

Retrofitting Fluorescent Luminaires to Improve Energy Performance

Most fluorescent lighting in Australia is provided by T8 (25mm diameter) tubes operating with a magnetic ballast. Renewing, refurbishing or retrofitting fluorescent luminaires is usually done to achieve a new outcome. This may be for aesthetic reasons, to improve the lighting or to reduce energy consumption.

A number of technologies and methods are available to improve the luminaires in a lighting installation. Some of these are:

- install new luminaires and smart control systems
- re-lamp and clean the existing luminaires/paint walls etc
- add retrofit reflectors to improve light output and direction, thereby reducing the number of tubes required
- remove excess tubes and centre those remaining
- replace the magnetic ballast(s) with a high frequency (HF) electronic ballast
- convert the luminaire from T8 to T5 (16mm) by replacing the ballast, lamps and lampholders
- convert to T5 lamps using a T8 to T5 adaptor kit

An increasingly common reason for refurbishing a lighting installation is to reduce energy consumption. All the above methods can be used separately or in combination. A relatively new method is to use a T8 to T5 adaptor. These are promoted as a cost-effective, energy efficient replacement for existing T8 lamps. The procedure involves, for example, removing a 36 Watt T8 lamp and replacing it with a 28 Watt T5 lamp and electronic ballast adaptor installed between the existing lampholders. The fluorescent starter is also changed.

Safety and EMC

Ballasts, including lamp adaptors, are 'Declared Articles'. That is, they require mandatory approval prior to sale. By installing ballasts, adaptors, lampholders, or re-positioning lamps, the installer legally assumes the role of luminaire manufacturer and therefore has a duty to ensure compliance with all statutory safety, performance, EMC and energy requirements.

Compatibility with existing maintained emergency luminaires

A new T5 HF ballast or a T5 lamp adaptor may not be compatible with the power pack installed in an existing T8 maintained emergency luminaire – that is, where an emergency inverter and battery is provided to operate the T8 lamp. At best, the result would be non-compliance with the Australian standard for emergency lighting (AS 2293) and at worst, safety may be compromised. Damage to the emergency luminaire, lamp, adaptor, emergency power pack, or all of these, is likely if components are mixed. Excessive battery discharge currents, inability to strike the lamp, low light output and shorter duration

than the original configuration could all contribute to poor performance or outright failure in an emergency. Rather than convert an old luminaire, the installation of a new dedicated emergency luminaire is recommended.

Lighting considerations

The light output of a modified T8 luminaire fitted with new ballasts, reflectors or T5 lamps and associated adaptors will be different to the original. The client/user responsible for the space under occupational health and safety requirements should ensure that the criteria used in the original lighting design are maintained or they should have the installation reassessed. These criteria include illumination levels as well as glare and any task specific lighting requirements. Australia has legal requirements for minimum task illuminance. These are contained in Australian Standard AS 1680.

Light distribution

Changing the lamp diameter or position in a luminaire will affect the light output and produce a different light distribution. This effect will compound if a semi or specular reflector system is used. The T5 lamp will also appear brighter than a T8 lamp. This may affect visual comfort associated with display screen equipment and other tasks. The installation may not meet its original design parameters, including glare.

Lamp warranty

The lamp manufacturer's warranty may be void if the ballast or adaptor and luminaire do not operate the lamp in accordance with internationally agreed lamp safety and performance standards for starting and operation.

Summary

Organisations modifying a luminaire to use a new ballast, lamp or adaptor assumes responsibility for the luminaire they have constructed. This extends to safety, performance, energy efficiency, EMC, photometrics, emergency operation and any other product-related legal responsibilities.

If you are contemplating energy saving upgrades to fluorescent lighting, you should insist on independent test and certification documentation from the supplier.

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