# PART L OF THE BUILDING REGULATIONS AND PROVISION OF LIGHTS IN BUILDINGS OTHER THAN A DWELLING

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In the last edition of Wiring Matters the implications of the amended Approved Document L (ADL) for those involved in the provision of lights in new and existing dwellings were discussed. This article addresses the guidance given for designers and installers involved in the provision of internal and external lighting services in new and existing buildings other than dwellings given in Approved Documents L2A and L2B respectively. It also introduces the guidance produced by the Building Research Establishment (BRE) on reasonable provision of lighting controls.

Item b. of Requirement L1 in Part L (Conservation of fuel and power) states that reasonable provision shall be made for the conservation of fuel and power in buildings by providing and commissioning energy efficient fixed building services with effective controls.

Local authority Building Control departments will expect to see that measures have been implemented to satisfy this requirement as a condition to achieving Building Control approval for any proposed developments in new or existing non-domestic premises.

**Definitions**

Definitions are given in Section 5 of Approved Documents L2A and L2B for the following:

*Daylit space* – "any space:

a. within 6m of a window wall, provided that the glazing area is at least 20% of the internal area of the window wall; or

b. below rooflights and similar provided that the glazing area is at least 10% of the floor area. The normal light transmittance of the glazing should be at least 70%, or, if the light transmittance is reduced below 70% the glazing area could be increased proportionately."

*Display lighting* – "lighting intended to highlight displays of exhibits or merchandise, or lighting used in spaces for public leisure and entertainment such as dance halls, auditoria, conference halls, restaurants and cinemas."

*Fixed building service* - "any part of, or any controls associated with:

a. fixed internal or external lighting systems, but does not include emergency escape lighting or specialist process lighting; or

b. fixed systems for heating, hot water service, air-conditioning or mechanical ventilation."

**General lighting efficacy in office, industrial and storage areas in all building types**

For the purposes of ADL, office areas include areas that involve predominantly desk-based tasks, including classrooms, seminar rooms and conference rooms (L2A – Para 50; L2B – Para 55).

In new buildings (L2A – Para 51), and existing buildings (L2B – Para 56), it would be considered reasonable to provide lighting having an average initial

efficacy of not less than 45 luminaire-lumens/circuit-Watt as averaged over the whole area of these types of space in the building. This should allow design flexibility to vary the light output ratio of the luminaire and the luminous efficacy of the lamp.

Average luminaire-lumens/circuit-Watt is calculated by:

(Lamp lumens x LOR) summed for all luminaires in the relevant areas of the building, divided by the total circuit Watts for all the luminaires where:

a. Lamp lumens = the sum of the average initial (100 hour) lumen output of all the lamp(s) in the luminaire and

b. LOR = the light output ratio of the luminaire, i.e. the ratio of the total light output under stated practical conditions to that of the lamp or lamps contained in the luminaire under reference conditions (L2A – Para 52: L2B – Para 57).

Additionally in the case of existing buildings other than dwellings only:

c. Control factor = the factor applicable when automatic controls substantially reduce the power consumption of the luminaire when electric light is not required.

This control factor is included in L2B to allow greater flexibility and to encourage the installation and use of better controls (L2B – Para 57).

**General lighting in all other types of space**

Luminaires for which photometric data is not available and/or are lower powered and use less efficient lamps may be used in these areas if the installed lighting in said space has an initial (100hour) lamp plus ballast efficacy of not less than 50 lamp lumens per circuit-Watt. (L2A – Para 53: L2B – Para 58).

**Controls for general lighting in all types of spaces**

Lighting controls should be provided to avoid lighting being switched on when daylight levels are adequate, or when spaces are unoccupied. If automatic switching arrangements are employed the lighting control scheme should be subjected to a risk assessment wherein safety should take precedence over energy efficiency (L2A – Para 54; L2B – Para 59).

Reasonable provision of controls would be achieved by installing local switches in easily accessible positions within each working area or at boundaries between working areas and general circulation routes that are operated deliberately by occupants either manually or remotely.

Manual switches include rocker switches, push buttons and pull cords. Remote switches include wireless transmitters and telephone handset controls. It should be noted that for the purposes of Approved Document L dimmer switches constitute switches and switching includes dimming. It is emphasised that reasonable provision of dimming would be achieved by reducing rather than diverting energy supply (L2A – Para's 55 and 56; L2B – Para 60).

When viewed on a plan (that is, when viewed from above) the distance between any local switch and any luminaire which it controls should generally be not more than six metres, or twice the height of the light fitting above the floor if this is greater. Where a space is a daylit space served by side windows, the perimeter row of lighting should in general be capable of being switched separately (L2A – Para 57; L2B – Para 61).

Occupant control of local switching can be supplemented by other automatic controls which:
a. Switch off the lighting when they sense the presence of occupants; or
b. Either dim or switch off the lighting when there is sufficient daylight (L2A – Para 58; L2B – Para 62).

In the case of new buildings other than dwellings, the use of such automatic control systems can make a worthwhile contribution towards reducing the Building $CO_2$ Emission Rate (BER) (L2A – Para 58).

In the case of existing buildings other than dwellings L2B contains a Table 4 which gives control factors that may be applied when calculating the average luminaire efficacy provision requirements described in L2B Para 56.

**BRE recommendations for lighting controls**

BRE digest 498 (*Selecting Lighting Controls* ) describes a process whereby the internal space of a building is categorised in accordance with its typical occupancy and usage patterns. Rooms are classified as follows:

- *owned spaces* – small rooms likely to be occupied by one or two persons, such as small offices, workshops or medical consultancy rooms. Typically, the occupants will be in a position to control the lighting within the space.
- *shared spaces* – multi-occupied areas such as open plan offices and large workshop / factory areas or hospital wards containing a number of persons. Typically the occupants will want control of the lighting in their particular area of the space.
- *temporarily owned spaces* – areas such as meeting rooms, hotel rooms, church halls and classrooms.

Typically, occupants want control of the lighting within the space when they are there.

- *occasionally visited spaces* – areas such as store rooms, plant rooms and toilets / bathrooms. Typically, occupants are only present for a limited time.
- *unowned spaces* – areas such as staircases and corridors. People expect their way to be lit and may not expect to operate lighting controls
- *managed spaces* – areas such as cinemas / theatres, hotel lounges, railway stations, restaurants, public libraries and sports halls. The occupants have no control of the lighting. Those responsible for the lighting in the space may be too busy to control it effectively.

Once an area has been categorized, BRE digest 498 makes recommendations as to which types of control or combination of types of control would be acceptable, or indeed the most appropriate for that type of space. Both manual and automatic controls are considered and are summarised below:
*Manual operation* - this includes rocker switches, dimmer switches and pull-cords fixed to the fabric of the building or to the light fittings and also devices that may be controlled remotely such as infra-red, radio, sonic, and ultra-sonic operated controls. Manual controls may be positioned either locally or centrally.
*Automatic switch off* - where artificial lighting is controlled by time switch, for example outside of normal occupancy periods, or where photoelectric control is employed to switch off / dim lighting to take account of changes in ambient daylight levels.
*Occupancy detection* – This may be achieved by key control, presence detection or absence detection. Key control requires a coded key fob or room card to be present in the room to allow the lighting (and indeed other electrically operated loads) to be switched on and is commonly employed in hotel rooms, student lodging blocks and nursing accommodation. Both presence and occupancy detection rely on detectors set up to either sense the presence or absence of persons in a space. Detectors are typically infra-red in operation, although microwave and ultrasonic detectors are also used.

A summary of recommendations on the most appropriate forms of control to be employed in the various types of space are provided for guidance in Table form. It is accepted that following the recommendations given in BRE digest 498 (Selecting Lighting Controls) would meet the requirements for lighting controls of ADL in both new and existing non-domestic buildings (L2A – Para 59; L2B – Para 63).

**Display lighting and their controls in all types of space**

In the case of display lighting reasonable provision would be to demonstrate that the average initial (100 hour) efficacy was not less than 15 lamp-lumens per circuit-watt. The power consumed by any transformers or ballasts within the system should be included when calculating this efficacy (L2A – Para 60; L2B - Para 64).

It is expected that spaces where display lighting is present will also contain general lighting to allow circulation and activities such as cleaning and restocking when premises are not open to the public. Paragraphs 50 to 59 in ADL2A and 55 to 63 in ADL2B where relevant would apply to any such general lighting (L2A – Para 61; L2B Para 65).

It is accepted that the requirement for effective control would be met if display lighting were connected in dedicated circuits that could be switched off at times when people were not inspecting exhibits or merchandise. Such control measures might in the case of retail premises include timers to switch off the display lighting outside of opening hours except for the display lighting designed to be viewed from outside the building through display windows (L2A Para 62; L2B Para 66).

**Commissioning**

Building services systems including fixed internal and external lighting should be subject to commissioning so that the systems are working correctly and efficiently (L2A – Para 77; L2B – Para 70).

**Summary**

Approved document L requires that reasonable provision should be made for energy efficient lighting and controls to limit unnecessary use of the lighting when daylight levels are sufficient or when spaces being lit are unoccupied. Lighting controls should meet the needs of the building users, be appropriate for the type of space in which they are installed and allow for the safe occupation and use of the building.

Guidance on meeting the requirements for lighting controls in new and existing buildings other than dwellings is provided in BRE Digest 498.

It should be noted that the requirements of Approved Document L do not apply to emergency escape lighting or specialist process lighting.

**Publications referenced in the text**

*Digest 498. Selecting lighting controls, BRE, 2006*

*All of the Approved Documents to accompany the Building Regulations may be downloaded from www.planningportal.gov.uk/england/professionals/en/1115314110382.html*