

# How to refurbish office lighting

## Introduction

Lighting refurbishment should be seen as a major opportunity to get the lighting design right.

Decisions made during design will impact on the installation cost, subsequent running costs (energy and maintenance) and end-user satisfaction. There are many options open to the lighting designer, including the choice of illumination levels, lamp type, style of luminaire (fitting) and the use of automatic controls.

Replacing inefficient lighting with modern energy efficient specification could save up to 50% of the electricity consumption, without reducing lighting standards.

## The technology

There are five key areas which should be addressed in any lighting refurbishment:

### 1. High frequency electronic ballasts

These are the most efficient ballasts for fluorescent lighting.

### 2. T5 format, high output, triphosphor coated tubes

These are the most efficient fluorescent tubes.

### 3. High light output ratio (LOR) fittings

This means that most of the light emitted by the lamp leaves the fitting to usefully illuminate the workspace.

### 4. Switching arrangements

Sufficient switches should be provided to ensure that all lights can be turned off when not required.

### 5. Automatic lighting controls

These are used to automatically switch the lights depending upon daylight levels and/or whether the space is occupied. They are discussed in more detail in the How to implement automatic lighting controls guide downloadable from the lighting pages on the Carbon Trust website.



## Application

The following six steps should be followed in order to achieve an energy efficient lighting design:

1. Define the lux levels required for the area being refurbished (lux is the measure of illumination). Recommended lux levels vary, depending on the task or activity being performed.

Task/Activity	Lux levels	Comments
Circulation areas, entrance halls, corridors, rest rooms, store and stock rooms, changing rooms.	100	
Stairs	150	At floor level
Toilets, foyers, lounges, plant rooms, switch gear rooms, archives, and dining rooms.	200	
General office, reception desk, and filing.	300	
First aid rooms, kitchens, data processing, CAD workstations, conference/meeting rooms, switchboard, and post room.	500	Can be task lighting
Technical drawing	750	

2. Specify that high frequency ballasts and T5 fluorescent tubes should be used.

3. Specify that the light fitting should have a light output ratio (LOR) of at least 0.8 (this means that 80% of the light from the fluorescent tube will leave the fitting to illuminate the room).

4. Specify sufficient light switches. Consideration should be given to the zonal structure of the light switching having due regard to:

- Occupancy patterns (areas that are likely to be unoccupied for periods during normal working hours should be separately switched).
- The availability of natural daylight (areas adjoining windows or roof glazing should be separately switched).

Also ensure that the switches are positioned so that they are easily accessible.

5. Specify that appropriate automatic lighting controls are included – see How to implement automatic lighting controls guide.

6. When presented with the lighting design, check that it uses no more power than 8 Watts/ m<sup>2</sup> of floor area. Values above this indicate poor energy efficiency.



## Specification checklist

The following table lists the key parameters that you will need to define through discussion with your supplier in order to specify appropriate general office lighting.

Item No.	Parameter	Comments
1	Lux lighting levels	See table in Application section
2	Type of fluorescent tubes and ballast	T5 high output triphosphor coated tubes with high frequency electronic ballasts
3	Type of light fitting	Light output ratio of at least 0.8
4	Light switching arrangements	See Application section
5	Automatic lighting controls	Daylight/occupancy – refer to How to Implement Automatic Lighting Controls guide
6	Lighting power density ratio	Maximum 8 Watts /m <sup>2</sup> of floor area

Tungsten halogen lighting should generally be avoided due to its low efficiency and short lamp life. Where spotlights are required for aesthetic purposes, alternative lamps should be used (see How to implement compact fluorescent or LED spot lighting).

## Commissioning procedures

Building refurbishments must comply with Part L2 of the current Building Regulations which sets minimum standards for lighting energy efficiency, the provision of controls and end-user documentation. It is important that key energy efficiency and maintenance information (for example the precise specification of lamp to be used) is clearly documented.

On commissioning, checks should be made to ensure that the correct lux levels are being achieved and that all automatic controls are working correctly (see How to implement automatic lighting controls guide).

Electrical checks should include installation and commissioning to the current edition of the BS 7671 IEE Electrical Wiring Regulations.

## Common problems

Most problems associated with installing new office lighting result from poor design, leading to inadequate or excessive illumination and/or glare.

The provision of inadequate control capabilities can also lead to user complaints and excessive energy consumption.



## Finding a supplier

Lighting is one of the technologies supported by the Government's Enhanced Capital Allowances Scheme and a list of ECA approved lighting manufacturers can be found at [www.eca.gov.uk](http://www.eca.gov.uk)

## The business case

By spending more time at the design stage, potential capital cost savings may be achieved -using efficient light fittings may mean that fewer fittings and tubes are required to provide suitable replacement lighting.

Efficient light fittings may be more expensive but the capital cost difference will, over the lifetime of the lighting, be outweighed by the reduction in electricity used by the new lighting, leading to ongoing cost savings.

The effort involved in achieving an efficient lighting design during the refurbishment of lighting will be highly cost effective.



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