

How to use T5 retrofit conversion kits

Introduction

This guidance deals with the retrofit conversion kits that allow T5 fluorescent tubes to be used in light fittings designed to use T8 format tubes. The conversion kits also change fittings with mains frequency ballasts to operate using more energy efficient, high frequency ballasts. These kits are not recommended for fittings that already use high frequency ballasts, due to the reduced potential for energy savings.

Depending on the exact choice of T5 tube, energy savings of up to 45% are achievable (but this may bring with it a reduction in illumination levels).

The technology

Conversion kits are available which will work in existing fittings containing switch start, mains frequency fluorescent tube ballasts. The kits convert the fittings to use energy efficient, high frequency ballasts and accommodate the smaller diameter T5 tube.

There are two main types of conversion kits (see picture below):

- **Tube end type** – kits which include a replacement starter and two separate components to fit over each end of the T5 tube. The tube is then slotted into the existing fitting.
- **Baton type** – one piece kits which slot into the existing fitting and into which the T5 tube is placed.



The following table illustrates the correspondence between the T8 and equivalent T5 fluorescent tubes using the retrofit kits. The power consumed by T5 tubes is less and, although there may be a reduction in brightness, the lifetime of the tubes will typically increase from 15,000 hours to 20,000 hours.

Tube length (mm)	Mains frequency T8 fluorescent tube		Retrofit kit and high efficiency T5 equivalent		High frequency T8 fluorescent	
	Power (W)	Light output (Lumens)	Power (W)	Light output (Lumens)	Power (W)	Light Output (Lumens)
1,500	73	5,200	49	4,300	58	5,200
1,200	48	3,350	28	2,900	36	3,350
600	26	1,350	14	1,350	18	1,350

Application

The kits can be used on lighting in many commercial and office settings, as well as other locations such as schools.

The conversion kits can accommodate most tube lengths, and allow for changes from T12 and T8 tubes to T5 tubes. They are not currently available for 8 foot fittings. The majority of the savings come from converting from mains frequency to high frequency ballasts. Savings will be significantly reduced if your existing lighting already has high frequency ballasts.



The following table describes the recommended lux levels for a selection of different tasks (Lux is a measure of the brightness produced by the lighting). Given the lux levels required, and the distribution of the light fittings, a selection needs to be made between standard and high efficiency T5 tubes so that the maximum energy saving is made without impairing lighting levels. A supplier should be able to assist with this process.

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

For an existing lighting installation that is more than 10 years old, it may be more cost effective to completely renew the light fittings (rather than convert them). This will allow the additional benefits of higher light output ratio fittings to be used.

Further guidance is given in the How to implement office lighting refurbishment guide, downloadable from the Carbon Trust website.



Specification checklist

The following table lists the key parameters that you will need to define through discussion with your supplier in order to specify an appropriate retrofit conversion kit and tubes.

Item No.	Parameter	Comments
1	Length of existing fluorescent tubes	Expressed in mm.
2	Fluorescent tube format currently and required for use in the kit	Replace with T5 triphosphor coated tubes
3	Lux lighting levels	The brightness of the lighting required for a particular application.
4	Adapter type	Baton or tube end type.
5	Ballast	Confirm whether the existing fitting has a mains frequency switch start ballast. Switch start fittings have a characteristic cylindrical starter that is normally visible from outside the fitting.

*Note: Always ensure that any adapter purchased complies with appropriate EU safety requirements.

Commissioning procedures

The installation and commissioning of the plug-in retrofit conversion units and tube should be done in accordance with the manufacturer's recommendations. It is however advisable to trial the retrofit units and tubes before switching all fittings to ensure that the specification has been accurate.

Ensure that the correct lighting lux levels are maintained and checked (see Application section).

If electrical wiring is altered electrical checks should include installation and commissioning to the current edition of BS 7671 IEE Electrical Wiring Regulations.



Common problems

Installing the retrofit units is a straightforward process, with few difficulties likely to be encountered.

Converting fluorescent tubes from T8 to T5 may cause a reduction in overall lighting lux levels, which, if lighting levels were previously only just acceptable, may cause them to become unacceptably low. In these situations it is important that in choosing between standard and high efficiency T5 tubes, the higher lumen tubes are selected, maximising the light output.

Some fittings may offer restricted physical access, which may influence the type of adapter chosen.

Similarly, in some mirror reflector light fittings, the presence of the baton type adapter's "spine" can interfere with light output.

In all cases, it is recommended that a small trial installation is carried out before any bulk orders are placed.

Finding a supplier

A web-search is the best way to find a supplier for T5 retrofit conversion kits but satisfactory references should always be sought.

As an alternative, lighting is supported by the Government's Enhanced Capital Allowances Scheme. Individual lighting products are not included on the Energy Technology Product List, however manufacturers/supplier who successfully complete the Energy Technology List supplier assessment process do have their contact details listed on the ECA website and can be found at www.eca.gov.uk

The business case

The business case for a typical retrofit conversion unit, installed in an existing 1,500mm mains frequency switchstart fluorescent fitting, is as follows:

The T8 tube plus the mains frequency ballast would use a total power of typically 73W, whereas the T5 tube plus high frequency ballast uses typically 49W, a saving of 24W.

Assuming that the lighting is used 12 hours per day, 5 days per week, 52 weeks per year, a total of 3,120 hours per year changing the lighting would save 75 kWh per year. With a typical electricity cost of 7.9 p/kWh this would save £5.93 per year, leading to a payback period of approximately four years.

There are also savings as the tube life is increased, electrical circuit losses reduced and less demand on the air conditioning due to the lower heat output from more efficient lighting.

However, in this particular case, the light output would be reduced by 17% which may not be acceptable in some cases.



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