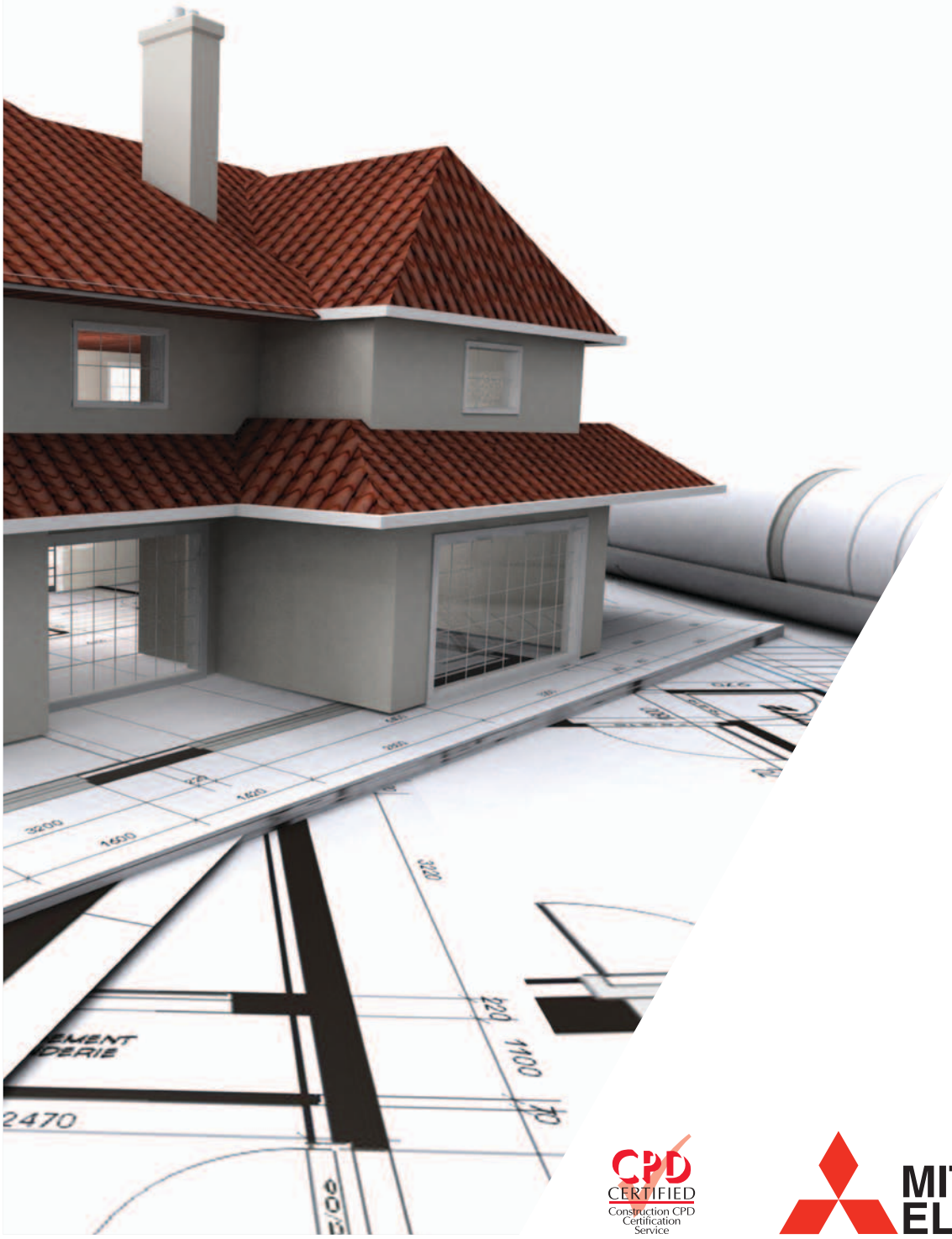
INFORMATION GUIDE

Part L Update

ISSUE 33



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Guide to Part L of the building regulations 2010

This is an independent guide produced by Mitsubishi Electric to enhance the knowledge of its customers and provide a view of the key issues facing our industry today. The guide accompanies a series of seminars, all of which are CPD accredited.

The changing face of construction in the 21st century demands that designers, specifiers and suppliers work as teams to create better buildings for occupants and the environment.

Mitsubishi Electric aims to be a part of this by encouraging employees and customers to work together to increase their knowledge of the latest technology, legislation and markets.

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The next changes to Part L are due to be introduced into law in October 2010, and they will continue to have a major impact on the way that new buildings are designed and constructed.

Part L
BRUSHING UP ON 2006

Part L of the Building Regulations has proved one of the most influential pieces of legislation for the construction industry. The last update in 2006 introduced the European Directive on Energy Performance of Buildings (EPBD) into UK law. As a result, we saw new targets on emissions rates from new buildings; a new form of calculation methodology for those emissions; and principles such as consequential improvements and building log books.

The next changes to Part L are due to be introduced into law in October 2010, and they will continue to have a major impact on the way that new buildings are designed and constructed, as well as the way we refurbish our existing building stock. As before, Part L relates to domestic as well as commercial buildings, although in this Guide we will focus on the non-domestic sector.

There are a number of drivers behind this update. Firstly, it has always been the intention to keep Part L updated to reflect changes in the performance of building technologies as well as the main sources of energy for our buildings – whether fossil fuel based, or increasingly, renewables. Secondly, a number of other schemes and programmes have been introduced which require the introduction of tighter targets on buildings through Part L. These include the five-point UK Low Carbon Transition Plan, the Carbon Change Act (last updated in 2009) as well as the CRC Energy Efficiency Scheme.

There are no radical changes to Part L 2010 – it is more a case of evolution than revolution. However, there are important new elements and targets introduced that anyone involved in the design, build and operation of buildings will have to understand. It is useful therefore to take a quick overview of the key elements of the current Part L 2006 as a reminder of the fundamentals.

Part L 2006 introduced the notion of a Target Emission Rate (TER) for new buildings. This is calculated using the National Calculation Methodology (NCM) using software known as SBEM (Simplified Building Energy Model). The overall aim of the TER is to assess the design of a new building, by comparing it to similar notional building constructed to Part L 2002 standards. Non-domestic buildings had two key targets for reducing emissions against the 2002 legislation:

Non-domestic, heated only: 24%

Non-domestic, mechanically cooled 28%

Part L 2006 also requires the installation of metering systems to allow at least 90% of the annual energy consumption of each fuel to be assigned to various end-use categories (heating, lighting, cooling etc). For buildings with a total useful floor area of more than 1000m^2, automatic meter reading and data collection should be included.

The current standards in Part L 2006 also demand that solar gains are limited through good design and use of shading and other solar control measures. Air tightness is also a cornerstone of Part L 2006, which introduced mandatory pressure testing for new buildings.

Another important concept in Part L is consequential improvements. The factors that trigger consequential improvements have not been changed for Part L 2010, and need to be borne in mind by designers:

Extensions

Material change of use

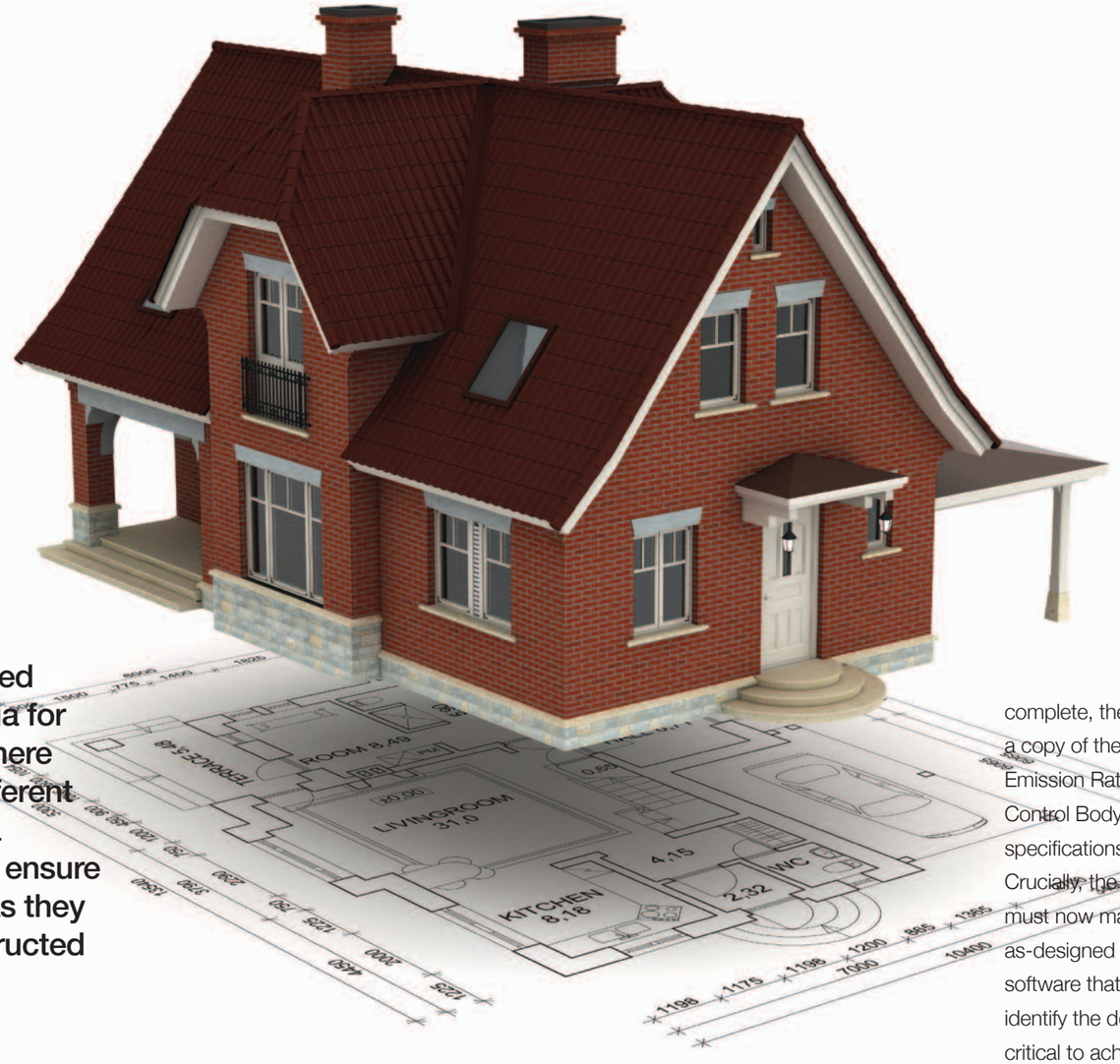
Controlled systems (provision, extension, alteration or renovation of a controlled element, service or fitting including walls, floors and roofs).

With these key points in mind, our next section looks at how the latest changes to Part L will affect the requirements for new and existing commercial buildings.

Part L 2006 introduced the notion of a Target Emission Rate (TER) for new buildings. This is calculated using the National Calculation Methodology (NCM) using software known as SBEM (Simplified Building Energy Model).

** Readers of this Guide may find it useful to read the Mitsubishi Electric Guide to Part L 2006, which is downloadable as a free PDF from the Mitsubishi Electric website.*

Part L 2010
MATCHING DESIGN TO REALITY



The main elements of Part L will not be changed in the 2010 version, for example the five criteria for new-build compliance will remain. However, there are some significant developments in how different types of building will be treated, and there is a strengthening of areas such as compliance to ensure that there is less of a gap between buildings as they are designed, and buildings as they are constructed and operated.

One of the most important changes for Part L 2010 is that there is now recognition that some building types can achieve a reduction in energy use more cost-effectively than others. An office or hotel, for example, has very different end-use energy consumption profiles. The aim is to achieve an overall national average reduction in CO_2 emissions of 25% against Part L 2006 standards. However, some building types will be expected to achieve more than this; others less. The range is between 18% and 38%. The system has been optimised to deliver the national target when applied across the building mix, and to try to ensure that all new non-domestic buildings achieve the required level of improvement at approximately the same cost of carbon mitigation.

As with Part L 2006, each new building is allocated a Target CO_2 Emission Rate (TER). This number represents the minimum energy performance requirement for a new building and is expressed in terms of the mass of CO_2 emitted per year, per square metre of the total useful floor area of the building – kg/m^2/year. The method for calculation is Government-approved and is already reflected in the new SBEM software, updated for 2010.

Because the new Part L recognises that different building types can achieve energy efficiency, and hence CO_2 emissions, improvements more cost-effectively than others, the TER method has changed slightly. Rather than basing the TER on a 2002 notional building and then adding an 'improvement factor' (as is the case for Part L 2006), the TER is based on a notional building of the same size and shape of the actual building, constructed to concurrent specification.

Developers have the freedom to vary the specification, as long as the same overall level of CO_2 emissions is achieved or bettered.

Once the design of the new building is complete, the design team must lodge a copy of the predicted Building Emission Rate (BER) with the Building Control Body (BCB), along with the specifications that will achieve the TER. Crucially, the TER and the as-built BER must now match or exceed the as-designed BER. Also, the SBEM software that generates the BER will identify the design features that are critical to achieving compliance. If changes are made to the specifications lodged with the BCB, a list of changes must be handed over with a certificate signed off by a 'suitably accredited' energy assessor.

It is possible for the BCB to check this up to five years after the building is complete. This is perhaps one of the most significant elements of Part L 2010, and looks set to fundamentally change approaches to 'value engineering' and alterations to specifications as construction progresses.

This is part of an overall drive within Part L 2010 to ensure that the actual building and its performance in terms of energy and carbon emissions match those presented at the design stage.

The SBEM software that is used to generate the TER has been relaunched for Part L 2010. There have been some very important alterations to the algorithms behind the scenes.
Most important of these are changes to the emission factors (EFs) relating to different fuels. The EF is a figure that in simple terms shows the amount of carbon dioxide emissions associated with a given fuel source. It is very important for designers to note that for Part L 2010, almost all fuels have seen their emission factors increase.
The table below shows the existing and new figures.

Fuel	2006 kg/CO_2/kWh	2010 kg/CO_2/kWh	Change
Grid-supplied electricity	0.422	0.517	+22.5%
Electricity displaced from grid	0.568	0.529	-6.9%
Mains gas	0.194	0.198	+2%
Heating oil	0.265	0.274	+ 3.3%
Wood pellets	0.025	0.028	

Existing buildings – Part L2B

It is widely accepted that if the UK is to meet it's emissions reduction targets, we must address the performance of existing buildings. Part L2B 2010 addresses the new requirements for improving our existing non-domestic building stock. The basic principle for existing buildings continues to be that whenever building work is carried out, elements of this work should meet certain minimum standards.

There is no CO_2 target given, except for very large extensions to existing buildings. However, when carrying out building works, there is a requirement to make additional improvements to the fabric and services of the whole building to improve its energy consumption, and ensure the building complies with Part L. The factors which trigger these consequential improvements are the same as for Part L 2006.

Part L 2010 documentation states that the improvements should be 'practical and economically feasible', and sets out examples of these. Potential improvements include upgrading heating, cooling or air handling systems that are more than fifteen years old; or installing energy metering.

A word on Part F

Part F of the Building Regulations deals with Means of ventilation in domestic buildings and non-dwellings. An important point to note is that with increasing requirements for air tightness in both commercial buildings and dwellings comes a greater requirement for ensuring that ventilation is adequate.

Part F will also be updated in October 2010 and the whole building ventilation rate for air supply to offices will be 10 litres per second, per person (l/s per person). The documentation for Part F 2010 also places increased emphasis on installation and commissioning of installation systems to ensure that they meet design specification. Installers need to be aware of these new developments and should check the documentation for Part F.

Our next feature will examine some other key changes introduced with Part L 2010, including tighter limits on design flexibility and solar gain.

Part L 2010
HIGHER MINIMUM STANDARDS

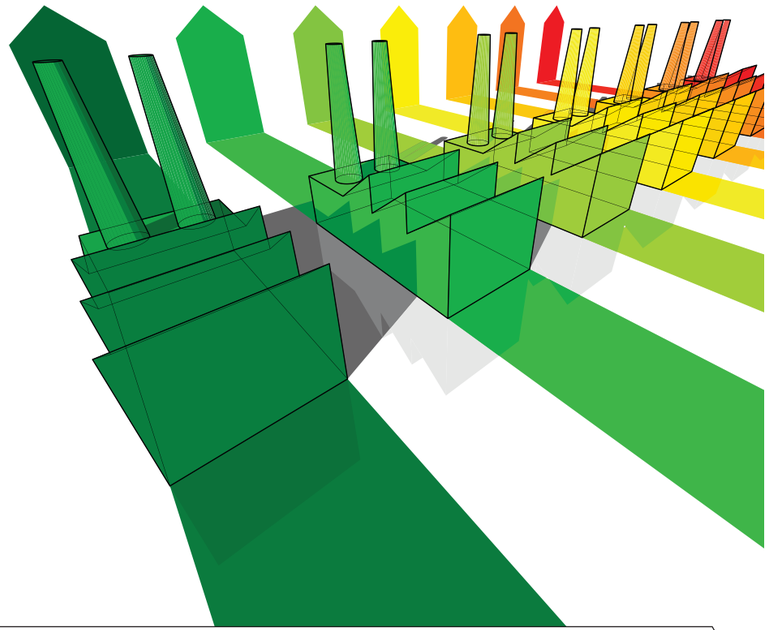
The new approaches to calculating how a building should perform are based on tightening of the minimum standards associated with various building elements such as air conditioning, solar gain and air permeability. Anyone involved in the design, construction and operation of buildings should also be aware that the Compliance Guides and Technical Manuals (TMs) that accompany the new legislation contain much more detailed information than in previous years, and should be read carefully.

The notional building model has also been altered to make it more realistic.

Changes to the 'notional building' used to calculate the Target Emission Rate (TER) have also been made to make this notional building a more realistic reflection of actual buildings. For example, the notional building now recognises that different types of building are likely to use different types of heating: most commercial buildings use boilers; warehouses tend to opt for radiant heating. The calculation software can now recognise the most likely system for a given building type.

The new notional building also includes a new approach to glazing options with three main categories: top lit, side lit and non-lit. They are intended to create a more life-like notional building. These options reflect new limits on solar gain per unit area of the façade of a new building.
The limits will apply to all buildings, not only those that are air conditioned. The intention of this change is to limit the need for air conditioning, or to reduce the required capacity for installed systems.

Part L 2010 also sets minimum efficiency levels for building services plant. The new efficiency levels have been set in collaboration with industry, and are set out in the *Non-domestic building services compliance guide (NDBSCG).* Part L 2010 also requires that 'effective controls be provided'. This includes controls to ensure that if a building has heating and cooling, they cannot operate simultaneously in a given space. The default condition for central plant should be 'off '.



Energy efficiency levels claimed for any fixed building service should have test data certified by a notified body. Part L 2010 documentation states that it is 'reasonable' for Building Control to accept this information at 'face value'.

Measurement of energy consumed continues to be a requirement, with a new rule that "output of any renewable electrical energy generation system is to be separately monitored". The types of metering covered by this clause include: electric (kWh); gas (m3/h); water (m3/h); solid fuel (kg/h); heat metering for water-based systems (m3/h + calorific value or kWh).

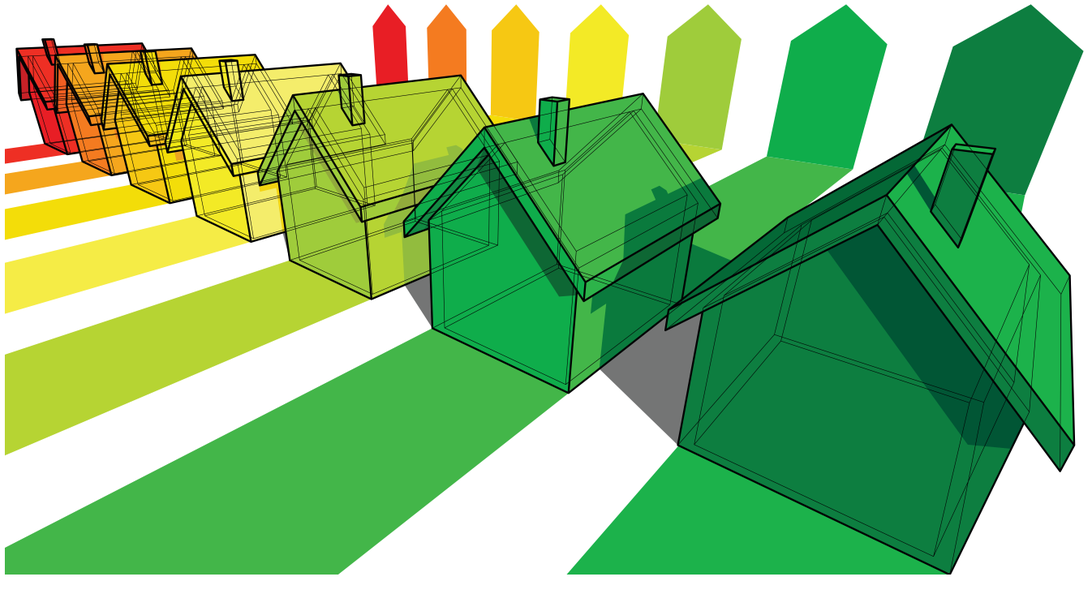
The methods for monitoring are set out in CIBSE's TM39: *Building Energy Metering 2009 publication.*

As might be expected, there are higher standards for air permeability of new non-domestic buildings, as well as thermal bridging. Pressure testing continues to be mandatory.

A central theme of the new Part L is that the gap between a building as-designed and as it performs should be minimised. With this in mind, it is no surprise to find that commissioning and log books play an increasingly important role. A commissioning plan should be handed to Building Control at the design stage. Part L 2010 documentation recommends the use of templates in the Model Commissioning Plan from BSRIA to document the process.

On handover of the building, the owner should receive a building log book which contains information about the fixed building services and their maintenance requirements 'so that the building can be operated in such a manner as to use no more fuel and power than is reasonable in the circumstances'.

The CIBSE TM 31 Building Log Book Toolkit is recommended. The log book should also include all the information used to calculate the TER and BER. Recommendations contained in the Energy Performance Certificate (issued on construction of a new building) must also be included so that the owner is aware of any steps that can be taken to further improve the energy performance of the building.



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Summary

The new Part L 2010 has addressed a number of issues that were raised by industry experts regarding the 2006 version. This includes a more realistic notional building; tougher requirements on the as-designed building matching the completed building; and higher minimum standards for the energy performance of building services. In summary, there are five main criteria for compliance with Part L 2010.

A new building must:

1. Achieve the Target Emission Rate (TER) using the new modeling software. Different building types will be expected to achieve different levels of improvement on the notional building – from 18% to 38%. This is the aggregate approach, and the objective is to achieve a national overall improvement in CO_2 emissions from new non-domestic buildings of 25% against 2006 standards.

2. Achieve or improve upon the new 'worst acceptable' standards for building fabric and fixed building services. Efficiency levels are set out in the NDBSCG. Provision for controls and metering must also be made.

3. Limit solar gains in summer. The aim is to reduce the need for air conditioning. This applies to all non-domestic buildings.

4. Meet standards for air permeability and thermal bridging. Commissioning is also given a higher priority and a commissioning plan should be included at the design stage and given to Building Control.

5. Include information on efficient operation of the building for the owner, including a building log book. Recommended guidance is available from CIBSE and BSRIA.

Further information

For free download of the Approved Documents see:

http://www.planningportal.gov.uk/england/professionals/buildingregs/technicalguidance/bcconsfppartl/bcconsfppartlappdoc/

You will also find publications such as the Non-domestic building services compliance guide (NDBSCG) here – downloadable in PDF format.

www.cibse.org

For information on CIBSE guidance and also Technical Manuals including TM 39.

www.communities.gov.uk

Includes information on software tool approved by government for calculation of TER/BER rates.

www.bsria.co.uk

For information on access to the Model Commissioning Plan.

www.bre.co.uk

Information on areas such as U-value calculations and thermal bridging.

www.2010ncm.bre.co.uk

The website for the Simplified Building Energy Model (SBEM) including a user manual and software.

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If you missed the CPD seminar on **Part L Update** you can call your Mitsubishi Electric Regional sales office to arrange an in-house presentation of this information.

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