# Building Regulations Part L 2006 Complex

Compliance using electric heating

#### Introduction

#### On the 14th September 2005, the government announced that it will implement a new Approved Document L of the Building Regulations (England and Wales).

This follows a period of consultation which began in the summer of 2004 and has seen the rules for setting carbon targets and achieving compliance in new dwellings changing to a very different set that originally proposed.

This document provides an overview of the proposed changes and the considerations that will need to be made for electrically heated dwellings.

### What is Building Regulation Part L?

Part L is the section of the Building Regulations that deals with conservation of heat and power from new and existing buildings, both domestic and non-domestic (i.e. commercial).

### Why is it being updated again?

The Government has a legal commitment to implement the European Directive on Energy Performance in Buildings, which requires all new and existing buildings to be given an energy rating and for new buildings to meet a minimum standard of energy efficiency.

These ratings must be based on carbon emissions (which the current Part L methodology does not necessarily require).

The Government also has numerous other policy objectives to reduce carbon emissions from our building stock; Part L is seen as the main vehicle by which the requirements of these and the EPBD can be achieved.

#### When will the changes take place?

The government announcement of 14th September stated that the changes will be implemented from April 2006.

#### What is the detail of the changes to Part L?

There are a number of sections to Part L. Part L1A deals with the requirements for new dwellings.

For new dwellings, the current compliance methods (elemental, target u-value and carbon index) are to be abolished, to be replaced by a new "whole building" methodology based on carbon emissions (kgCO<sub>2</sub>/m<sup>2</sup>/yr).

In order to demonstrate compliance, designers must demonstrate that the predicted actual carbon emissions from the building (known as the Dwelling carbon dioxide Emission Rate) are less than or equal to a calculated target (Target carbon dioxide Emission Rate).

Improvements to the building fabric elements or heating system efficiency improve the DER, allowing compliance to be achieved.

For new buildings, minimum air tightness standards will apply, which will have to be confirmed on building completion by sample pressure test results.

#### How are the TER and DER calculated?

A new version of SAP (SAP2005) has been produced to enable the calculations to be carried out.

The TER is calculated using a "notional" building of the same floor area/shape/etc as the one being designed, with default element u-values and heating/hot water/ventilation systems applied, thus a carbon emissions figure can then be calculated.

Various improvement factors and allowance factors for different fuel types are then applied using a standard formula in Part L, and hence the TER target in kgCO<sub>2</sub>/m<sup>2</sup>/yr is produced.

The DER figure is calculated by applying the proposed building details (floor area/shape/u-values/air-tightness/heating/hot water/ventilation/etc) to SAP, which will produce a predicted carbon emissions figure for the building.

#### What are the practical implications of these changes?

As well as implementing a mandatory carbon based compliance method to provide a means for the government to meet its legal obligations, improvements in the energy-efficiency of buildings will also be demanded.

For new buildings, the new regulations require an energy (carbon) efficiency improvement of around 20% over the Part L 2002 standards, meaning that any new building - irrespective of the heating fuel type used - will require improvement to the thermal insulation levels and/or heating/hot water system efficiency over those currently being specified.

#### How do they affect electrically heated properties?

#### **Building fabric**

As with the existing Part L regulations, it will be necessary to make an additional level of improvement for electrically heated properties above and beyond that required for gas. This is because despite the fact electric heating appliances are 100% efficient at the point of use, carbon emissions from the generation of electricity at source are high, due to the high content of coal, oil and gas used to generate electrical power.

#### Heating appliance efficiencies

Because the new compliance method is now based on carbon emissions, the type of heating appliance used will have an effect on the overall result.

For electric heating appliances, the more controllability the appliance offers, the lower the carbon emissions generated. Therefore compliance is easier (i.e. DER reduced) using products such as Dimplex electronic panel heaters or DuoHeat radiators which score highly in SAP (i.e. low carbon emissions) due to their recognized high levels of controllability and energy efficiency.

Renewable sources of energy are also being encouraged and the use of solar thermal panels for water heating, for example, provides a significant benefit in the DER figure.

#### **Flats and apartments**

For buildings containing multiple dwellings such as flats, it is permissible to use a whole block methodology to demonstrate compliance. This is done by calculating the individual TER/DER for each dwelling and simply adding them together. (cont.)

This has the distinct benefit that mid floor flats with less exposed surface areas can be used to trade off against ground floor and top floor flats, meaning it is not necessary to achieve compliance for every single dwelling, only the overall block.

#### **DER compliance options for electric heating**

Research carried out by Dimplex and TEHVA (The Electric Heating and Ventilation Association) using a BETA version of SAP2005 found that in an average block, compliance for electric panel heating could be achieved by implementing the following building fabric improvements:

Element	As built u-value (2002)	2006 U-value improvement
Window	2.0	1.90
Wall	0.35	0.30
Ground floor	0.25	0.20
Roof	0.16	0.14
TER (block average)	29.87	29.87
DER (block average)	30.65	29.82
Result	FAIL	PASS

#### Air tightness

For the u-values suggested in the exemplar above to achieve compliance, an air tightness of  $5m^3/m^2/h@50Pa$ , needs to be achieved. However, this can be traded off against further improved u-values (e.g. a window u-value of 1.8 allows air tightness of  $6m^3/m^2/h@50Pa$ ). There is the option to improve air tightness down to as low as  $3m^3/m^2/h@50Pa$ ).

In addition, the flexibility for achieving block average compliance means that u-values across a range of the above can be traded against each other as suites the house builder/specifier.

#### Wall u-values

Achieving improved wall u-values for multi-storey blocks has been considered within the Industry Advisory Group and it is noted that the design structure of most blocks of flats can accommodate increased cavity widths to >100mm to achieve the wall u-value improvement.

Aircrete blocks offer excellent thermal, acoustic and load bearing capabilities and with thin jointing can reduce build times and improve u-value performance. External insulation can easily accommodate the u-value improvements and will also provide altitude to improve thermal bridging performance.

#### **Thermal bridging**

Improved thermal bridging performance will have a substantial impact on the overall DER of a dwelling or block average. An ODPM funded demonstration project at Stamford Brook identified a range of construction details that would enhance thermal bridging performance including split lintels, incorporation of a course of low thermal conductivity blockwork at the junction between external and groud floor slabs, setting of door and window frames in the plane of the wall insulation and use of modified roof truses to ensure adequate thickness of insulation at the eves. The effective allowance for thermal bridging with these values varies between 0.03 and 0.05W/m<sup>2</sup>K versus the base requirement of 0.08W/m<sup>2</sup>K.

#### Glazing

It is also worth considering that the glazing specified as a % of total floor area does have an impact as reduced openings can help with compliance, moving from the ODPM default consideration of 25% to a more market consistent 10-15%.

#### **DER advanced compliance options**

#### Solar water heating

Specifying the use of solar thermal panels to serve top floor or penthouse dwellings provides a significant carbon swing in the DER, offering even greater flexibility for the fabric.

Providing solar dedicated only to the top floors also alleviates concerns regarding available roof space, specification of pipework and putting in place management arrangements for billing customers

#### Mechanical ventilation with heat recovery

From early 2006, high performance whole house mechanical ventilation with heat recovery will achieve carbon benefits within SAP through its inclusion in Appendix Q of the revised SAP2005 (currently in development).

This provides possibly the most cost-effective alternative to significant improvements in fabric u-values to demonstrate compliance.

#### **Electric heating benefits**

Many builders and developers prefer to specify electric heating and hot water solutions for flats due to the benefits electric heating provides, namely:

- Lower capital costs
- Build speed benefits (less time spent on site)
- Layout flexibility (no flue positioning restrictions)
- No pipework or risk of associated leak damage to completed units
- Saleable service costs (lower maintenance and servicing costs)

Electric heating will continue to provide these benefits and specifiers will benefit greatly from the ODPM's decision to allow block average assessments for DER/TER calculations. This gives plenty of flexibility in overall design and will enable compliance to be met through a mix of improvements in materials, construction methods and air tightness, along with possible specification of innovative measures.

#### **Further information**

The latest drafts of the approved documents can be downloaded from:

www.odpm.gov.uk/stellent/groups/odpm\_buildreg/documents/ page/odpm\_breg\_040269.hcsp

TEHVA document "Approved Document L of the Building Regulations (England and Wales) - A compliance briefing for housing professionals"

#### **Contact details**

Dimplex has a range of innovative electric heating products helping specifiers to meet the challenges of Part L 2006.

For more information, advice or to arrange a consultation to discuss electric heating options further, please email marketing@glendimplex.com and we will arrange for an appropriate person to contact you.

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