Energy Efficiency **Partnership** for Homes

The Domestic Heating & Hot Water Guide

to the Building Regulations 2001 – Part L1

This guide is supported by
The Energy Efficiency Partnership for Homes
and produced in consultation with the

DTLR
Transport Local Government Regions

Contents

This guide has been produced on behalf of Energy Efficiency Partnership for Homes

by

SBGI Society of British Gas Industries

TACMA

WMA

Central Heating Information Council

The Domestic Heating and Hot Water Guide to the Building Regulations 2001 – Part L1

EXECUTIVE SUMMARY

The Building Regulations for England and Wales have recently been amended and come into force on 1st April 2002. The Approved Document L1 2002 (ADL1), *Conservation of fuel and power in dwellings*, has been published and replaces the content of the 1995 edition relating to dwellings.

Significant changes have been introduced by this amendment. For the first time the regulations apply when a boiler or hot water cylinder is changed in an existing dwelling and minimum efficiency standards for boilers and hot water cylinders are introduced for new build and replacement situations.

Approved Documents are intended to provide practical guidance on the interpretation of the legal requirements of the regulations. Some aspects of the ADL1 document, however, are not so clear and are open to interpretation. This guide is intended to give the minimum requirements to be confident of meeting the regulations. It is aimed at specifiers, installers, heating engineers and heating system designers and may also be of interest to Building Control officers.

This guide has been produced by representatives of the heating industry and the content has been accepted by the DTLR Building Regulations Division as a reasonable interpretation of the legal requirements and the Guidance in the Approved Document L1 that comes into effect on 1st April 2002.

INTRODUCTION

- The latest revision to the Building Regulations Part L make significant changes to the 1995 version.
- The regulations have been divided into two sections, the first dealing with dwellings and the second with other types of buildings. This guide only covers those Regulations in Part L1 dealing with dwellings.
- The requirement relating to heating and hot water systems has been changed to include the whole system performance and not only the controls as previously.
- The regulations have been expanded to include boilers and hot water vessels that are being replaced in an existing property.
- The requirements call for heating and hot water systems to be fully commissioned and there are requirements on the provision of operating and maintenance instructions.
- It is important to note that Part J, *Combustion appliances and fuel storage systems* of the Building Regulations, has also been amended and these changes also come into effect on 1st April 2002. These, for example, impose greater restrictions on the positioning of flue terminals and require notice plates. These requirements are not covered in this document.
- This guide only covers changes to the aspects of the regulations relating to heating and hot water systems. There are also changes to other aspects of the regulations relating, for example, to replacement windows.
- The regulations as applied in Scotland have also been revised. The equivalent in Scotland is the Part J, *Conservation of fuel and power*, of the Building Standards (Scotland) Regulations. Although similar to Part L1 in many respects there are important differences and these are covered where appropriate.
- Northern Ireland is covered by the Building Regulations (Northern Ireland) 2000 Part F. These have yet to be revised in light of the move towards higher efficiencies.

NEW DWELLINGS

Scope

- The regulations apply to all new dwellings, major extensions or alterations and where there has been a change in the way the building is used.
- Where the total floor area exceeds 150m^2 there are additional controls requirements.

Boiler and Heating System Considerations

- The boiler will have been specified as part of the application for building control approval.
- Compliance with Part L1 of the Building Regulations will have been demonstrated by one of three methods:
  – Elemental
  – Target U-value
  – Carbon Index
- Each imposes slightly different requirements on the space heating and hot water systems.
- If the 'Elemental' method is used then a minimum mains gas (methane or natural gas) boiler SEDBUK value (see box) of 78% is required. The equivalent values for LPG and Oil appliances are 80% and 85% respectively.
- If either the 'Target U-value' method or 'Carbon Index' method has been used, then it is possible, but perhaps unlikely, that a boiler with a SEDBUK value lower than the quoted minimum has been used. If this were the case then higher levels of insulation would have been specified in the building construction to compensate.
- Within the Target U-value method, higher boiler SEDBUK values may have been used to offset against lower values of insulation of the structure.
  Note: This trade off cannot be used in Scotland.

SEDBUK Values

The SEDBUK value for a particular appliance can be found from a number of sources:

- *Boiler Efficiency Database: A database is available on the internet at* **www.boilers.org.uk** *that includes information on the majority of boilers available and many that have ceased production. This database is updated on a monthly basis.*
- *'The Little Blue Book of Boilers': The Boiler Efficiency Database is provided in print form by the EST. Although this will not be as up to date as the internet version, updates will be produced. (not all boilers are included and it cannot be assumed that because a boiler is not listed that it does not meet the requirements). A copy can be obtained by ringing 0845 727 7200.*
- *Manufacturers' literature: Manufacturers will include the SEDBUK value in their literature. These will be included in an agreed form of words so that there can be no confusion with other efficiency values.*
- *Manufacturers' Technical Services: Manufacturers will supply SEDBUK values for their products on request.*

- Any space heating pipework that is outside the heated space must be insulated. The insulation must have a thermal conductivity no greater than 0.035W/m.K and the thickness should be at least that of the pipe diameter. In some unheated areas it might be necessary to use greater insulation to protect against freezing.

Hot Water Storage System Considerations

- Vented systems:
  In the case of vented copper cylinders, compliance should be demonstrated by fitting products labelled as conforming to the relevant British Standards i.e. BS1566 & BS3198. The installer should look for clear labelling on the product such as a BSI Kitemark, Registered firm status or reference to an equivalent quality control scheme. Vented cylinders in materials other than copper should also be labelled as complying with the heat loss and heat exchanger requirements of BS1566.[1]

- Unvented systems:
  For Unvented hot water storage systems products should either be labelled as complying with BS7206 and/or certified by the BBA, WRc or other accredited body as complying with Building Regulations.

- Primary Stores:
  Due to the higher than normal storage temperatures, it is very important that these are well insulated. Typically the insulation thickness is in excess of 50mm.
  A way of demonstrating compliance for primary storage systems would be to meet the requirements of the 1999 WMA performance specifications for thermal stores.

Controls

- All boiler based heating systems need to be fully pumped and must provide independent temperature and time control to both the heating and hot water circuits and have a boiler control interlock.

- Space Heating Temperature control:
  The space heating system must be split into temperature zones with separate control[2].
  This can be achieved by the use of:
  – room thermostats in all zones or
  – programmable room thermostats in all zones or by:
  – a room thermostat or programmable room thermostat in the main zone and
  – TRVs on all radiators in the second or further heating zones.

- If the boiler manufacturer's instructions advise that a bypass is to be fitted, as a requirement of the new boiler, then an automatic by-pass valve must be used in conjunction with any requirements for a minimum pipe length specified in manufacturer's instructions.

- Hot Water Temperature Control:
  Where the hot water is supplied from a storage system then the stored water temperature must be controlled by a cylinder thermostat[3].

- Time control:
  Totally separate time control is required on the space heating and hot water systems.
  This can be achieved by the use of:
  – a full programmer (allowing the time settings for space heating and hot water to be fully independent) or
  – two or more separate timers.

- In dwellings with a total floor area greater than 150m^2 it is considered reasonable to provide more than one space heating circuit each having separate timing and temperature controls. This can be achieved by:
  – multiple heating zone programmers or
  – a single multi-channel programmer

- In the case where the hot water is produced instantaneously, such as with a combi boiler, then time control is not appropriate for the hot water circuit. All heating zone requirements still apply.

---

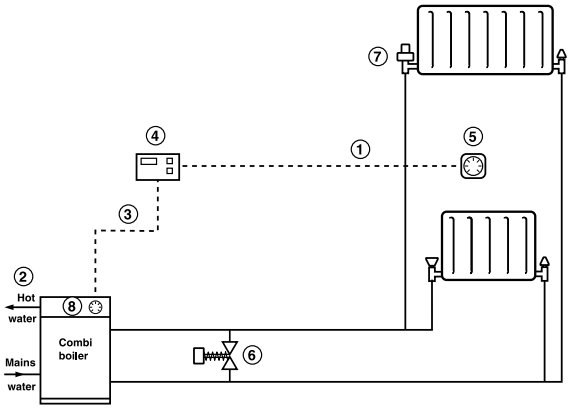
1 *'Medium Duty' cylinders with sub-standard insulation thickness and reduced coil length do not comply.*

2 *In some small dwellings, such as single storey, open-plan flats and bed-sitters, sub-zoning of temperature control is not appropriate.*

3 *Non-electric thermal controllers are not suitable.*

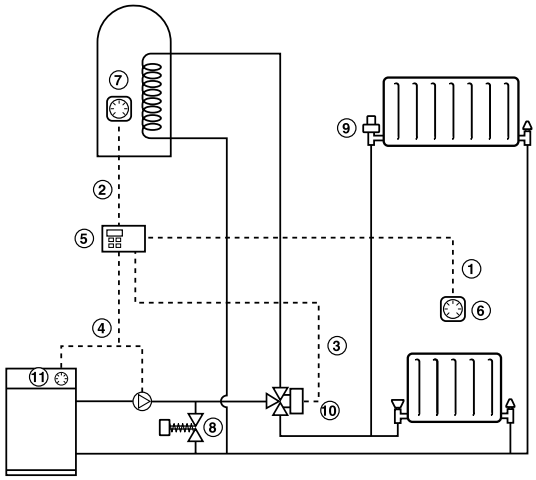
- Boiler Control Interlock:
  The boiler and pump must be wired such that when there is no call for heat from either the space heating or hot water circuits then the boiler and pump[4] are switched off. This is achieved by the correct installation of the room thermostat(s) or programmable room thermostat(s), hot water cylinder thermostat and zone valve(s) as appropriate. The use of TRVs alone does not meet this requirement.

Typical combi system control diagram



1. Time and temperature control to space heating
2. Flow to hot water outlets
3. Time control to space heating and boiler interlock
4. Timer to heating area
5. Room (or programmable room) thermostat
6. Automatic by-pass valve to the system
7. TRV's on all radiators except in the rooms with a room (or programmable room) thermostat
8. Boiler thermostat

Typical fully pumped system control diagram



1. Time and temperature control to space heating
2. Time and temperature control to stored hot water
3. Switching of zone valve or valves
4. Boiler and pump interlock
5. Full programmer or two or more seperate timers
6. Room (or programmable room) thermostat
7. Cylinder thermostat
8. Automatic by-pass valve to the system
9. TRV's on all radiators except in rooms with a room (or programmable room) thermostat
10. Zone valve (or valves)
11. Boiler thermostat

[4] *The pump should switch off after any pump overrun period has finished. This is controlled by the boiler or boiler management control system.*

EXISTING DWELLINGS

Scope

- The replacement of a boiler or hot water storage vessel is now covered by the regulations[5]. This may require some upgrading of the system and/or controls.
- When a new installation is provided in an existing dwelling, the heating and hot water systems should be selected on performance as if for a new dwelling.
- The equivalent Scottish Regulation, Part J, that is the equivalent to the Part L1 for England and Wales, does not refer to existing dwellings.

Boiler and Heating System Considerations

- A key element of the new regulations is the setting of a minimum boiler efficiency. This is expressed in terms of SEDBUK value (see box on page 4). The minimum efficiency for replacement boilers is based on a SEDBUK value of 78% for Mains Gas[6]. Back boilers are the exception in that the minimum SEDBUK required is 75%.
- There are minimum efficiency requirements for fuels other than Mains Gas. Boilers fuelled by LPG or Oil require minimum SEDBUK values of 80% and 85% respectively. An LPG fuelled back boiler would require a minimum SEDBUK of 77%. For an Oil fired combi boiler a value of 82% is acceptable.
- Solid fuel boilers should have an efficiency not less than that recommended for its type in the HETAS certification scheme.
- It is likely that boiler packaging will be labelled to show that the boiler is compliant.
- It is unlikely that standard mains gas boilers with SEDBUK efficiencies below 78% will be available in England and Wales. It is, however, important that a check is made to ensure that the boiler SEDBUK value does meet the requirements.
- The requirements apply if the replacement is by a new but similar system or by a different type of system.
- Where primary pipework is altered or replaced then the new pipes should be insulated where they are outside the heated space.

Other Forms of Heating

- Warm air heating units are not covered by the SEDBUK scheme. There is no limit in the regulations on their performance, beyond that they should meet the requirements of BS EN778:1998, and new warm air units can still replace existing units. Insulation should be provided on any ducts that are newly installed or changed.

Hot Water Vessels

- For the first time the replacement for a hot water vessel must meet the same standard as that fitted in a new dwelling. In the context of the Building Regulations the term “vessel” means any hot water storage vessel including vented copper cylinders, unvented systems and thermal stores.
- Vented systems
  In the case of vented copper cylinders, compliance can be demonstrated by fitting products labelled as conforming to the relevant British Standards i.e. BS1566 & BS3198 as for new dwellings.[7]
- Cylinders labelled type P are only suitable for pumped primary systems. Type G should ideally be pumped but can be used on gravity systems.
- Unvented systems and Primary Stores should be labelled as for new dwellings.
- All the pipes connected to a hot water vessel (including the primary flow and return connections and the vent pipe) should be insulated for at least a metre in length or up to the point at which they are concealed to limit summer heat loss from the vessel.

---

5 *The regulations only apply if the total useable floor area (not just the plan area) of the dwelling is greater than 50m².*

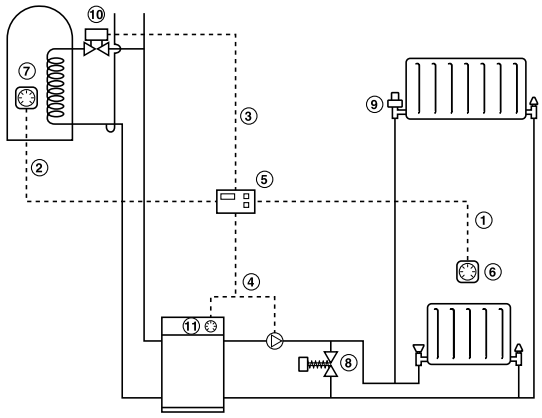
6 *In the case of replacement boilers installed in the period between the 1st April 2002 and the 31st August 2002, a boiler with a lower SEDBUK value than those above could be used as long as the system controls meet the requirements for new dwellings including at least one programmable room thermostat.*

7 *‘Medium Duty’ cylinders with sub-standard insulation thickness and reduced coil length do not comply.*

Controls

- When replacing the boiler and/or hot water storage vessel, the opportunity should be taken to improve the system controls. To be confident that the requirements are met this would entail:
  - that for fully pumped systems the control system should provide time and temperature control to both the heating and hot water circuits and a boiler control interlock.
  - Temperature control:
    The space heating system should be split into zones.[8] If a room thermostat is already fitted then fit TRV's on at least those radiators in the sleeping areas if not already fitted. If no room thermostat is fitted then one should be fitted in conjunction with the TRVs. If the boiler manufacturer's instructions advise that a bypass is to be fitted as a requirement of a new boiler, then an automatic by-pass valve must be installed in conjunction with any requirements for a minimum pipe length specified in manufacturer's instructions.
  - Time control:
    Time control can be provided by:
    – a full programmer[9] or
    – a standard programmer[10] or
    – a mini programmer[11] or
    – time switches.
- In the case where the hot water is produced instantaneously, such as with a combi boiler, then time control is not appropriate for the hot water circuit. All heating zone requirements still apply.
- Boiler Control Interlock:
  The boiler and pump must be wired such that when there is no call for heat from either the space heating or hot water circuits then the boiler and pump[12] are switched off. This is achieved by the correct installation of the room thermostat(s) or programmable room thermostat(s), hot water cylinder thermostat[13] and zone valve(s) as appropriate.
- Semi gravity systems:
  If the existing installation has a gravity primary circuit to the hot water cylinder then, if either the new boiler or cylinder requires to be used on pumped circuits only, the installation must be converted to fully pumped. The controls should then be treated as detailed above.
- If it is not proposed to convert the existing gravity circuit to the preferred option of fully pumped, or if this would be impractical, it can be retained[14] although the controls should be upgraded. This should include:
  – a cylinder thermostat[13] and zone valve to control the temperature of the hot water circuit and provide a boiler interlock,
  – a room thermostat
  – a programmer or time switch
  – TRVs on the radiators in the sleeping areas.

Typical semi gravity system diagram with recommended appropriate controls



1. Time and temperature control to space heating
2. Time and temperature control to stored hot water
3. Switching of zone valve
4. Boiler and pump interlock
5. Timing control using either a full, standard or mini programmer or seperate timers
6. Room (or programmable room) thermostat
7. Cylinder thermostat
8. Automatic by-pass valve to the system
9. TRV's on at least all radiators in the sleeping area
10. Zone valve
11. Boiler thermostat

8 *In some small dwellings, such as single-storey, open-plan flats and bed-sitters, sub-zoning of temperature control is not appropriate.*

9 *A full programmer allows the time settings for space heating and hot water to be fully independent.*

10 *A standard programmer uses the same time settings for space heating and hot water.*

11 *A mini-programmer allows space heating and hot water to be on together, or hot water alone, but not heating alone.*

12 *The pump should switch off after any pump overrun period has finished. This is controlled by the boiler or boiler management control system.*

13 *Non-electric thermal controllers are not suitable*

14 *If a boiler is being replaced as part of a semi gravity system, it is important to select a boiler capable of operation on semi gravity systems.*

COMMISSIONING – NEW AND EXISTING SYSTEMS

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 must be commissioned in accordance with the manufacturer's instructions. These instructions will be specific to the particular boiler and/or hot water storage system.

Responsibility for ensuring compliance with the Regulations rests with the building control body, which can exercise discretion to inspect and test for compliance. However, further changes to the Building Regulations have enabled certain 'controlled services' to be self-certified by the person undertaking the work. If they are members of an approved competent persons scheme. Members of such schemes do not need to notify the work to the building control body, but to show compliance must provide a 'commissioning certificate'. The regulations specifically state that a ***Benchmark*** log book (see box) meets these requirements.

Every ***Benchmark*** license holder will provide a log book with the appliance. If this is not available contact the manufacturer who will provide a replacement. The person who commissioned the work must complete the relevant sections to record that he has carried out the checks to ensure efficient operation of the equipment.

The person completing the ***Benchmark*** log book must have a 'recognised qualification' (see page 10), or if they do not, 'provide or obtain a written declaration of successful commissioning'.

The ***Benchmark*** log book or alternative commissioning certificate must be left with the owner, an appointed agent, or the end user. The log book will need to be available for inspection by a building control body or its agent.

The installer must give a full explanation of the system and its operation to the user, including the manufacturer's instructions where these are provided.

Benchmark Log Book

The Regulations refer to a 'commissioning certificate' and indicate that the ***Benchmark*** *log book is suitable for this purpose and will be available in the equipment packaging for the following product categories:*

Gas fired boilers
Gas fired combined primary storage units (CPSU)
Oil fired boilers (some manufacturers)
Unvented water storage vessels

Vented storage vessels will be provided with an adhesive label attached to the vessel that will fulfil the function of a 'commissioning certificate'.

Benchmark *log books have been produced in consultation with the DTLR. If the log book does not indicate this on the front cover, the manufacturer will supply the correct version.*

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 Central Heating Information Council Ltd. and the content is copyright). Check the list of licence holders on* **www.centralheating.co.uk**

DOCUMENTS REFERRED TO:

1. Controls for domestic central heating and hot water – guidance for specifiers and installers – GPG 302 BRECSU
2. Performance specification for thermal stores, 1999 – Water Heater Manufacturers Association (WMA)
3. Central heating system specifications (CHeSS) year 2000 – GIL 59 BRECSU
4. BS EN778: 1998
5. Domestic central heating and hot water: systems with gas and oil fired boilers – GPG 284 BRECSU

Recognised Qualifications

For the purposes of installing hot water central heating and domestic hot water systems, the following definitions apply:

'Recognised qualifications' are defined as:

For gas fired hot water central heating boilers	*CORGI registration based upon certificates of competency in gas safety (ACS modules CCN1 and the domestic central heating module, or a valid ACOPS equivalent).*

This is a statutory requirement relating to Gas Safety Regulations (Installation and Use) 1998. Persons without this registration cannot be employed by others to work on gas appliances.

For oil fired hot water central heating boilers, oil tanks and oil pipework	*OFTEC registration is available for:* *Appliance installation. OFT105* *Appliance commissioning. OFT105* *Installation of oil tanks and pipework. OFT105 or OFT 101 or OFT600A*
For solid fuel hot water central heating	*HETAS registration*
For unvented hot water storage systems	*Holders of a current Registered Operative Identity Card issued by the following registration bodies:* *i) BBA* *ii) CITB* *iii) IoP* *iv) AIUHWS*
For vented hot water storage systems	*There is currently no formal requirement for this.*

Definitions of 'Competent Persons' were approved by the Secretary of State for Transport, Local Government and the Regions in February 2002.

Glossary

AIUHWS	The Association of Installers of Unvented Hot Water Systems (Scotland and Northern Ireland)
BBA	British Board of Agrément
BRECSU	Building Research Energy Conservation Support Unit
CHIC	Central Heating Information Council
CITB	Construction Industry Training Board
CORGI	Council for Registered Gas Installers
DEFRA	Department for Environment, Food and Rural Affairs
DTLR	Department for Transport, Local Government and the Regions
EST	Energy Saving Trust
HETAS	Heating Equipment Testing and Approval Scheme
IoP	Institute of Plumbing
OFTEC	Oil Firing Technical Association for the Petroleum Industry
SBGI	Society of British Gas Industries
SEDBUK	Seasonal Efficiency of Domestic Boilers in the UK
TACMA	The Association of Controls Manufacturers
WMA	Water Heater Manufacturers' Association
WRc	Water Research Council

Energy Efficiency **Partnership** for Homes

This leaflet is supported by

The Energy Efficiency Partnership for Homes and the information produced in consultation with the Department for Transport, Local Government and the Regions

SBGI Society of British Gas Industries

TACMA

WMA

Central Heating Information Council

BRPL1-02-20K