

# This Month

## LED Tubes - what you should know

This newsletter highlights some results and findings we have been seeing in the market with various clients over a number of years. These findings resulted in LED tubes failing prematurely and drastically reducing the light from the LED tubes over a short period of time.

In a recent report by Lux, they bench tested and rated the latest LED tubes from the major brands using the LIA (Lighting Industry Association) labs. According to the LIA, none of the LED tubes were totally correctly labelled as required by IEC 62776:2014.

If you change an LED tube and an accident was to happen, the original luminaire manufacturer and your building insurance company would be absolved of any responsibility, this is explained further in Lux's report.

If you are considering replacing your existing fluorescent lamps with LED tubes, you have two choices. If all you have to do is replace the lamp and starter (and nothing else), make sure that the LED tube complies with BS EN 62776:2015. If you need to rewire the luminaire, such as bypassing the ballast, Lux recommend you don't do it. They go onto explain why later in the report.

There are thousands of T8 installations in the UK, some quite old and in need of refurbishment. There is also the increasing need to save energy. Lux tested LED tubes from 12 different suppliers. All the tubes were tested at the new Lighting Industry Association laboratories in Telford, UK. Lux tested them for basic electrical safety, light output and flicker.

Note that the LED tubes that have been tested are unlikely to be suitable for use in luminaires which are used for emergency lighting. Neither can they be dimmed. The tube should carry and is likely to carry one or more of these symbols.



Most of the tubes Lux tested had fixed end caps but some were rotatable. This means that the light emitted can be angled to direct it where you most want it. I.e. the LEDs do not simply point straight down.

Rotating them can be a bit fiddly since you have to adjust the end caps independently. It is much easier to do it at ground level than at height. On one of the tubes lux looked at, the cap broke off the end of the tube even before they had even tested it! End cap strength is part of safety testing to BS EN 62776:2015 so that is another reason to check that your tube conforms.

The full title of BS EN 62776:2015 is “Doublecapped LED lamps designed to retrofit linear fluorescent lamps. Safety specifications”. It runs to 34 pages of safety tests because there is a lot to consider. By placing a CE label on the tube the supplier is acknowledging that the product is safe and complies to the requirements of the Low Voltage Directive.

If your fluorescent lamp has an electronic ballast, you only need to swap the lamps. However, not all LED tubes are suitable for all HF ballasts. Some manufacturers, supply a ballast compatibility table.

If the fluorescent lamp has a magnetic or wirewound ballast you will also need to replace the starter canister. No other rewiring should be required. Note that this means that the wirewound ballast remains in the circuit so it will still consume some energy. This may well affect the overall power factor depending on exactly how the original luminaire is wired.

There are also symbols indicating suitability for HF or magnetic gear. The symbol for this should be clearly marked on the tube. You should ensure that full, complete and unambiguous installation instructions are supplied with the LED tubes. After conversion, the luminaire should have a label stating that it is no longer suitable for fluorescent lamps. Most LED tube manufacturers supply a label with the instructions. If fitting the LED tube requires you to alter the wiring (other than changing the starter canister), then we recommend you don't do it. Instead, choose an LED tube that can be simply retrofitted.

## \*PHOTOMETRIC FLICKER MEASUREMENTS

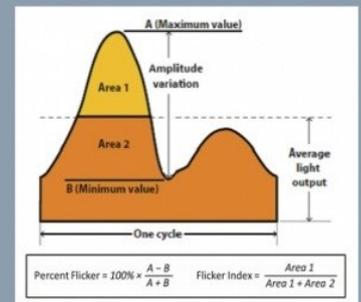
The LIA Laboratories also measured flicker from the LED tubes. Two parameters are reported from the measurement of photometric flicker – Flicker Percent and Flicker Index.

In accordance with the IES Lighting Handbook 10th edition, Flicker Percent is computed from the maximum value of the periodic waveform, A, and the minimum value, B.

**Percentage Flicker =  $(A - B) / (A + B)$ .**  
Flicker Index is calculated from determining the average signal and comparing the area above the average, A1, and the area below the average, A2.

**Flicker Index =  $A1 / (A1 + A2)$ .**  
There is no generally accepted standard for

what degree of flicker is, or is not, acceptable. But basically, the lower the figure, the less likely is flicker to be noticeable.



The main reason Lux advise against rewiring is that you then become responsible for the luminaire complying with the relevant safety standards such as BS EN 60598. Hopefully it will never happen but if there were an accident of any kind, the original luminaire manufacturer and your insurance company would be absolved of any responsibility. The LIA laboratory advised Lux that this is still the case if swapping the starter and retrofitting an LED tube. If something goes wrong with the magnetic ballast, even through no fault of the LED tube, the original luminaire manufacturer will deny any liability as they can claim the original product was not designed for LED tubes.

**Low Energy Designs would recommend that if you are going to invest in LED products for you business then you should contact us first to discuss the best option for you. Low Energy Designs provide a free site survey to analyse your existing light and provide a low-energy LED lighting solution tailored to meet your requirements, enhance cost savings and meet your sustainability and environment objectives all to make you become a more profitable company.**

To see the full Lux report click [here](#).

