

Technical Note 158

Guide to the Use of LED Road Lighting Luminaires

November 2017

Copyright



<http://creativecommons.org/licenses/by/3.0/au/>

© State of Queensland (Department of Transport and Main Roads) 2017

Feedback: Please send your feedback regarding this document to: tmr.techdocs@tmr.qld.gov.au

1 Purpose of technical note

This Technical Note provides guidance on the use of LED road lighting luminaires on Transport and Main Road's road network. The photometric performance of LED luminaires differs from High Intensity Discharge (HID) luminaires and gives the designer more options to optimise designs. The aim is to establish a uniform statewide approach to the application of this technology.

2 Background

With the emergence of LED technology as a viable alternative to current HID luminaires the department has undertaken field trials to ascertain whether it is suitable for major roads. Encouraging results from these trials have reinforced the move to LED luminaires, which should have both an operational and maintenance benefit over the life of the luminaire. The department's Technical Specification MRTS94 *Road Lighting* has been updated to include LED luminaires and a type approval process has been undertaken to add LED luminaires to the department's lighting fleet. This process is ongoing as the technology is still improving, and at this stage is preferred over moving to a contract luminaire situation. Feedback will be sought on both design and installation issues that may arise as the technology is implemented.

3 Referenced documents

Reference	Title
AEMO	<i>Australian Energy Market Operator – National Electricity Market Load Tables for Unmetered Connection Points</i>
AS/NZS 1158.1.1	<i>Lighting for roads and public spaces, Vehicular traffic (Category V) lighting – Performance and design requirements</i>
MRTS94	<i>Road Lighting</i>
TRUM Vol 4 Part 3	<i>Traffic and Road Use Manual, Volume 4, Part 3 Electrical Design for Roadside Devices</i>

4 Application

It is recommended that the department moves to LED technology and all new designs be completed using type approved LED luminaires. While you could mix different luminaire manufacturers for a single installation it is recommended that only one be used. This is for ease of purchasing and asset management.

It is not recommended that individual HID luminaires be replaced with LED in an existing lighting scheme. Aesthetically this is not ideal and matching the exact performance of the HID to an LED luminaire is difficult. However where an existing HID luminaire failure is attributed to end of life of the fitting then a determination should be made as to whether the other luminaires in the same installation are also approaching end of life. If this is the case, an upgrade to LED luminaires should be considered. An AS/NZS 1158.1.1 compliance check will need to be undertaken for all upgrades.

Staged upgrade of installations may be undertaken where lighting segments are upgraded in one block for example, at an interchange the through road may be upgraded to LED while the on and off ramps remain as HID. Where no through road lighting exists the ramps may be upgraded to LED and the intersection and cross road lighting remain HID. For a purely route lighting installation ten spans of lighting could be upgraded at a time. An AS/NZS 1158.1.1 compliance check will need to be undertaken for all upgrades.

5 Designing with LED luminaires

Initially we expect that designs will be compared across a few manufacturers' products and the best fit selected. When undertaking the design pay special attention to the AS/NZS 1158.1.1 luminance and illuminance parameters and design as close to these values as possible being aware of the requirement for Threshold Increment (Ti) below. There can be quite a variation in performance from one LED luminaire to another, depending on the road geometry. If you do this in combination with the highest efficacy (lumen output to power ratio) luminaire you will generally end up with a design which gives the best whole of life cost.

The limiting value for Threshold Increment (Ti) from Table 2.2 of AS/NZS1158.1.1 shall be less than or equal to 15.

Australian Standards is still considering the best option for determining maintenance factors for LED luminaires. Until this has been finalised a 0.75 maintenance factor shall be used for all LED designs.

The electrical design for LED luminaires shall comply with the department's *Electrical Design for Roadside Devices*, which can be located on the departmental website www.tmr.qld.gov.au via TRUM Vol 4, Part 3. Attention is drawn to Clause 2.5.4 Maximum demand, for dealing with LED in-rush currents.

LED Luminaire Selection Guide (for TN158) details the current departmental type approved LED luminaires.

6 LED luminaire equipment

All LED luminaires detailed in *LED Luminaire Selection Guide (for TN158)* are on the Australian Energy Market Operator (AEMO) load table and can be used for Transport and Main Road's rate 3 unmetered public lighting.

All LED luminaires have a 7 pin Nema base and can have a wireless node installed if a Central Management System is being considered for dimming.

The cleaning interval for the LED luminaires shall coincide with other periodic assessment requirements of the road lighting infrastructure but shall not be more than six years.

