

Energy efficient lighting in domestic premises

by Paul Bicheno

An article in the previous edition of *Wiring Matters* (Autumn 09 Issue 32) looked at 'energy efficiency of luminaires' which highlighted the energy efficiencies of various types of lamps and provided specific information for the phasing out of incandescent type lamps. This article looks at some requirements for energy efficient lighting in domestic premises and includes guidance on some typical scenarios that can be encountered when working on a lighting system.

Building Regulations 2000 energy efficiency requirements

This article will look at the requirements of the Building Regulations 2000 as applicable in England and Wales. Energy efficiency is dealt with by requirements of Regulations 4A, 17C and 17D and Part L of Schedule 1 of the Building Regulations. Regulation 4A relates to thermal elements and so would not be applicable to lighting. Regulation 17C refers to new buildings and 17D refers to consequential improvements to the energy

performance of building work to an existing building (with a total useful floor area over 1000 m²). Part L of Schedule 1 has requirements for conservation of fuel and power and is reproduced in Figure 1. Fixed internal or external lighting systems are included within the scope of a 'fixed building service' as referred to in L1b and L1c of Schedule 1. The type of building work where energy efficient lighting requirements would apply is the provision of a new dwelling, an extension to an existing dwelling or material

change of use of a building to a dwelling and the replacement of a lighting system as part of rewiring works. For domestic premises there are two approved documents that provide guidance on complying with Part L, L1A *Conservation of fuel and power in new dwellings* and L1B *Conservation of fuel and power in existing dwellings*. Included are specifications for the provision of energy efficiency fixed internal and external lighting and is summarized in Figure 2.



L1. Conservation of Fuel and Power

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

- a) limiting heat gains and losses:
 - i. Through thermal elements and other parts of the building fabric;
 - ii. From pipes, ducts and vessels used for space heating, space cooling and hot water services;
- b) providing **fixed building services** that:
 - i. Are energy efficient;
 - ii. Have effective controls; and
 - iii. Are commissioned by testing and adjusting as necessary to ensure they use no more fuel and power than is reasonable in the circumstances; and
- c) providing to the owner sufficient information about the building, 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.

Note: bold text highlights requirements related to lighting.

Figure 1: Schedule 1 Part L1 (Conservation of fuel and power)

When looking to comply with L1c, the occupier of the premises should be given details on the types of lamps to obtain as replacements, including the style, rating and connection so as to continue the benefits of energy efficiency. This is important if the premises have a mixture of dedicated energy efficient light fittings and their associated lamps and retrofit energy efficient lamps.

What is an energy efficient light fitting?

An energy efficient light fitting as specified in the Approved Documents L1A and L1B (Figure 2) is one that comprises the lamp, control gear, housing, reflector, shade or diffuser. This specifies that the fitting will only be capable of accepting lamps that have a luminous efficacy greater than 40 lumens per circuit-watt, where 'circuit-watts' is the power that the light fitting control gear and lamp consumes. The lamps would typically be of the compact fluorescent type with pin-based connections and so would not accept lamps of the traditional Edison Screw (SC) or Bayonet Cap (BC) connection types. In the context of energy efficient lighting the whole fitting would typically be referred to as a 'dedicated fitting' and there are a number of traditional fitting designs available.

In addition to a dedicated energy efficient light fitting, compact fluorescent lamps are

Fixed internal lighting

Provide light fittings (including the lamp, control gear, housing, reflector, shade or diffuser) that can only take lamps having a luminous efficacy greater than 40 lumens per circuit-watt.

Provide fixed energy efficient light fittings (as above) that number no fewer than the greater of:

- a. one per 25 m² of dwelling floor area (excluding garages), or
- b. one per four fixed lighting fittings.

Fixed external lighting

Fixed external lighting should enable the effective control and/or the use of efficient lamps such that:

- a. Either, the lamp capacity does not exceed 150 Watts per light fitting and the lighting automatically switches off;
 - i. When there is enough daylight; and
 - ii. When it is not required at night; or
- b. The light fittings have sockets that can only be used with lamps having an efficacy greater than 40 lumens per circuit-watt.

Figure 2: Provision of energy efficient fixed internal and external lighting

available that have integrated control gear with the traditional SC and BC connections types that also have a luminous efficacy greater than 40 lumens per circuit-watt. A number of lamp designs have been developed to enable the replacement of traditional lamp designs (e.g. traditional GLS, candle, mini globe, reflector)

used in existing light fittings. Table 1 provides some information on the equivalent energy efficient lamp for a particular traditional lamp. The traditional tungsten filament and tungsten halogen type lamps do not meet the 40 lumens per circuit-watt requirement and so are not regarded as energy efficient lamps. Energy saving GU10 type

Traditional	Energy efficient
100W	20-23W
75W	15-19W
60W	11-14W
40W	8-9W
25W	5-7W

Table 1: Equivalent energy efficient lamp for a particular traditional lamp



Image courtesy of Philips

halogen lamps are available that consume less power than standard halogen lamps, typically up to 30%, that can be used to retrofit into existing GU10 type fittings. Light Emitting Diode (LED) array lamps are now available that consume a small amount of power and have a longer life than the compact fluorescent types. These can be used to replace halogen lamps in existing light fittings or can be installed as part of a new LED fitting or arrangement. There are also LED lamps available for the replacement of traditional incandescent lamps, typically up to 40W.

Replacing an existing light fitting

For this scenario the replacement of a light fitting in domestic premises would need to consider when the premises was built or created from a material change of use. If it is post 6th April 2006 then the premises is likely to already include some dedicated low energy light fittings as the

building works would have looked to comply with the requirements given in Approved Document L1A. The dedicated low energy light fittings are likely to be in areas such as the lounge, dining room, kitchen and hallways as these normally have lights switched on for the most hours in a day, so any replacement of these fittings would need to be of the dedicated low energy type so as to retain the energy efficient status. Replacement of a light fitting that is not an energy efficient type could be carried out but it should be recognised that the continual maintenance with regards to replacement of lamps may not be possible due to the phasing out programme of incandescent lamps.

For older domestic premises that did not need to meet the provision of energy efficient light fittings, the Building Regulations does not specifically state that the replacement of a light fitting has to be with an energy efficient type as the

requirements relate to extensions to a dwelling, where a dwelling is created from a material change of use or an existing lighting system is being replaced as part of rewiring works. Replacing a light fitting is not replacing a lighting system and it is unlikely that the occupier would be in a worse position with regards to their energy usage. However, the occupier should be encouraged to have an energy efficient light fitting.

Rewiring a lighting circuit

For this scenario the rewiring of a lighting circuit in a dwelling would need to comply with the conservation of energy and power requirements related to a fixed building service as detailed in Approved Document L1B (Figure 2). The appropriate number of fixed internal energy efficient dedicated type light fittings should be installed in the main living areas where lighting is on for the most number of hours. Any fixed external lighting that forms part of the rewiring work as supplied

by the fixed electrical installation should also comply with the requirements for external lighting.

Installing lighting as part of building works for an extension to domestic premises

For this scenario the installation of additional fixed internal and/or external lighting in a dwelling due to building work, such as an extension would need to comply with the conservation of energy and power requirements related to a fixed building service as detailed in Approved Document L1B (Figure 2). For a newer dwelling that includes a number of energy efficient light fittings, reasonable provision of energy efficient lighting is expected in the extension so that the occupier continues to obtain the benefits. For an older dwelling that does not have any energy efficient light fittings then there will be an obvious benefit of installing energy efficient light fittings as part of the building work. The guidance does

recognise flexibility, so it could be reasonable to install energy efficient fittings in main living areas that did not previously have any rather than the extension to fulfil the requirements. However as already highlighted there are a number of energy efficient lighting solutions available, therefore energy efficient solutions should be agreed with the occupier, especially if the phasing out of traditional lamps is highlighted as part of the selection process.

Code for sustainable homes

The technical guidance for the provision of energy efficient lighting in approved document L1A for new dwellings is the minimum standard. In April 2007 the Government introduced the 'Code for Sustainable Homes' which is a national standard for the design and construction of sustainable new homes. The Code sets minimum standards for energy and water use for homes within England. From 1st May 2008 it was mandatory for a new home to have a rating against the code. The Code supports the government target that all new homes will be zero carbon from 2016. The associated technical guidance document includes requirements for the provision of energy efficient light fittings that exceed the current requirements of Building Regulations.

Additional information

The energy saving trust is an independent organisation that promotes action on energy saving issues (www.energysavingtrust.org.uk).

The following publications relating to energy efficient lighting are available;

- Energy efficient lighting – guidance for installers and specifiers (CE61)
- Low energy domestic

lighting (GIL20)

- Cost benefit of lighting (CE56)
- Energy saving lamps should be marked with the energy saving recommended certification mark. This means they have been independently tested to verify their overall quality and energy efficiency claims.



- A guide to energy saving light bulbs is available from the Lighting Association website (http://www.lightingassociation.com/pdf/EST_lighting_English_Final09.pdf)

- Aurora has a useful tool for showing the benefits of using energy efficient lamps along with a range of energy efficient lighting solutions. www.aurora.eu.com/EnergyCalculator.aspx
www.aurora.eu.com/lowenergy

- Information on the Code for Sustainable Homes is available from the Communities and Local Government website (<http://www.communities.gov.uk/planningandbuilding/buildingregulations/legislation/codesustainable/>)

- Building Regulations approved documents along with the government proposals for the development of Part L are available from the government planning portal (www.planningportal.gov.uk).

- Local Authority Building Control (www.labc.uk.com)