ELECTRICAL EQUIPMENT EXAMINATION & PERFORMANCE EVALUATION REPORT

"IFR" T8-T5 1200mm Fluorescent Light Conversion Fitting Model No: FS 28R

Report Number	**:**	**08/QEC/26**
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Page One of	**:**	**Seven pages + Appendix**
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Signature:_____

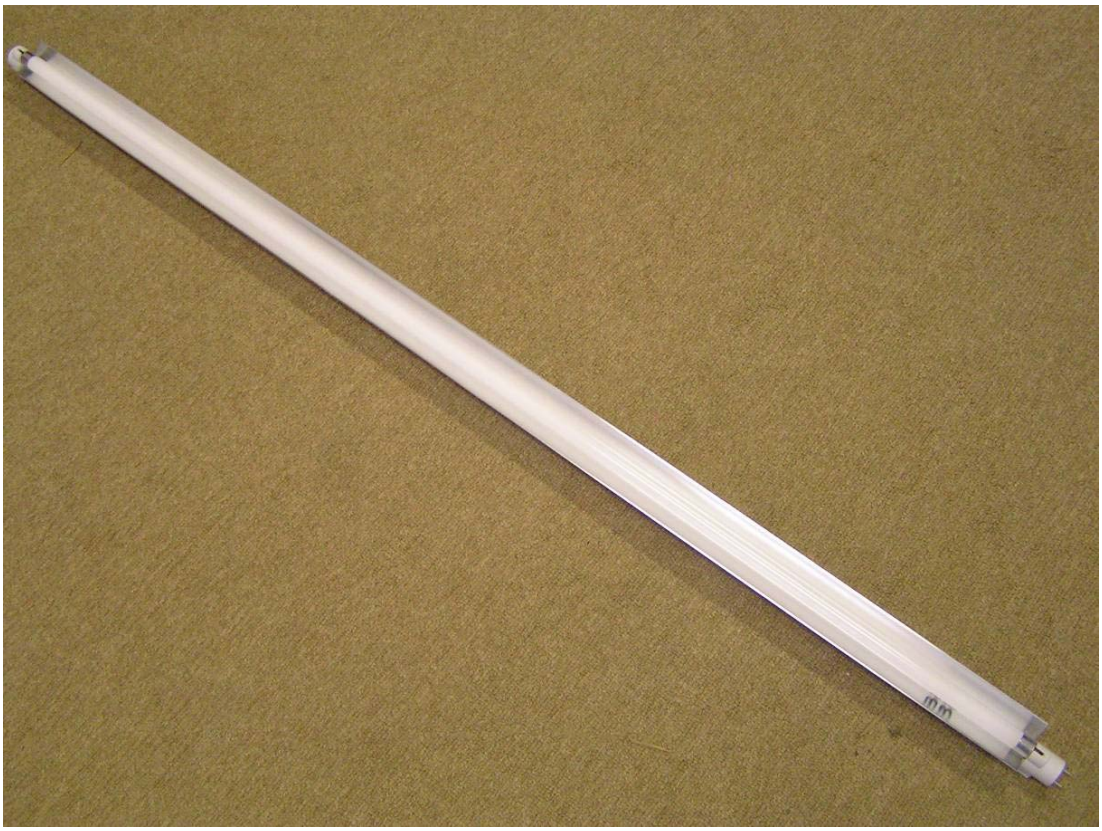
Description of Article

The T8-T5 conversion fitting is an adaptor which permits a T5 16mm fluorescent tube to be 'retro-fitted' into a T8 1200mm fluorescent light fitting. This is achieved by the fitting of the adaptor into the normal position the T8 fluorescent tube would occupy. The adaptor then has provision for the insertion of a T5 fluorescent tube.

Operational Requirements of Article

The adaptor has an electronic ballast enclosed within the metal extrusion forming the body of the adaptor. This ballast provides all the control and supply requirements for the T5 tube. Its operation therefore does not rely any of the normal internal components of the fitting in which it is inserted. However, the starter must be removed or it will interfere with the operation of the T5 light.

Photo 1 - General View of Article



Examination of Article

The adaptor base was disassembled into its component parts. The internal electronic ballast was insulated from the surrounding enclosure by two layers of insulation. It consisted of a high quality fibreglass type PCB substrate material with discrete components forming the requisite circuit for operation of the tube.

Evidence of compliance to applicable safety Standards is covered by a separate Test Report so 'Safety Certification' is not covered in the scope of this report.

Photo 2 - Electronic Ballast

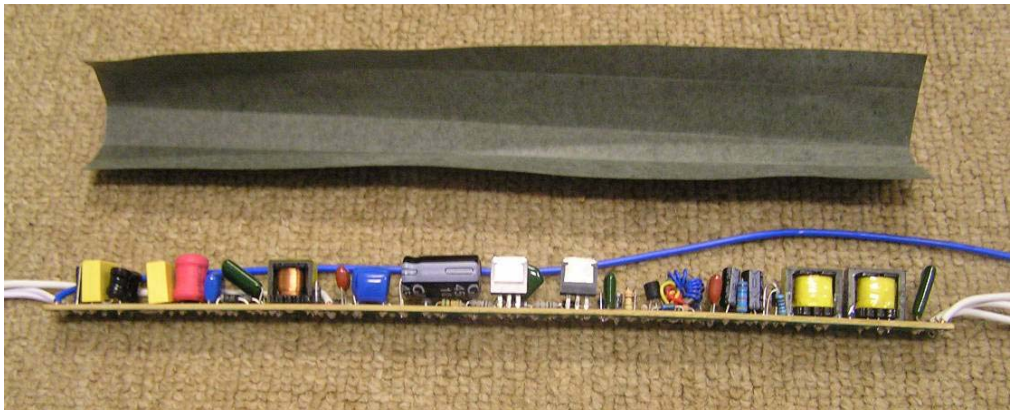


Photo 3 - End Cap Adaptor and Tube Holder

Scope of Testing

Both Electrical Load Characteristics and Light Output testing was conducted.

Electrical Performance Testing

The supplied sample was tested for operational performance to confirm the efficiency of the unit in regard to the electrical load characteristics.

Load characteristics for a typical 2x36 Watt fluorescent fitting with Standard cool white fluorescent tubes were recorded to give a comparison of the relative energy performance.
The exact same base fitting was used for all testing including the light performance tests. Loading combinations of one, two and no tubes installed were recorded to give as close as possible to practical real situation results, as well as with power factor correction components removed. Significant numbers of fittings would not have this component installed, (Generally those older than 10 years) or the component would have failed in service as happens after a number of years in operation.

Light Performance Testing

Part 1
Situational testing was carried out with a standard production T8-T5 adaptor. The tubes were conditioned before hand. A bare room with light coloured walls and fawn coloured carpet was used to obtain floor and desktop light levels using a hand held Light Meter with results recorded in Lux, the common unit of measurement for situational testing in Australia. The meter used had been calibrated by a NATA registered calibration laboratory within the last six months.

Part 2
Illuminance (lighting output performance) testing of the adaptor fitting with a T5 tube was carried out by a NATA accredited facility, 'LightLab International', using a typical common 2x36 Watt Fluorescent lighting fitting as the base unit. These results are in the report attached as Appendix 1 and give a true indication of the amount of light given out and its spread in an 'as installed' situation. A data file was also created for design use using the results of the testing.

Electrical Performance Testing

Test Results

Test Equipment- Yogogawa WT210 Digital Power Meter. Supply Voltage 240.2Vac

Typical Fluorescent Light fitting - Standard Tubes - Power Factor Correction installed.				
Item	**Va 1Va=1Watt @ Unity PF**	**Current**	**Power Factor – (1.0 is most efficient)**	**Indicated Power (Watts)**
Standard 2x36 Watt Fluorescent Batten. Inductive Ballast type ERC Model 86/53 PFC Capacitor 8µf 250 Vac (2xtubes -36 Watt cool white)	95	426mA	0.87	83
As Above (1xtube)	76	310mA	0.56	43.3
Standard 2x36 Watt Fluorescent Batten. Inductive Ballast type ERC Model 86/53 PFC Capacitor 8µf 250 Vac **(No tubes in circuit)**	144	596mA	0.011	0.15
Typical Fluorescent Light fitting -T5 Adapter & T5 Tubes - No Power Factor Correction				
Standard 2x36 Watt Fluorescent Batten Inductive Ballast type ERC Model 86/53 (1xIFR T8-T5 adaptor & T5 tube) *PFC Capacitor Removed*	28.3	117mA	0.99	28.2
As Above (2xIFR T8-T5 adaptor & T5 tube)	56	232mA	0.99	55.4
Typical Fluorescent Light fitting - Standard Tubes - No Power Factor Correction				
Standard 2x36 Watt Fluorescent Batten Inductive Ballast type ERC Model 86/53 As Above (2xtubes -36 Watt cool white) *PFC Capacitor Removed*	194	843ma	0.41	80
Typical Fluorescent Light fitting - T5 Adapter & T5 Tubes - Power Factor Correction installed				
Standard 2x36 Watt Fluorescent Batten Inductive Ballast type ERC Model 86/53 PFC Capacitor 8µf 250 Vac (2xIFR T8-T5 adaptor & T5 tube)	150	622mA	0.36	55.4
(1xIFR T8-T5 adaptor & T5 tube)	144	599mA	0.19	27.51

Discussion of Results

The above results show high current consumption for the T8 fitting without power factor correction. This current level is because of the very low power factor which is a result of the effect of a magnetic ballast. Whilst the power consumed is indicated as being less than a fitting with power factor correction, in reality high losses are occurring through higher heat generation in the cabling and components of the fittings. Measurement of these losses is not easily quantifiable without specific equipment and is outside the scope of the practical nature of this report.

The major advantage of the T5 fitting is clearly shown in that practically all power used goes into producing light output.

Light Performance Testing

Test Results (Part 1)

Test Equipment- Topcon IM-2D Digital Lux meter (Calibrated 19-2-08 NATA Laboratory)
All measurements in Lux * = no measurement recorded

Vertical Distance (Metres)	Centre location Directly under Fitting	Right of Fitting 1 Metre	Left of Fitting 1Metre	Right of Fitting 1.5 Metres
Typical Fluorescent Light fitting -2 x Standard Tubes - Power Factor Correction installed.				
1.7	494	340	345	*
2.4	312	270	270	199
Typical Fluorescent Light fitting -1 x Standard Tube - Power Factor Correction installed.				
1.7	240	180	170	71
2.4	168	140	128	*
Typical Fluorescent Light fitting -2xT5 Adapter & T5 Tubes - No Power Factor Correction				
1.7	510	310	307	*
2.4	322	245	235	207
Typical Fluorescent Light fitting -1xT5 Adapter & T5 Tube - No Power Factor Correction				
1.7	244	152	153	103
2.4	152	117	118	*

Discussion of Results

Part 1

Whilst every precaution has been taken to give a true indication of the comparative effect of the light levels in the performing of the above tests, repeatability of the results in other equivalent situations cannot be guaranteed due to factors affecting the situation, such as fitting type and differing components. However it is the belief of the author of this report that these results give true comparison for real situations and similar results would be attainable.

Part 2
The information presented in the Lightlabs report is about the illuminance of the tube when installed in a fitting and using the electronic ballast for which the efficiency testing was carried out. Commonly this level of light output is less than the theoretical situation due to effect of the fitting design and components. When compared to the absolute light outputs measured in a test lab utilising as close to ideal supply conditions and with light measured around the full circumference of the tube there will always be significant differences and the two situations cannot be legitimately compared.

Conclusion

1. It is shown that a common surface mount 2 x 36 Watt Fluorescent Batten with 2 x T8-T5 adaptors fitted with 28Watt T5 tubes produces 3.2% more light directly under the fitting and provides slightly better or equivalent light at the fringe.

2. It is also shown that the T5 Adaptor fitting consumes only 66% of the power level compared to the Standard T8.

3. It is further shown that the ballast of the T8-T5 adaptor fitting of C.A.S. operates at high efficiency in that the power factor is extremely close to unity. The net benefit of this is less deterioration and arcing of switching contacts which occurs with T8 magnetic ballast fittings as well as elimination of losses due to the starters, and ballast and power factor correction capacitor if fitted. Taking into account these losses it can be expected that a 40% saving in energy consumption would be achieveable.

DATE: 21/07/2008

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Regulatory Compliance & Investigations

APPENDIX 1

Report on the lighting output performance of 'T8 - T5 Adaptor Fittings' supplied by Carbon and Energy Reductions Pty Ltd previously (Carbon Abatement Solutions), when installed in a commonly available 2x36 Watt surface mount fluorescent light fitting.