with conventional heating boilers or electric heating, a reasonable minimum proportion of the annual heat supply from biofuels would be 45% of the annual heat demand (space, domestic hot water and process heating).* *Further guidance is provided in Strategic Guide to Renewable and Decentralised Systems, ODPM 2005.*
3. Combined heat and power (CHP)	Where CHP is used in conjunction with boiler plant, the control system should ensure as far as practicable that the CHP plant operates as the lead heat source.	*a. CHP capacity should be optimised to meet the required economic and environmental objectives. A reasonable minimum proportion of the annual heat supply from CHP would be 45% of the annual heat demand (space, domestic and hot water heating).* *b. To maximise the use of CHP heat over the year, consideration should be given to the use of thermal storage to meet peaks, especially in the early morning period.* *c. The procedure given in SAP 2005 should be used to calculate the carbon emissions from CHP systems.*
4. Heat pumps	No minimum requirement, but see supplementary information.	*Heat pumps can be used as a heat source for CH systems. Selection of operating temperatures to suit efficient community heating systems and achieve high CoPs is important if carbon emissions are to be reduced. This may lead to the use of underfloor heating and the provision of domestic hot water by other means.* *Where heat pumps are installed in conjunction with conventional heating boilers a reasonable minimum proportion of the annual heat supply from the heat pump would be 45% of the annual space heating demand.*
5. Solar	No minimum requirement, but see supplementary information.	*Solar thermal panels can be used as the heat source for a centralised domestic hot water system.*

Table 23 Minimum provisions for system controls within dwellings for community heating

	Minimum provision for *new systems*	Supplementary information
1. Zoning	• **Dwellings with a total usable floor area up to 150m^2** should be divided into at least two zones with independent temperature control, one of which is assigned to the living area. • **Dwellings with a total usable floor area greater than 150m^2**, should be provided with at least two space heating zones, each having separate timing and temperature controls.	*In single-storey open-plan dwellings in which the living area is greater than 70% of the total floor area, sub-zoning of temperature control is not appropriate.*
2. Time control of space heating	• Time control of space heating should be provided by: i. a full programmer; OR ii. two or more separate timers providing timing control to each zone; OR iii. programmable room thermostat(s) to the heating circuit(s). • **For dwellings with a total usable floor area greater than 150m^2**, timing of the separate space heating zones can be achieved by: i. multiple heating zone programmers; OR ii. a single multi-channel programmer.	*Where the hot water is produced instantaneously, such as with a plate heat exchanger, time control is only required for space heating zones.* *Time control of domestic hot water heating using a cylinder is not considered essential for CH and could be a disadvantage with CHP based systems, increasing the morning peak demand and hence causing more use of the boiler than necessary.*
3. Temperature control of space heating	• Separate temperature control of zones within the dwelling should be provided using: i. room thermostats or programmable room thermostats in all zones; OR ii. a room thermostat or programmable room thermostat in the main zone and individual radiator controls such as thermostatic radiator valves (TRVs) on all radiators in the other zones; OR iii. a combination of (i) and (ii) above.	*Control valves and TRVs should be two-port type to reduce flow rates under part load.* *Differential pressures across the control valves and TRVs should not exceed maximum values to ensure that the control valves work effectively and maintain shut-off.*
4. Temperature control of domestic hot water	• Temperature control of the domestic hot water service should be provided by means of two-port control valves either electrically operated or direct acting.	*Where instantaneous heat exchangers are used the control valve should be selected to maintain steady temperatures (<±5ºC) for a range of draw-off rates and primary differential pressures. To reduce the incidence of scaling, the control valve should shut off the primary flow when there is no domestic hot water draw-off. A small intermittent flow is an advantage to maintain the temperature within the heat exchanger so as to provide more rapid heat-up.*
5. Limitation of maximum flow rate into building or dwelling	• The maximum design flow rate into the dwelling heating system should be limited by suitable control and balancing valves to maintain the overall balance in the network and to avoid excessive pumping energy.	

Table 24 Minimum provisions for domestic hot water production, storage and water treatment, heat meters and commissioning for community heating

	Minimum provision	Supplementary information
d1. DHW production and storage	The hot water system should be controlled using variable volume control principles and be designed to maintain low return temperatures in the primary CH circuit.	*Hot water can be produced in four ways in CH systems:* • *in individual dwellings, using indirect storage cylinders;* • *in individual dwellings, using instantaneous plate heat exchangers;* • *centrally, using storage calorifiers with either an indirect coil or an external plate heat exchanger;* • *centrally, using an instantaneous plate heat exchanger.* *In selecting the system, consideration should be given to:* • *the impact on return temperatures in the community heating system;* • *the impact on flow rates in the community heating system;* • *the impact on heat demand profiles and compatibility with the heat source;* • *standing losses from storage cylinders/ calorifiers and the impact on energy use;* • *the quality of service provided in terms of flow rate and temperature control;* • *the advantages of having local storage in terms of security of supply.* *Where the network is extensive, and hot water production is centralised, a two-stage water heating system can be used to deliver low return temperatures. In this design the return water from the space heating circuit is used to pre-heat the cold feed to the domestic hot water.*
d2. Water treatment	A suitable system for introduction of water treatment chemicals into the CH system in a controlled manner with facility for monitoring of water quality should be provided.	*A suitable long-term programme of water treatment is essential to preserve the life of the CH system by limiting internal corrosion.* *Additional chemical and physical treatment should be evaluated, especially for larger systems, including:* • *removal of oxygen by physical means;* • *softened water supply;* • *side-stream filtration;* • *biocide.*
e. Heat meters	Provision should be made in the design for including heat meters either at the time of installation or at a later date without major pipework changes.	
f. Commissioning	• The CH system should be commissioned so that the design volume flow rates are supplied to each dwelling and there is no excessive bypassing of water that would lead to higher pumping energy use. • The flow rates in individual heat emitters should be balanced using appropriate return temperatures or by using calibrated control valves. • The systems within the dwellings should be demonstrated to the resident, and suitable information provided on the operation of the controls.	*Where the central heat source includes a low-carbon heat source the control system should be proven by demonstrating that the low-carbon heat source will normally act as the lead heat source.*

Table 25 Minimum provisions for insulation of pipes for community heating systems (within dwellings and distribution pipework outside the dwelling)

Minimum provision	Supplementary information
In ***new systems*** pipes should be insulated to comply with the maximum permissible heat loss indicated in the Supplementary Information column, and labelled accordingly, as follows: • Primary circulation pipes for heating and hot water circuits should be insulated wherever they pass outside the heated living space or through voids which communicate with and are ventilated from unheated spaces. • Primary circulation pipes for domestic hot water circuits should be insulated throughout their length, subject only to practical constraints imposed by the need to penetrate joists and other structural elements. • All pipes connected to hot water storage vessels, including the vent pipe, should be insulated for at least 1 metre from their points of connection to the cylinder (or they should be insulated up to the point where they become concealed). • If secondary circulation is used, all pipes kept hot by that circulation should be insulated. For ***replacement systems***, whenever a boiler or hot water storage vessel is replaced in an existing system, any pipes that are exposed as part of the work or are otherwise accessible should be insulated in accordance with the recommendations above – or to some lesser standard where practical constraints dictate.	***Insulation for pipework in unheated areas*** *Extra provision may need to be made to protect central-heating and hot water pipework in unheated areas against freezing. Further guidance is available in:* • *BS 5422:2001 Method for specifying thermal insulating materials for pipes, tanks, vessels, ductwork and equipment operating within the temperature range of –40°C to +700°C.* • *BRE Report No 262 Thermal insulation: avoiding risks, 2002 Edition.* *Where insulation is labelled as complying with the Domestic Heating Compliance Guide it must not exceed the following heat loss levels:* ***Pipe diameter (OD) mm*** / ***Maximum permissible heat loss* (W/m)*** *8* / *7.06* *10* / *7.23* *12* / *7.35* *15* / *7.89* *22* / *9.12* *28* / *10.07* *35* / *11.08* *42* / *12.19* *54* / *14.12* **In assessing the thickness of insulation required to meet the provision, standardised conditions should be used in all compliance calculations based, in this instance, on a horizontal pipe at 60°C in still air at 15°C.* *Further assistance in converting these heat loss limits to levels (thickness) of insulation for specific thermal conductivities is found in the 'TIMSA HVAC Guidance for achieving compliance with Part L of the Building Regulations'.*
Insulation of community heating pipework (i.e. distribution pipes outside the dwelling)	
CH pipework should be insulated to the standards defined in EN 253 for pre-insulated pipes or to an equivalent performance for conventionally insulated pipes.	*Community heating pipework typically uses pre-insulated buried pipe systems. Minimum insulation thicknesses are defined in the EN standards. Where pipework is run above ground, the pipe insulation performance should be at least as high as that used in the buried part of the system. Enhanced insulation standards should be evaluated where CH is supplied only from fossil-fuelled boilers or where flow temperatures over 100ºC are being used.* ***Designing for minimum heat losses from distribution pipework*** *Heat losses can be reduced by optimising operating temperatures in conjunction with the need to minimise pumping energy. Variable volume control systems will assist in maintaining low return temperatures. While some bypasses may be needed to maintain the system in a hot condition ready to meet the demand, these should be controlled to the minimum flow needed. The use of temperature-controlled bypass valves where the bypass only operates when flow temperature has dropped below a set level is recommended.*

Supplementary information

Additional information is provided in the documents and standards listed below.

Good Practice Guide GPG234	*Guide to community heating and CHP – commercial, public and domestic applications, available from the Carbon Trust*
BS EN 13941:2003	*Design and installation of pre-insulated bonded pipe systems for direct heating*
BS EN 14419:2003	*District heating pipes. Pre-insulated bonded pipe systems for directly buried hot water networks. Surveillance systems*
BS EN 253:2003	*District heating pipes. Pre-insulated bonded pipe systems for directly buried hot water networks. Pipe assembly of steel service pipe, polyurethane thermal insulation and outer casing of polyethylene*
BS EN 448:2003	*District heating pipes. Pre-insulated bonded pipe systems for directly buried hot water networks. Fitting assemblies of steel service pipes, polyurethane thermal insulation and outer casing of polyethylene*
BS EN 488:2003	*District heating pipes. Pre-insulated bonded pipe systems for directly buried hot water networks. Steel valve assembly for steel service pipes, polyurethane thermal insulation and outer casing of polyethylene*
BS EN 489:2003	*District heating pipes. Pre-insulated bonded pipe systems for directly buried hot water networks. Joint assembly for steel service pipes, polyurethane thermal insulation and outer casing of polyethylene*

Section 7: Underfloor heating systems

This section provides guidance on the specification of underfloor heating systems in dwellings.

7.1 Scope of guidance

The guidance in this section covers systems that use hot water as the energy carrier and those that rely on electric heating elements. It should be used in conjunction with the guidance on central heating systems in the fuel-based sections of this guide on gas-fired, oil-fired, solid fuel or electric heating systems.

In order to comply with the requirements of Part L, underfloor heating in new dwellings should meet all of the following conditions:

a. The minimum provisions for control of the system and safe operating temperatures given in Table 26; AND

b. The minimum provisions for floor insulation and system design to minimise distribution losses given in Table 27; AND

c. For electric underfloor heating systems in new dwellings, the minimum provisions for construction and controls given in Table 28 as applicable to the type of system.

Table 26 Minimum provisions for control of electric and wet underfloor heating systems

Controls	Minimum provision	Supplementary information
1. System temperature controls (electric and wet floor heating systems)	All floor heating systems, whether electrical or warm water types, should be fitted with suitable controls to ensure safe system operating temperatures as follows: • A separate flow temperature high-limit thermostat is required for warm water systems connected to any high water temperature heat supply (i.e. operating at more than 60°C). • Mixed systems containing both radiators and floor heating, connected to a common high water temperature supply (i.e. operating at more than 60°C) should be provided with a separate means of reducing the water temperature to the floor heating system.	
2. Room temperature control (electric and wet floor heating systems)	• Each room should have its own temperature control device; however, it may be acceptable for adjacent rooms with similar function to share a thermostat or sensor, e.g. separate kitchen and utility areas. • Bathrooms or en-suites which share a heating circuit with an adjacent bedroom will provide heat only when the bedroom thermostat is activated. In such cases, the bathroom or en-suite areas should be fitted with an independent towel rail or radiator. • Weather-compensating controllers should be installed.	
3. Time control (electric and wet floor heating systems)	• **Dwellings with a total usable floor area up to 150m^2** should be divided into at least two zones with independent temperature control, one of which is assigned to the living area. • **Dwellings with a total usable floor area greater than 150m^2** should be provided with at least two space heating zones each having separate on/off timing controls and temperature controls. • **Single-storey open-plan dwellings in which the living area is greater than 70% of the total floor area** – sub-zoning of temperature control is not appropriate. • **Thick screed floor heating systems (>65mm)** should have facilities for automatic setback of room temperature to a lower level at night or during unoccupied periods.	*Facilities for automatic setback of room temperature to a lower level at night or during unoccupied periods are recommended for both electrical and warm water systems.*
4. Boiler control (wet systems only)	Warm water floor heating system controls should be interlocked with the boiler and stored hot water temperature control to ensure that the boiler does not fire when there is no demand for heat for either space or water heating.	

Table 27 Minimum provisions for floor insulation and minimising distribution losses of wet and electric underfloor heating systems

Floor insulation and design for reducing distribution losses	Minimum provision	Supplementary information
1. Exposed ground floors	i. Ground floors on earth, or suspended floors in contact with outside air, should be insulated to limit downward heat loss to not more than 10 W/m^2 resulting from thermal resistance of the applied floor finish. ii. When heat output is not known, but the floor finish is specified, the extra amount of system thermal insulation may be calculated using the sum of the thermal resistance of the floor finish and the thermal resistance of the underlying heated layer, all multiplied by a factor of 10. iii. Supplementary floor heating system thermal insulation may be supplied independently, or added to the statutory insulation requirement. iv. Notwithstanding (ii) or (iii) above, floor heating systems intended for cyclical operation or installed over unheated rooms should be separated from the structural floor by a layer of thermal insulation of at least 1.25 m^{2}K/W thermal resistance, and installed below the heated plane.	
2a. Intermediate floors (with heated rooms below): wet systems	Intermediate floors with heated rooms below, complying with both Part L and Part E of the Building Regulations, should have a separating layer of system thermal insulation to comply with either 1 (ii) above or BS EN 1264 Part 4, where the minimum thermal resistance is given as not less than R = 0.75 m^{2}K/W.	*Thermal insulation of party floors is essential because the floor/ceiling is directly coupled to the heating elements.*
2b. Intermediate floors (with heated rooms below): electric systems	Intermediate floors with heated rooms below, complying with both Part L and Part E of the Building Regulations, should have a separating layer of system thermal insulation where the minimum thermal resistance is given as not less than R = 0.5 m^{2}k/W, or comply with 1 (ii) above.	
3. System design to minimise distribution losses	i. Underfloor heating distribution boards or warm water distribution manifolds should be located centrally between the rooms being heated, thus minimising the length of interconnecting services. ii. Service pipes carrying hot water to more distant rooms should be insulated or routed via conduits to reduce distribution losses and the risk of overheating the room or floor finish.	

Table 28 Minimum provisions for construction and control of electric underfloor heating systems

Minimum provision			Supplementary information
c1. Electric storage systems with individual room or programmable thermostats but without low tariff anticipatory controls	**Construction**	i. Electric cable underfloor heating low tariff night energy storage systems should have a 65mm minimum thickness screed for correct operation. ii. Principal rooms containing 80% floor area should be assigned to low tariff heating cables and 20% of the floor area should be assigned to direct-acting perimeter heating cables in order to maximise energy efficiency.	*a. Other areas should be assigned as low tariff heating cables only (subject to heat requirements).* *b. Bathrooms and separate kitchens may have direct acting heating cables (subject to heat requirements).*
	Controls	iii. Anticipatory controllers should be installed controlling low tariff input charge with external temperature sensing and floor temperature sensing. iv. Programmable room thermostats with override feature should be provided for all direct acting zones of the system with air and floor temperature sensing capabilities to be used individually or combined.	*Anticipatory controllers (i.e. weather compensators) reduce night energy storage as a function of external temperature.*
c2. Electric cable, direct acting (non-storage) systems with individual room timer/ thermostat control in screeded floors	**Construction**	i. Direct acting electric underfloor heating cables should be installed within screeds of thickness not exceeding 50mm. ii. All heated floors should be insulated to the requirements shown in Table 27 above.	
	Controls	iii. Programmable room thermostats with manual override feature for all heating zones with air and floor temperature sensing capabilities to be used individually or combined.	
c3. Electric cable, direct acting with individual room timer/thermostat control in timber floors	**Construction**	i. Direct acting electric underfloor heating cables installed below floor boards in voids between floor joists should be provided with insulation to comply with Part L1 (and Part E) requirements and the effects of any floor covering in accordance with Table 27 above.	
	Controls	ii. Programmable room thermostats with manual override feature should be provided to control space temperature and limit floor void temperature for safety and comfort in each area.	
c4. Under-tile electric floor heating systems	**Construction**	i. Direct acting electric underfloor heating cables should be provided with a prefabricated mattress, or equivalent material, of thickness less than 4mm encapsulated in tile bedding adhesive or mortar, below a ceramic or other equivalent floor finish on a thermally resistive insulation layer as defined in Table 27 row 1 (ii).	
	Controls	ii. Programmable room thermostats with manual override feature should be provided to control space temperature and limit floor void temperature for safety and comfort in each area.	

Section 8 Heat pump systems

This section provides guidance on the specification of heat pump systems in dwellings.

Definition of a heat pump

A heat pump is a device which takes heat energy from a low-temperature source and upgrades it to a higher temperature at which it can be usefully employed for heating and/or hot water. Heat pumps may supply all or part of the space heating load.

8.1 Scope of guidance

The guidance in this section applies to the following types of heat pump technologies:

Heat pump type	***Warm (or hot) water systems***	***Warm air systems***
Ground source systems (GSHP) *Heat energy is extracted from the ground using closed pipe loops buried horizontally in trenches or in vertical boreholes that are connected back to the GSHP. The fluid circulating in the closed loop is normally a water/ propylene glycol antifreeze mixture or accepted equivalent but some direct expansion GSHPs use refrigerant. Open loops may also be used to collect water from an aquifer and discharge via a separate aquifer downstream of the water table flow; systems of this type normally require permits from the Environment Agency. Heat extracted from the ground may be supplied to a dwelling either by a water-based heating system (ground to water heat pumps) or by an air distribution system (ground to air heat pumps).*	*Ground to water*	*Ground to air*
Water source systems (WSHP) *Heat energy is extracted indirectly from a water source using closed pipe loops as a heat exchanger. The closed loop is connected back to the water to water heat pump. The water source may be a lake, pond or river or other stable water source. The fluid circulating in the closed loop will normally be water but a water/propylene glycol or accepted equivalent antifreeze mixture may be used, depending on operating temperatures. Open loops may also be used subject to the permits being obtained from the Environment Agency. Heat may be supplied to the dwelling either by a water-based heating system (water to water heat pumps) or by an air distribution system (water to air heat pumps).*	*Water to water*	*Water to air*
Air source systems (ASHP) *Air source heat pumps extract heat directly from the ambient air. Heat is supplied to the dwelling either by a water-based heating system (air to water heat pumps) or by an air distribution system (air to air heat pumps). Air to air heat pumps may be single package or split systems.*	*Air to water*	*Air to air*
All heat pump systems are at their most efficient when the source temperature is as high as possible, the heat distribution temperature is as low as possible and pressure losses in air and water systems are kept to a minimum. If installed in a new dwelling, heat pumps should use refrigerants complying with the provisions of EU Directive 2037:2000. Heat pumps should be CE marked in accordance with the relevant EU Directives where applicable, e.g.: machinery safety, low voltage, pressure equipment, electromagnetic compatibility. If summer cooling is provided by the heat pump, it is recommended that condensate drainage from the fan coil units is provided.		

In order to comply with the requirements, heating systems using a heat pump as the heat generator (such as underfloor, warm air and medium temperature radiator systems) in new and existing dwellings should meet all of the following conditions:

a. Electrically driven heat pumps should have coefficient of performance of no less than 2.0 when operating at the heating system design condition; AND

b. The minimum provisions for supply temperatures, and for wet systems radiator efficiency, in systems using warm (and hot) water heat pumps as the heat generator, should be met as given in Table 29 (row a); AND

c. The minimum provisions for installation should be met as given in Table 29 (row b) for warm (and hot) water heat pumps, and as given in Table 30 (row a) for warm air heat pumps; AND

d. Where warm (and hot) water heat pumps are used to meet all or part of the domestic hot water load, the minimum provisions for hot water should be met as given in Table 29 (row c); AND

e. The minimum provisions for control of the system should be met as given in Table 29 (row d) for warm (and hot) water heat pumps and as given in Table 30 (row b) for warm air heat pumps.

Table 29 Minimum provisions for warm (and hot) water heat pumps (ground to water, water to water and air to water systems)

Minimum provision		Supplementary information
a. Supply water temperatures and/or efficiency	**Underfloor heating** Supply water temperatures to the underfloor heating system should be in the range 30°C to 40°C.	*See section 7 of this guide on underfloor heating.*
	Radiators High-efficiency radiators with high water volume should be utilised. Supply water temperature to the radiators should be in the range 40°C to 55°C.	*Space heating may be sized to meet all or part of the space heating load. Secondary heating will be required if the heat pump is sized to meet part of the space heating load.*
	Fan coil units Supply water temperature to the fan coil units should be in the range 35°C to 45°C.	*Fan coil units may be utilised for heating only, or for winter heating and summer cooling.*
b. Installation	i. The water distribution system should be arranged for reverse return operation to maximise efficiency and ease of commissioning and future maintenance. ii. Pipework not contributing to the space heating should be insulated to prevent heat loss following the guidance in the TIMSA guide. iii. If summer cooling is provided by the heat pump, all water distribution pipework should be insulated to prevent condensation following the guidance in the TIMSA guide. iv. External pipework between the dwelling and the ground heat exchanger should be insulated following the guidance in the TIMSA guide. v. The ground loop water circuit should be protected with an antifreeze solution and inhibitor as recommended by the heat pump manufacturer. vi. The internal water distribution circuit should contain an inhibitor and may be protected by an antifreeze solution as recommended by the heat pump manufacturer.	• *A pressurised water distribution system with expansion vessel is recommended.* • *Constant water flow should be maintained through the heat pump.* • *Pipe sizes should be in accordance with the manufacturer's recommendations.* ***Installation*** • *Installation should be carried out by an installer approved by the manufacturer.* • *If, during installation, access to the refrigeration circuit is needed, a competent refrigeration and air conditioning engineer (with a valid refrigerant handling certificate and/or an engineering services skillcard) should carry out the work.* • *Installation of the dwelling's water distribution system should be undertaken by a competent central heating specialist.* *TIMSA HVAC Guidance for Achieving Compliance with Part L of the Building Regulations.*
c. Domestic hot water	For full heating, the heat pump should be capable of supplying water in the range 60°C to 65°C. If the heat pump is not capable of supplying water at these temperatures, supplementary heating should be provided and controlled as described in other sections of this guide. The DHW system should include a tank thermostat and a time clock to optimise the time taken to heat the water.	*The heat pump may be utilised for all or part of the DHW load. During the DHW heating period the heat pump may not necessarily be providing heated water to the space heating system.*

Table 29 *(continued)*

d. Controls	**Heat pump unit controls** should include: • control of water pump operation (internal and external as appropriate); • control of water temperature for the distribution system; • control of outdoor fan operation for air to water units; • defrost control of external airside heat exchanger for air to water systems; • protection for water flow failure; • protection for high water temperature; • protection for high refrigerant pressure; • protection for air flow failure on air to water units. **External controls** should include: • room thermostat to regulate the space temperature and interlocked with the heat pump unit operation; • timer to optimise operation of the heat pump.	

Table 30 Minimum provisions for warm air heat pumps (ground to air, water to air and air to air systems)

Minimum provision		Supplementary information
a. Installation	• Minimum clearances adjacent to all airflow paths, as recommended by the manufacturer, should be maintained. • Pipe sizes should be in accordance with the manufacturer's recommendations. • The refrigerant pipework on split systems should be insulated in line with manufacturer's recommendations. • If summer cooling is provided by the heat pump, provision should be made for condensate drainage from the indoor terminal units. • For ground-to-air and water-to-air systems all external pipework between the dwelling and the external heat exchanger should be insulated by following the guidance in the TIMSA guide. • For ground-to-air and water-to-air systems constant water flow should be maintained through the heat pump.	• *Installation should be carried out by an installer approved by the manufacturer.* • *Installation that requires access to the refrigeration circuit, or the connection of split systems, should be carried out by a competent refrigeration and air conditioning engineer holding a refrigerant handling certificate and, preferably, an engineering services skillcard.* *TIMSA HVAC Guidance for Achieving Compliance with Part L of the Building Regulations.*

Table 30 *(continued)*

b. Controls	**Heat pump unit controls** should include: • Control of room air temperature (if not provided externally). • Control of outdoor fan operation for air-to-air units. • Defrost control of external airside heat exchanger for air-to-air systems. • Control for secondary heating (if fitted) on air-to-air systems. • Control of external water pump operation for ground-to-air and water-to-air systems. • Protection for high water temperature. • Protection for high refrigerant pressure. • Protection for indoor air flow failure. • Protection for external air flow failure on air-to-air units. • Protection for water flow failure on ground to air and water-to-air systems. **External controls** should include: • Room thermostat (if not provided internal to the heat pump) to regulate the space temperature and interlocked with the heat pump unit operation. • Timer to optimise operation of the heat pump.	

Supplementary information – further guidance on heat pumps

- *BS EN 15450 'Heating systems in buildings. Design of heat pump heating systems.'*
- *EU Directives for: Machinery Safety; Low Voltage; Pressure Equipment; Electromagnetic Compatibility*
- *SAP 2005*
- *DEFRA/Carbon Trust Energy Technology List – Heat Pumps (www.eca.gov.uk)*
- *EN 14511 'Air conditioners, liquid chilling packages and heat pumps with electrically driven compressors for space heating and cooling'*
- *ISO 13256 'Water-Source Heat Pumps – testing and rating for Performance: Part 1 – Water-to-Air and Brine-to-Air Heat Pumps and Part 2 – Water-to-Water and Brine-to-Water Heat Pumps'*
- *CE 82 'Energy Efficiency Best Practice in Housing: Domestic Ground Source Heat Pumps: design and installation of closed-loop systems'*
- *EN 378 'Specification for refrigerating systems and heat pumps. Safety and environmental requirements'*
- *Microgeneration Certification Scheme Standards: MCS007 'Product certification scheme requirements – heat pumps'*
- *MIS3005 'Requirements for contractors undertaking the supply, design, installation, set to work commissioning and handover of microgeneration heat pump systems'*
- *EU Ecolabel 'Establishing the ecological criteria for the award of the Community eco-label to electrically driven, gas driven or gas absorption heat pumps'*
- *Heat Pump Association Data Sheet 'Air to Water Heat Pumps'*
- *TR/30 'HVCA Guide to Good Practice: Heat Pumps'*

Section 9: Solar water heating

This section provides guidance on the specification of solar water heating for dwellings.

9.1 Scope of guidance

The guidance in this section covers solar systems with a collector area of less than 20 m^2 and solar heated water storage of less than 440 litres. It does not cover systems intended to contribute exclusively to space heating or systems providing heat exclusively to heat swimming pools. It should be used in conjunction with the guidance on water heating contained in the fuel-based sections of this guide.

In order to comply with the requirements of Part L, solar water heating in new and existing dwellings should meet the following conditions:

a. The minimum provisions for collector certification, identification and testing specified in Table 31 (row a); AND

b. The minimum provisions for selection of transfer fluid in the collector primary loop given in Table 31 (row b); AND

c. The minimum provisions for circulation pump power given in Table 31 (row c); AND

d. The minimum provisions for heat exchanger sizing given in Table 31 (row d); AND

e. The minimum provisions for control of the system given in Table 31 (row e). Where work is carried out in a dwelling that already has a solar hot water system it is recommended that the system control is upgraded in line with the minimum provisions for systems in new dwellings; AND

f. The minimum provisions for solar pre-heated water storage given in Table 31 (row f). Where work is carried out in a dwelling that already has a solar hot water system it is recommended that the insulation is upgraded in line with the minimum provisions for systems in new dwellings.

g. The minimum provisions for storage volume of solar pre-heated water given in Table 31 (row g); AND

h. The minimum provisions for system labelling and commissioning given in Table 32 (rows h and i); AND

i. The minimum provisions for insulating pipes in a solar primary system given in Table 33.

Table 31 Minimum provisions for solar water heating

Minimum provision		Supplementary information
Allowance for collector shading	No minimum provision.	*Solar collectors should be sited in unshaded locations wherever possible. Where this is unavoidable or in cases of significant or heavy shading or significant variance to the optimum orientation and tilt (i.e. normal pitch roofs facing between SE and SW), then an allowance for the loss of performance should be made when sizing the collector area according to the factors indicated in SAP 2005, Appendix H.*
a. Solar collector certification	Collectors should be independently certified to comply with all required tests, safety, thermal performance reporting and identification according to BS EN 12975.	*Copies of the full test report should be made available upon request.*
b. Primary circuit fluid	The transfer fluid in the collector primary loop should be chosen so as not to deposit limescale, sludge, ice or other solids that could either restrict circulation or impair the rate of heat transfer within the absorber.	*In secondary systems, measures to reduce the formation of limescale should be considered so that performance is not significantly affected.*
c. Circulation pump power	The electrical input power of the primary pump in the solar system should be less than 50W or 2% of peak thermal power of the collector, whichever is the higher.	
d. Heat exchanger sizing	The heat exchanger between a solar primary and secondary system should be sized so that no less than 0.1 m^2 or equivalent of heat exchanger area is provided per 1 m^2 of solar collector net absorber area.	*A heat exchanger reduces the possibility of clogging and deposition due to dirt, scale or similar impurities that could reduce the system performance.* *Heat exchangers and store connections should be sized and located to promote a low return temperature to the solar collector. Solar heat exchangers are often sized larger than those usually used on gas- or oil-based primary systems owing to the lower temperature of transfer.*
e. System control	Solar DHW system controls should be fitted to: i. maximise the useful energy gain from the solar collectors into the system's dedicated storage ii. minimise the accidental loss of stored energy by the solar DHW system, whether originating from solar collectors, cold intake or auxiliary heat sources iii. ensure that hot water produced by backup (auxiliary) heat sources is not used when adequate grade solar pre-heated water is available iv. provide a means of control consistent with the solar system being hydraulically (inherently) secure against the adverse effects of excessive primary temperatures and pressures v. where a separate DHW heating appliance is pre-heated by a solar system, control the appliance where possible such that no extra heat is added if the target temperature is already satisfied from the pre-heat vessel vi. inform the end user of the system's correct function and performance at all times.	

Table 31 *(continued)*

f. Solar pre-heated water storage	For new or replacement solar heated water storage the minimum provisions are as follows: a. Vented copper hot water storage vessels should comply with the heat loss and backup heating heat exchanger requirements of BS 1566-1:2002. b. Unvented hot water storage system products should: • comply with BS EN 12897; OR • be certified by the British Board of Agrément, the Water Research Council; OR • be certified by another accredited body as complying with Building Regulations. c. Primary storage systems should meet the insulation requirements of sections 4.3.1 or 4.3.2 of the Water-heating Manufacturers' Association performance specifications for thermal stores.	*Vented copper hot water cylinders should carry clear labelling on the product such as a BSI Kitemark, registered firm status or reference to an equivalent quality control scheme.* *Vented cylinders which are not of copper construction should be labelled as complying with the heat loss and heat exchanger requirements of BS 1566.* *Due to the higher than normal storage temperatures in primary stores it is very important that these are well insulated.*
g. Volume of solar pre-heated water	The ratio of solar heated water storage volume to collector area should be as follows: i. The dedicated solar storage volume, Vs, should be at least 25 litres (or equivalent heat capacity) per net square metre of the solar collector absorber area. ii. Alternatively, Vs should be a volume (or equivalent heat capacity) which is equivalent to at least 80% of the daily hot water demand, Vd (as defined by SAP 2005).	*Collector area is measured as effective aperture or net absorber area, whichever is smaller.* *A separate pre-heat storage vessel should be considered where-ever possible.*
h. System preparation and water treatment	a. Solar primary circuits should be thoroughly cleaned and flushed out before filling with the operating fluid. b. Where mains water is used to fill the solar primary circuit and the total water hardness exceeds 200 parts per million, provisions should be made to reduce the limescale. c. Solar grade antifreeze should be used in collector circuits where no alternative means of freeze protection is provided.	*Parts of BS 7593:2006 Code of practice for treatment of water in domestic hot water central heating systems may assist in flushing and cleaning procedures.*

Table 32 Minimum provisions for labelling, commissioning and documentation for solar hot water systems

	Minimum provision	Supplementary information
1. Labelling of solar collectors and hot water stores	a. All solar collectors should have a visible and durable label displaying all information required according to BS EN 12975, and including at least the following: • Name of manufacturer • Collector type • Serial number • Year of production • Gross area of collector • Aperture area of collector • Net absorber area of collector • Maximum operation pressure • Stagnation temperature at 1000W/m^2 and 30°C • Volume of heat transfer fluid • Weight of empty solar collector • Labelling of solar heated water storage vessels within solar DHW systems b. All hot water storage vessels should carry a label with the following information: • Manufacturer's name • Nominal overall capacity in litres • Dedicated solar capacity in litres • Standing heat loss in kWh/day • Type of vessel • Backup heating heat exchanger performance in kW (where present) • Solar heating heat exchanger performance in kW	*In addition to the minimum provision for labelling of hot water storage vessels, labelling with the following information is also recommended:* • *Total net fluid content of secondary volume normally heated by each heat exchanger, where present (±1.0 litre).* • *The type, fluid content, maximum pressure and surface area of all heat exchangers.*
2. Commissioning	a. A signed and dated commissioning certificate should be completed to confirm that the equipment has been correctly installed and to record key safety and operational features. b. As a minimum, the commissioning certificate should record the following details of the solar system: • Net or aperture area of solar collector • Minimum ambient temperature without freeze damage to components • Location and method of controlling over-pressure • Location of the electrical isolating switch • Type of circulation fluid • Circulation rate of collector circuit • Location of device for overheating protection of solar heated water	• *A signed commissioning certificate, certifying that the equipment is safe, legal and fit for its intended purpose, should be handed over to the dwelling owner and/or user as applicable.* • *A separate certificate is required to cover the installation and commissioning of the hot water storage vessels and/or appliances within a solar DHW system.* • *A commissioning engineer should be a competent person who can personally testify by signature and date that the equipment is commissioned.*
3. Documentation	No minimum requirement	*Information concerning the solar DHW system should be provided to the dwelling owner and/or user as applicable. The documentation should include:* • *User's manual* • *Warranty information* • *A recommended maintenance schedule* • *Commissioning certificate* • *Full contact details of the installer*

Table 33 Minimum provisions for insulation of pipes for solar hot water systems

Minimum provision	Supplementary information
For new or replacement solar heated water storage, pipes connected to solar heated storage should be insulated in the following situations: • All pipes of a solar primary system should be insulated throughout the length of the circuit. • All other pipes connected to hot water storage vessels, including the vent pipe, should be insulated for at least 1 metre from their points of connection to the cylinder (or they should be insulated up to the point where they become concealed). Pipes should be insulated with materials labelled as complying with the Domestic Heating Compliance Guide and in line with the guidance in the TIMSA guide.	*The insulation should be suitably rated for the maximum foreseeable pipe temperature applicable and, where external, also be resistant to vermin attack and climatic degradation.* *In a dwelling that already has a solar hot water system it is recommended that the insulation should be upgraded in line with these minimum provisions where significant work, such as change of solar storage, is carried out.* *A fully filled or drainback solar hot water system can have a pipe service temperature of 150°C. Therefore an insulation material should be specified to accommodate this temperature. An EPDM based rubber would normally be a minimum requirement for such an application. Any insulation specified must be better than 0.044 W/m.K at 40°C mean and the insulation diameter must be 87% of the pipe diameter.* *Insulation materials that are labelled as complying with the Domestic Heating Compliance Guide will not exceed the following heat loss values:*

Pipe diameter (OD) mm	***Maximum permissible heat loss* (W/m)***
8	*7.06*
10	*7.23*
12	*7.35*
15	*7.89*
22	*9.12*
28	*10.07*
35	*11.08*
42	*12.19*
54	*14.12*

Further assistance in converting heat loss limits to levels (thickness) of insulation for specific thermal conductivities is found in the 'TIMSA HVAC Guidance for achieving compliance with Part L of the Building Regulations'.

Insulation for pipework in unheated areas
Extra provision may need to be made to protect water carrying pipework in unheated areas against freezing. Further guidance is available in:

- *BS 5422:2001 Method for specifying thermal insulating materials for pipes, tanks, vessels, ductwork and equipment operating within the temperature range of –40°C to +700°C.*
- *BRE Report No 262 Thermal insulation: avoiding risks, 2002 Edition.*

Supplementary information on solar water heating

Energy Efficiency Best Practice in Housing 'Solar Water Heating systems Guidance for Professionals', CE131.

CIBSE 'Solar Heating Design and Installation Guide'. ISBN 978-1-903287-84-2
'Central Heating System Specifications (CHeSS) – 2005' (CE 51/GIL59).

Glossary of standards relevant to solar hot water heating

BS 7431:1991	*Method for assessing solar water heaters. Elastomeric materials for absorbers, connecting pipes and fittings*
BS 6785:1986	*Code of practice for solar heating systems for swimming pools*
prCEN/TS 12977-3:2006	*Performance characterisation of stores for solar heating systems*
prCEN/TS 12977-2:2005	*Thermal solar systems and components. Custom built systems. Test methods*
TS 12977-1:2001	*Thermal solar systems and components. Custom built systems. General requirements*
BS EN ISO 9488:2000	*Solar energy. Vocabulary*
BS EN 12976-2:2006	*Thermal solar systems and components. Factory made systems. Test methods*
BS EN 12976-1:2006	*Thermal solar systems and components. Factory made systems. General requirements*
BS EN 12975-2:2001	*Thermal solar systems and components. Solar collectors. Test methods*
BS EN 12975-1:2000	*Thermal solar systems and components. Solar collectors. General requirements*
ISO 9553:1997	*Solar energy – Methods of testing preformed rubber seals and sealing compounds used in collectors*
BS 3734-1:1997	*Rubber – Tolerances for products – Part 1: Dimensional tolerances*
BS 903-0:2003	*Physical testing of rubber – Part 0: General*
BS 6920:2000	*Suitability of non-metallic products for use in contact with water intended for human consumption with regard to their effect on the quality of water*
ISO/TR 10217:1989	*Solar energy – Water heating systems – Guide to material selection with regard to internal corrosion*
BS 8000	*Workmanship on building sites*
BS EN 12897	*Water supply. Specification for indirectly heated unvented (closed) storage water heaters*
BS 7671	*Requirements for electrical installations*
BS 1566	*Copper indirect cylinders for domestic purposes*
BS 4814	*Specifications for expansion vessels using an internal diaphragm for sealed hot water heating systems*
BS 7074	*Application, selection and installation of expansion vessels and ancillary equipment for sealed water systems*
BS 5422	*Methods of specifying thermal insulation materials on pipes, ductwork and equipment in the temperature range of –40ºC to 700ºC.*
BS 5449, BS EN 12831 BS EN 12828	*Specification of forced circulation hot water central heating systems for domestic premises*
BS 6701	*Telecommunications equipment and telecommunications cabling*
BS 5970	*Code of practice for thermal insulation of pipes and equipment*
BS 6700	*Specification and design, installation, testing and maintenance of services supplying water for domestic uses within buildings and their curtilages*

Section 10: Individual domestic (micro) combined heat and power

This section provides some guidance on the specification of micro-combined heat and power (CHP) systems for dwellings.

At the time of writing, the guidance for micro-CHP is still under development and is expected to include:

- A Good Practice Guide specifying the minimum standards for installation and control of micro-CHP.
- Publicly Available Specification – PAS 67 Laboratory test to determine heating and electrical performance of heat-led micro-cogeneration packages primarily intended for heating dwellings.
- Method to evaluate the energy performance of micro-cogeneration heat-led systems in dwellings.
- Appendix N of the UK Government's Standard Assessment Procedure (SAP 2005) for the energy rating of dwellings.

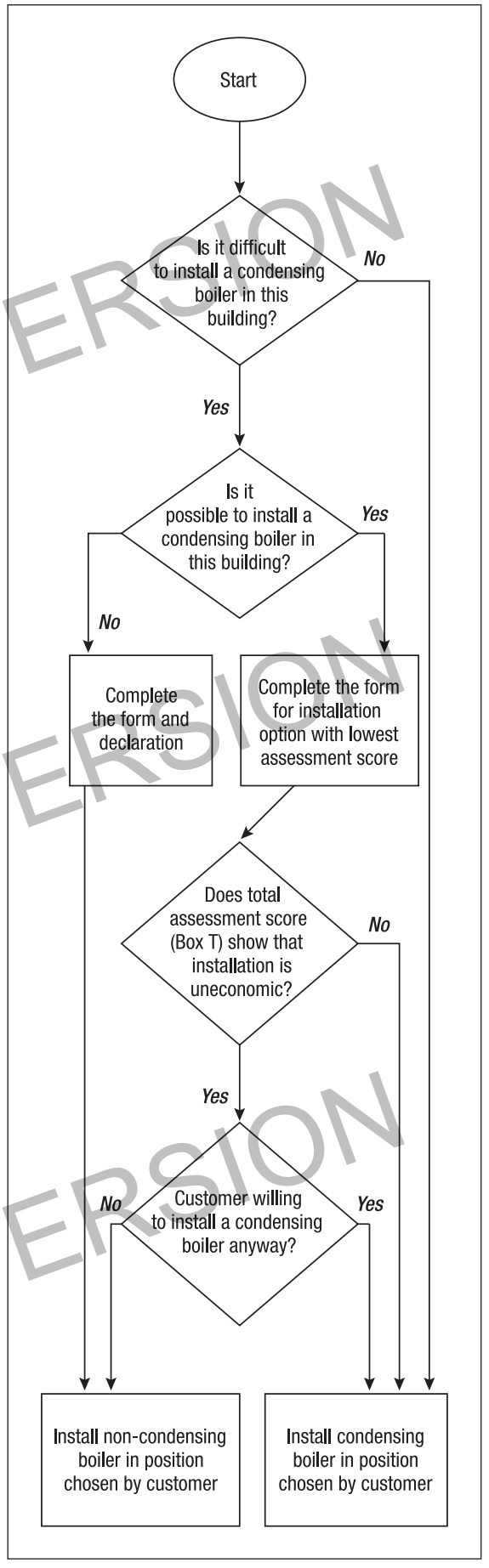
Until this guidance is available the following publication may be useful: ODPM Publication *Low or Zero Carbon Energy Sources – Strategic Guide, May 2006*.

Appendix A Assessing the case for a non-condensing boiler

1. This Appendix sets out the approved assessment procedure for determining, for the purposes of the requirement in Part L of the Building Regulations, where practical considerations mean that it would be reasonable to install a non-condensing boiler.

2. The chart summarises the steps in the assessment procedure. In determining the position within a dwelling where a condensing boiler could be installed at lowest cost, obstacles such as furniture or fittings should be ignored. If the assessment shows that this cost is too high then, in accordance with section 2 or 3 (as appropriate) of the *Domestic Heating Compliance Guide*, it would be reasonable to install a non-condensing boiler.

3. Paragraphs 8 to 10 in ADL1B give guidance on how to deal with historic buildings.



The assessment procedure

4. The assessment should be carried out following the detailed guidance given in the *Guide to the condensing boiler installation assessment procedure for dwellings*[6] (the Guide). It should consider all feasible condensing boiler installation options (subject to the restrictions given later) for whichever fuel has been chosen by the householder (natural gas, LPG or oil). For the purposes of the assessment, boiler positions preferred by the householder are not relevant. The lowest cost position should be found, and recorded on the form.

5. An assessment score exceeding 1000 points indicates that exceptional circumstances exist. In these circumstances, the installation of a condensing boiler is not considered necessary to meet the requirements of the Building Regulations. (Householders may still choose to install a condensing boiler and they may be eligible for a grant[7] that defrays some of the additional costs.)

6. The assessment result is restricted to the chosen fuel for the new boiler, and is not valid for a different fuel.

7. Whether a condensing or non-condensing boiler is chosen, it need not be installed in the position shown on the assessment form.

6 Guide to the condensing boiler installation assessment procedure for dwellings, ODPM, 2005.
7 See Note 3 in the 'Notice to Householders' on the calculation and declaration form.

Completion of the assessment form

1 First, complete section 1 of the form.

2 If a defective boiler is being replaced within 3 years of the date of original installation under the original manufacturer's or installer's guarantee, tick box X and sign the declaration in section 14 of the form, omitting sections 2 to 13. Otherwise, continue below.

3 Complete sections 2 and 3 of the form.

4 Decide what fuel is to be used for the new boiler (gas, LPG or oil), and complete section 4 of the form.

5 If an oil-fired boiler is to be installed before 1 April 2007, then proceed to section 14 of the form, omitting sections 5 to 13. Otherwise, continue below.

6 Complete sections 5 and 6 of the form.

7 Consider ALL feasible condensing boiler positions and extended flue options, taking no account of householder's preferences. In some positions special condensate disposal arrangements may be necessary. Some installation options are NOT regarded as feasible for the purpose of this assessment procedure, and should NOT be considered. They are listed in Tables A1 and A2. (They do not necessarily contravene standards or regulations, and in some cases they may be acceptable to the householder but they are not acceptable for the purposes of the assessment. Further advice on the bases of Tables A1 and A2 is given in the Guide.)

8 If there are no feasible condensing boiler installation options, proceed to section 14, omitting sections 7 to 13. Such cases are unusual and a clear explanation should be inserted in section 14 following the advice in the guide. Otherwise, continue below.

9 Complete section 9, inserting points from Table A3. Where a change of boiler fuel is proposed, the assessment should reflect this decision.

10 Complete sections 7, 8 and 10 to 13 for the installation option that gives the lowest assessment score in section 13. Evidence may be required that all feasible options have been considered and that this is the lowest scoring option, so forms used to assess other options should be attached when the final, signed form is made available.

11 Complete and sign the declaration in section 14, ticking one box only. Supply the completed form to the householder for use when the house is sold and retain a copy for building control compliance purposes.

Table A1 Flue and terminal installation options that are NOT to be considered

Flue and terminal positions that do not comply with Approved Document J of the Building Regulations.
A shared flue, unless specially designed to be shared by condensing boilers.
A flue passing through a wall or floor that must not be pierced for structural reasons.
An internal flue extension exceeding 4m (ignoring the part that passes through a loft/attic space).
A flue that passes through another dwelling, or another building in different ownership, or another fire compartment.
A vertical flue pipe visible on the outside of the building facing the main approach direction (usually the front). This refers only to the flue pipe, not the flue terminal (a terminal may be positioned on any side of the building).
Wall terminals that discharge under the roof of a car port.
Wall terminals with horizontal discharge less than 2.5m from any wall, fence, building or property boundary facing the terminal.
Wall terminals with horizontal discharge less than 2.5m from a car parking space and less than 2.1m above the ground.
Wall terminals less than 2.1m above the ground with horizontal discharge of the flue products across a public footway, route or a patio (hard surface area).

Table A2 Boiler positions NOT to be considered

1 Gas boiler:	Where the boiler or extended internal flue is in a: • lounge • lounge/dining room • principal living room that does not include a kitchen area.
2 LPG boilers:	Where the boiler or extended internal flue is in a: • lounge • lounge/dining room • principal living room that does not include a kitchen area • cellar or basement.
3 Oil boilers:	The only positions that ARE to be considered are: • a kitchen, or • a kitchen/dining room, or • a utility room • purpose-made boiler room. And only where they are on the ground floor or in a basement. All other positions are NOT to be considered.

Table A3 Points for property type and fuel

Building type	Natural gas	LPG	Oil
Flat	710	660	830
Mid-terrace	640	580	790
Others (end-terrace, semi-detached or detached)	590	520	760

L1 ASSESSING WHERE NON-CONDENSING BOILERS COMPLY

CALCULATION AND DECLARATION FORM

This form may be used to show that a non-condensing boiler is reasonable provision for the purposes of complying with Part L of the Building Regulations.

1	Full address of property assessed:	_____
		_____
		_____
	Postcode:	_____
2	Dwelling type (tick one only)	Flat ☐ Mid-terraced ☐ End-terraced ☐ Semi-detached ☐ Detached ☐
3	Existing boiler fuel (tick one only)	Natural gas ☐ LPG ☐ Oil ☐ Solid fuel ☐ None ☐
4	New boiler fuel (tick one only)	Natural gas ☐ LPG ☐ Oil ☐
5	Existing boiler type (tick one only)	Wall mounted ☐ Back boiler ☐ Floor standing ☐ None ☐
6	Existing boiler position (tick one only)	Kitchen ☐ Utility room ☐ Garage ☐ Living room ☐ Bedroom ☐ Other ☐ None ☐
7	In the lowest cost option is the new boiler positioned in a different room from the existing boiler position?	Yes ☐ No ☐ Inapplicable (no existing boiler) ☐
8	If YES to section 7, state new boiler position	Kitchen ☐ Utility room ☐ Garage ☐ Living room ☐ Bedroom ☐ Other:

9	Determine points for property type and new boiler fuel from the Table at the foot of this form and insert in box A	**Box A**
10	New boiler position in a different room from the existing boiler? (see 7) If YES insert 350 in box B	**Box B**
11	Extended flue (longer than 2m) necessary? If YES insert 200 for gas boilers, or 350 for oil boilers, in box C	**Box C**
12	Condensate pump or soakaway necessary? If YES insert 100 in box D	**Box D**
13	ASSESSMENT SCORE — **TOTAL of points in boxes A + B + C + D**	**Box T**

14 Declaration (tick one box only)

Box W	I declare that the boiler to be installed is oil fired and will be installed before 1st April 2007, OR
Box X	I declare that the boiler is being replaced under the original manufacturer's or installer's guarantee, within 3 years of the original installation date, OR
Box Y	I declare that there are no feasible condensing boiler installation options (as defined by the assessment procedure) because:
	_____
	_____
	_____
Box Z	I declare that I have considered all feasible boiler installation options in the property above, and the option defined in boxes A to D produces the lowest total T.

Signed _____ Date _____

Name (in capitals) _____ Status (agent or installer) _____

Competent person scheme _____ Competent person registration number _____

Notice to householder:

1. Where Box W has been ticked, a non-condensing oil boiler may be installed before 01 April 2007.
2. Where box X is ticked, a like-for-like replacement boiler is reasonable.
3. Where Box Y has been ticked or box Z has been ticked and the assessment score in section 13 exceeds 1000, this document may be used as evidence that installation of a condensing boiler has been assessed as impractical or uneconomic. **Nevertheless you may choose to exceed the Building regulations requirement** if a suitable installation option can be found. Condensing boilers are more efficient and therefore save on fuel costs and cause less harm to the environment. You may be eligible for a grant that defrays some of the additional costs – contact your local energy efficiency advice centre, or the energy efficiency helpline of your gas or electricity supplier (phone number on back of bill).
4. You should retain this form. It may be required when you sell your home.

Points for property type and fuel

Building type	**Natural gas**	**LPG**	**Oil**
Flat	710	660	830
Mid-terrace	640	580	790
Others (end-terrace semi-detached, or detached)	590	520	760