

Upgrading fluorescent lighting to LED tubes

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Question from user: I'm thinking of upgrading my fluorescent lighting to LED tubes to save some energy. I have heard of some compatibility issues with some tubes, so what do I need to know before replacing my tubes?

The answer provided

There are several types of LED tubes on the market. The most common are the retrofit type used in light fittings with magnetic ballast and starter. Other types include tubes which require separate LED drivers, and retrofit tubes that can operate on electronic fluorescent ballasts. Deciding on which is most suitable will depend on the existing fluorescent light fittings.

When LED tubes first emerged on the market, there were some unsafe products introduced, some of which could give you an electric shock. As a first step, it's best to stick to reputable manufacturers because they will have done the due diligence to ensure products are safe. Also look for the RCM which is the Australian or CE LVD/ECM which is the EU, compliance mark for both safety and EMC requirements.

Retrofit LED tubes can operate in light fittings with conventional magnetic ballasts with starters. The easiest way to identify whether the ballast is a magnetic type is to look for the starter. If there is a starter, then replacing the lamp and starter is generally all that needs to be done.

One caveat to the above scenario is that most manufacturers will recommend disconnecting the power factor correction capacitor to get the best possible power factor. Leaving the power factor correction capacitor in circuit will result in low power factor.

Retrofit LED tubes can also be directly connected to 240V AC mains because the tubes have integral drivers. However, it should be noted that if you modify the wiring of a light fitting (removing or disconnecting the ballast for example), it voids the safety and EMC certification of the light fitting. Essentially you are now responsible for the safety and EMC of the light fitting.

LED tubes that require separate drivers to operate are not true retrofit types. Whilst they will fit into the same lamp holders, the light fitting will need to have the original ballast and wiring removed and changed. Re-wiring an existing light fitting is more labour intensive and therefore costly. As with the above scenario, the person doing the installation will be responsible for the safety and EMC of the light fitting.

LED tubes that can operate on electronic fluorescent ballasts aren't as common, but are starting to emerge in the market. However, ballast compatibility can be limited, so it will be critical to refer to the manufacturers' compatibility documents for suitability with existing electronic ballasts.

Other than electrical compatibility, it should also be noted that LED tubes will usually emit less light than a fluorescent tube. For example, a typical four foot LED tube will have an output around 2000 lumens, whereas a fluorescent tube will be around 3300 lumens. Therefore, the

photometric performance of the tube will vary depending on the reflector system within a light fitting.

Because LED tubes are directional light sources with beam angles around 120° - 160°, most of the emitted light is 'usable' because it is being directed downwards. Fluorescent lamps are omnidirectional with light being emitted 360°. In a basic light batten, a lot of the light from a fluorescent tube is 'wasted' out the sides and top because there is no reflector to reflect light downwards. In such a scenario, an LED tube could provide better illumination levels (lux) than a fluorescent tube. However, sophisticated fittings with mid to high end reflectors (for example troffers for office lighting), will mean the fluorescent tube comes out on top because it has higher lumen output to start with, and more usable light will exit the fitting. This is known as light output ratio, which is a measure of how efficient a light fitting is in its photometric performance.

Based on the above, an LED tube is usually ideal for general lighting tasks such as lighting walkways, car parks, lobbies, foyers etc. Fluorescents will still be the better choice for more demanding lighting tasks or areas with strict lighting requirements. If ever in doubt, it could be worth engaging a lighting designer to help determine whether LED tubes will meet the lighting requirements, by undertaking a lighting design.

So as you can see, there are many different aspects that need to be considered when trying to determine whether changing to an LED tube will work for you.