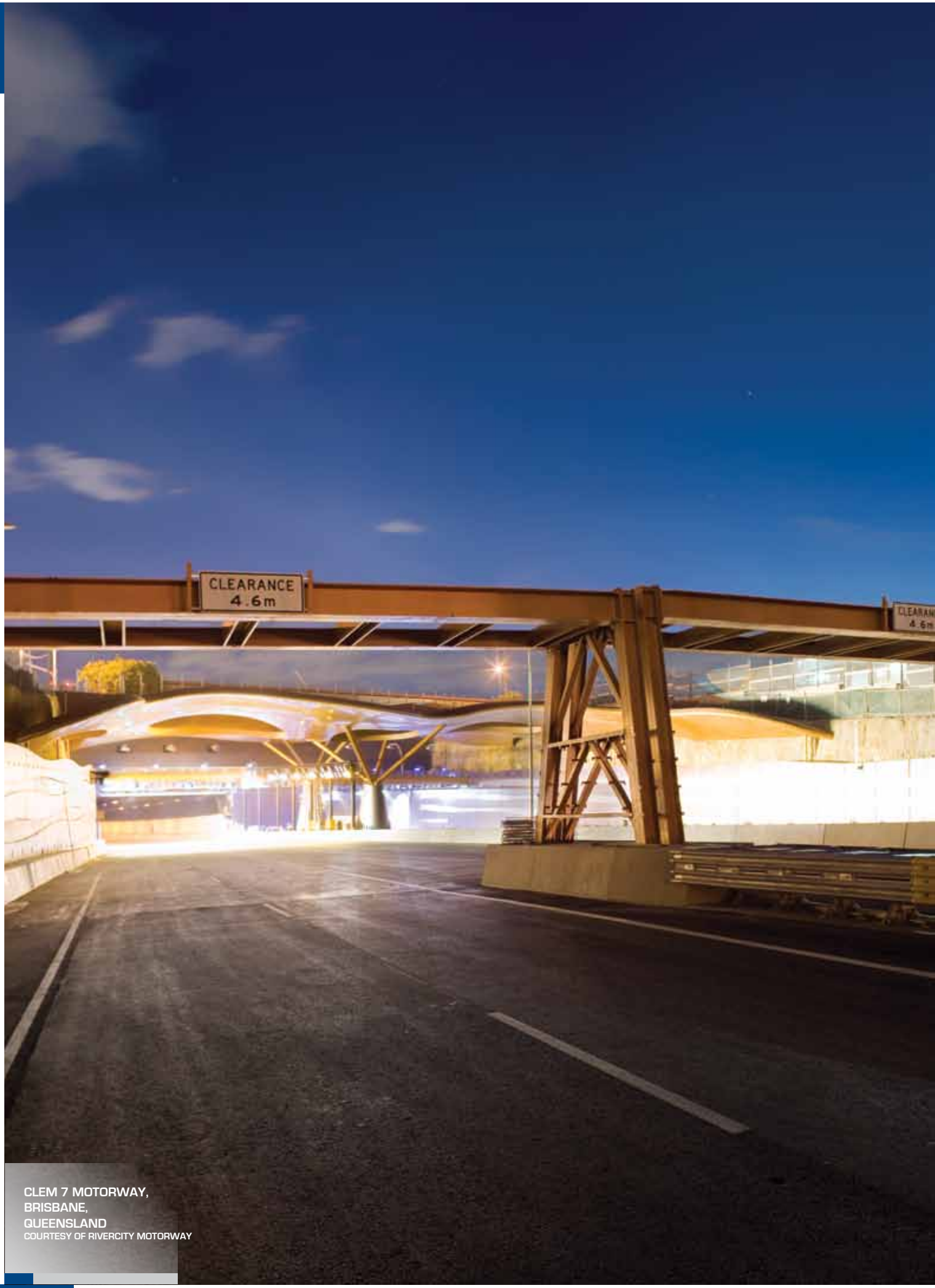

CLEM 7 MOTORWAY,
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COURTESY OF RIVERCITY MOTORWAY

TUNNEL & UNDERPASS

Tunnel Pro HE Asymmetric Fluorescent
Page 287

Tunnel Pro HE Fluorescent
Page 286

Tunnel Pro Fluorescent
Page 285

Tunnel Pro Twin Series
Page 284

Tunnel Pro Single Series
Page 283

Tunnel & Underpass Lighting
Page 280

TUNNEL & UNDERPASS LIGHTING

As Australia's population increases and governments endeavour to limit urban sprawl via consolidation of our cities and suburbs, congestion on our road networks is building and in-turn the reliance on tunnels and underpasses to improve traffic flow is set to continue. Even in rural areas increasing traffic volume combined with the desire to provide safer roads, mean existing roads that wind around and over mountains are now seen as goat tracks and tunnels are now being used as a viable alternative.

This increasing demand also sees the evolution of an Australian Standard for tunnels and underpass lighting. The new standard is part of the AS1158 Series, Lighting for roads and public spaces Part 5: Tunnels and underpasses.

Design Principle

Why do we need Tunnel / Underpass lighting?

To ensure drivers can approach, pass through and exit the tunnel / underpass with a degree of safety commensurate to that of the approach road. Unlike an uncovered road the approaching driver's adaptation level is significantly higher in comparison to the lighting level within the tunnel /underpass and therefore limits the driver's ability to view the road surface, surrounds and other objects.

This phenomenon is generally known as the "black hole" effect.

Black Hole Effect

How Much light is required?

Determination of tunnel Lighting requirements is provided in the Australian Standard AS/NZS 1158.5 2007 Lighting for roads and public spaces Part 5: Tunnels and underpasses.

In principle the lighting level required within the tunnel entrance (threshold zone) is determined by the approaching driver's adaptation level and speed. After the threshold zone the lighting level within the tunnel or underpass is gradually reduced as the driver's adaptation level also reduces. This is illustrated in the following schematic diagram (see Fig. 1).

Best practice approach

To date Australia's major tunnel installations have incorporated a best practice approach, where basic daytime and night-time lighting is achieved with a continuous row of fluorescent luminaires installed throughout the entire length of the tunnel. Supplementary adaptation lighting is then provided at the entrance, transition and exit zones, via high pressure sodium luminaires to cater for changes in ambient light levels throughout the day. The benefits of this system are excellent visual guidance, uniform appearance and minimisation of annoying flicker and glare.

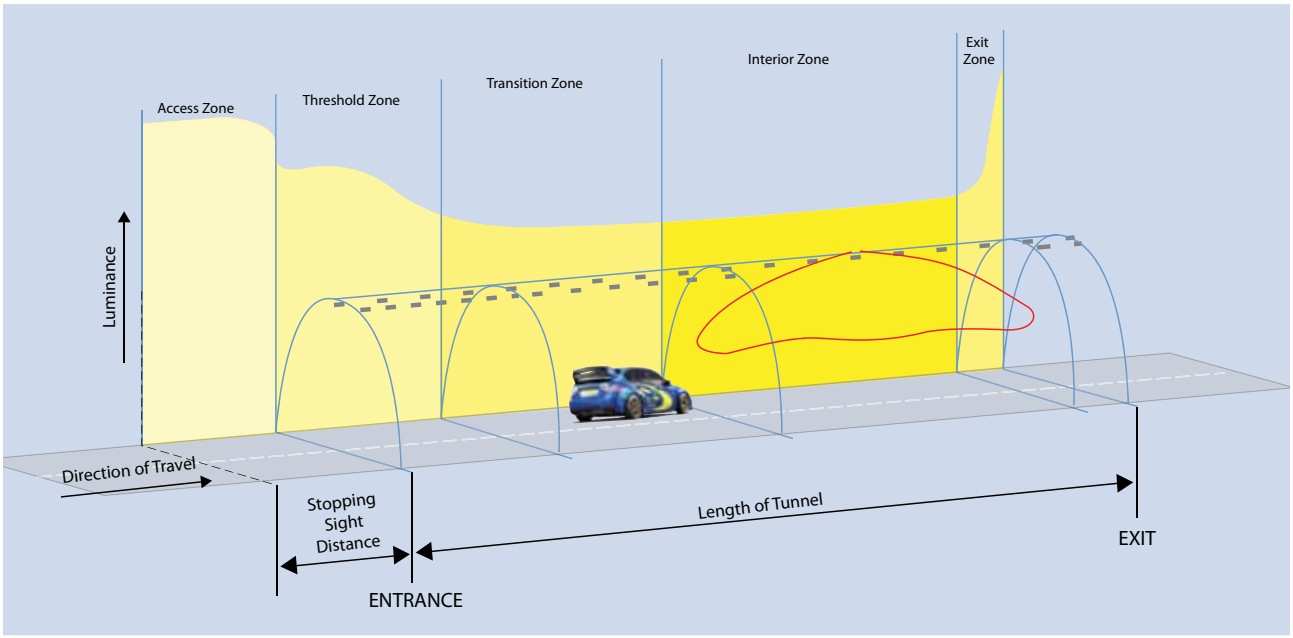


Fig. 1

This best practice approach is now changing due to the higher capital and maintenance cost of a fluorescent based system in comparison to an all high pressure sodium lighting solution. Whilst an all high pressure sodium system provides significant savings in capital and maintenance and therefore desirable from a cost point of view, there are a number of challenges to overcome at the design or specification stage. Apart from compliance to the nominal lighting technical parameters designers need to carefully consider other factors, to ensure the long term success of this type of installation.

Current and future practice

Firstly the designer will need to consider how to minimise the impact of random lamp failure to luminaires on the core lighting system that provides basic daytime and night-time illumination. Failure of these lamps will have a dramatic effect due to the large spacing between luminaires, in comparison to a fluorescent system where random lamp failure will generally only have a minor impact on the lighting system.

The reliability of these luminaires can be improved with the use of twin arc type high pressure sodium lamps which have an average rated life up to 55,000 hours. Other considerations would be the use of an intelligent control system with remote monitoring capabilities to provide early detection of lamp failures. This would greatly assist in the maintenance regime and facilitate the prompt replacement of failed lamps.

Secondly, in contrast to the wide beam uniform distribution produced by fluorescent luminaires, high pressure sodium luminaires with higher intensity narrower beam distributions will need to be assessed for suitability. An inappropriate distribution or any irregularities to the optical system that produce banding, stripes or hot spots will be detrimental to the driver's visual environment. It should be noted that although calculations may demonstrate compliance with the relevant light technical parameters, the distribution may not be suitable.

Sylvania Lighting is well equipped to respond to these challenges with it's NATA development laboratory and Light Engineering Design team enabling interaction between the luminaire design and application design ensures a high quality energy efficient lighting system is provided for every installation. With the ever increasing focus on the need to reduce greenhouse gases the importance of energy efficiency will continue to rise.

In response to these increasing requirements Sylvania has recently released a second generation range of single and twin lamp high intensity discharge tunnel luminaires. Sylvania has also co-developed a Lighting Interface DALI Addressable (LIDA) interface for High Intensity Discharge (HID) light sources utilising D.A.L.I protocol. This unit is specifically designed for HID lighting control providing switching and lamp failure reporting via standard DALI interrogation.

Sylvania Tunnel luminaires have been developed locally by the same expert design team that developed market leading road lighting products such as the Roadster and Suburban luminaires. This range shares the same high level of optical design, robust construction and ease of maintenance ensuring the installation a design life in excess of twenty years.

Ultimately the success of the installation will be determined by how well the designer/client responds to these challenges. It can sometimes be the subtle refinements which differentiate between a good and poor installation.

For more information please contact your local Sylvania Customer Service department or visit http://www.sla.net.au

NORTH WEST TRANSITWAY,
HILLS DISTRICT,
NEW SOUTH WALES

TUNNEL PRO-SINGLE SERIES

IP66 IK08 Ta 40°C

TUNNEL & UNDERPASS (HID)

SLA, as market leader in Road Lighting, has expanded to include a range of high performance Tunnel and Underpass Luminaires in line with the new Australian Standard for the lighting of Tunnels and Underpasses. Levering off the expert design team that developed Market leading Road Lighting products, such as the Roadster, Urban and Suburban, the Tunnel range represent a complementary range of uniquely Australian designed / Manufactured HID luminaires. This range shares the same high level of optical design, robust construction, ease of installation and maintenance affording the owner or installers a design life in excess of twenty years.

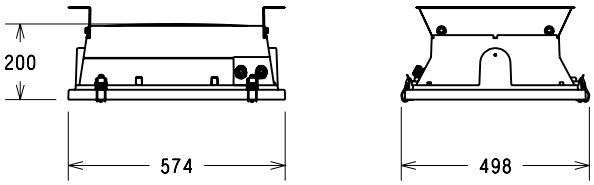
Featuring HID light sources the high precision optical design provides the lowest installed cost whilst maintaining the lowest possible cost of ownership. An extensive range of Symmetric, Asymmetric and Counterbeam optics with an IP66 optical compartment ensure an optimum design can be provided for every application.

LUMINAIRE CONSTRUCTION

- Pressure die-cast aluminium body and visor frame
- IP66 optical / control gear chamber with glass visor
- Black polyester powdercoat finish as standard

FEATURES

- 70-400W HID lamps
- Integral 240V removable control gear tray.
- Options
  - Mounting brackets can be designed to suit project requirements
  - DALI control
  - Polyester powdercoat finish in various RAL colours
  - High ambient temperatures 45 - 50°C



TUNNEL PRO SINGLE

Description	Type	Base	Lamp	Weight	Order Code
Tunnel Pro Single 70W HPS	High Pressure Sodium	E27	SHPTS70	18kg (approx)	TS4100L
Tunnel Pro Single 100W HPS	High Pressure Sodium	E40	SHPTS100	18kg (approx)	TS4700L
Tunnel Pro Single 150W HPS	High Pressure Sodium	E40	SHPTS150	18kg (approx)	TS4200L
Tunnel Pro Single 250W HPS	High Pressure Sodium	E40	SHPTS250	18kg (approx)	TS4300L
Tunnel Pro Single 400W HPS	High Pressure Sodium	E40	SHPTS400	18kg (approx)	TS4400L

Options Available:

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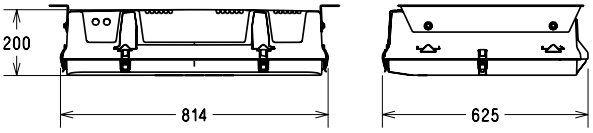
TUNNEL PRO -TWIN SERIES



TUNNEL PRO TWIN

TUNNEL & UNDERPASS (HID)

SLA, as market leader in Road Lighting, has expanded to include a range of high performance Tunnel and Underpass Luminaires in line with the new Australian Standard for the lighting of Tunnels and Underpasses. Levering off the expert design team that developed Market leading Road Lighting products, such as the Roadster, Urban and Suburban, the Tunnel range represent a complementary range of uniquely Australian designed / Manufactured HID luminaires. This range shares the same high level of optical design, robust construction, ease of installation and maintenance affording the owner or installers a design life in excess of twenty years.

Featuring two optical systems for HID light sources the high precision optical design provides the lowest installed cost whilst maintaining the lowest possible cost of ownership. An extensive range of Symmetric, Asymmetric and Counterbeam optics with an IP65 optical compartment ensure an optimum design can be provided for every application.

LUMINAIRE CONSTRUCTION

- Die-cast aluminium body and visor frame
- IP65 optical / control gear chamber with glass visor
- Black polyester powdercoat finish as standard

FEATURES

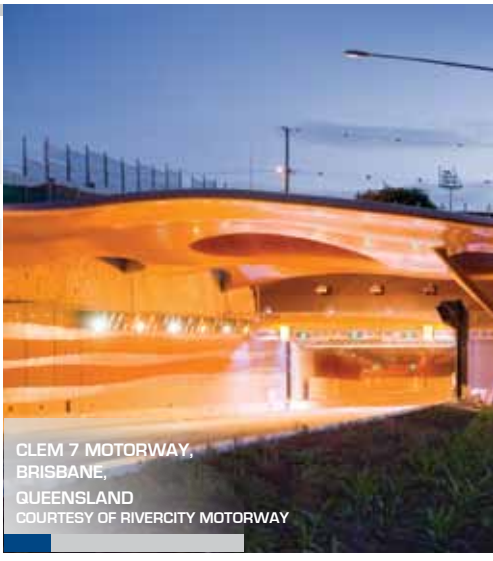
- 70 - 400W HID lamps
- Integral 240V removable control gear tray.
- Options
  - Mounting brackets
  - DALI control
  - Polyester powdercoat finish in various RAL colours
  - High ambient temperatures 45 - 50°C

TUNNEL PRO-TWIN SINGLE

Description	Type	Base	Lamp	Weight	Order Code
Tunnel Pro Twin 150W HPS	High Pressure Sodium	E40	2xSHPTS150	34kg (approx)	TPT4200L
Tunnel Pro Twin 150W HPS	High Pressure Sodium	E40	2xSHPTS250	34kg (approx)	TPT4300L
Tunnel Pro Twin 400W HPS	High Pressure Sodium	E40	2xSHPTS400	34kg (approx)	TPT4400L

Options Available:

Note: the above codes are for standard products only. Please refer to SLA Pricelist for options.



CLEM 7 MOTORWAY,
BRISBANE,
QUEENSLAND
COURTESY OF RIVERCITY MOTORWAY

TUNNEL PRO-FLUORESCENT

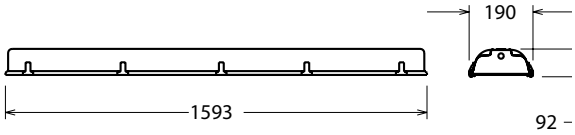
TUNNEL & UNDERPASS (FLUORESCENT)

The Tunnel Pro Fluorescent is designed for tunnel and underpass applications to provide “Basic daytime”, “Night time” and “Mains Failure” lighting. This range supplements the Tunnel Pro HID Series and shares the same high level optical design, robust construction and ease of maintenance to provide a minimum design life in excess of 20 years.

A single piece stainless steel body provides superiors corrosion and mechanical resistance for these arduous environments. A glass visor is supported via a stainless steel frame and secured via toggle latches which remain attached to the housing when opened for easy maintenance. The lamps, reflector and control are also mounted on a removable gear tray for ease of installation and maintenance.

LUMINAIRE CONSTRUCTION

- Stainless steel, grade 304 18/8 body and visor frame
- 5mm thick tempered glass visor
- Stainless steel toggle latches and fasteners
- Silicone rubber gasket
- Removable optical / control gear tray
- IP65 optical / control gear chamber
- Natural finish



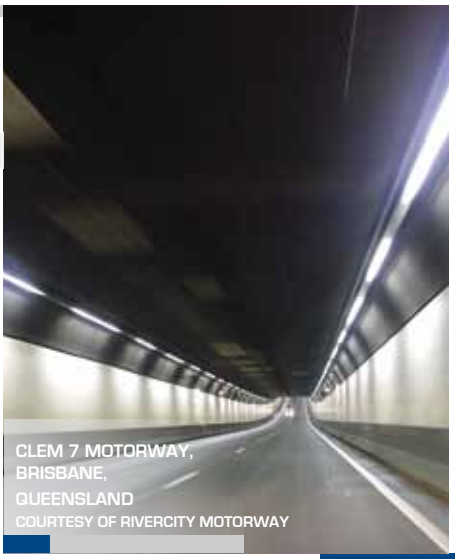
FEATURES

- 2 x 58W T8 Fluorescent lamps
- Integral electronic control gear
- Options:
  - T5 Fluorescent lamps
  - Dimming ballasts
  - DALI Control
  - Mounting brackets
  - Polyester powdercoat finish in various colours

TUNNEL PRO-FLUORESCENT

Description	Type	Base	Lamp	Weight	Order Code
Tunnel Pro Fluorescent 2x 58W	Fluorescent	G13	2x F58W/840	11.3kg	TFN601L

Note: the above codes are for standard products only. Please refer to SLA Pricelist for options.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COURTESY OF RIVERCITY MOTORWAY

TUNNEL PRO - HIGH EFFICIENCY FLUORESCENT

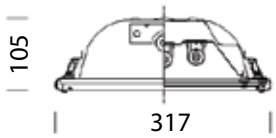
IP65 IK08 Ta 40°C

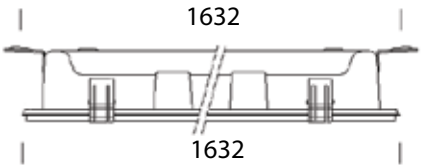
TUNNEL & UNDERPASS (FLUORESCENT)

The Tunnel Pro High Efficiency Fluorescent is designed for tunnel and underpass applications to provide “Basic daytime”, “Night time” and “Mains Failure” lighting. This range supplements the Tunnel Pro HID Series and shares the same high level optical design, robust construction and ease of maintenance to provide a minimum design life in excess of 20 years.

In comparison to the standard Tunnel Pro – Fluorescent the wider body of the High Efficiency luminaire improves the performance of the optical system as well allowing various distributions. In addition the increased volume provides a cooler environment to maximise lamp and control gear life.

A single piece stainless steel body provides superiors corrosion and mechanical resistance for these arduous environments. A glass visor is supported via a stainless steel frame and secured via toggle latches which remain attached to the housing when opened for easy maintenance. The lamps, reflector and control are also mounted on a removable gear tray.





LUMINAIRE CONSTRUCTION

- Stainless steel, grade 304 18/8 body and visor frame
- 5mm thick tempered glass visor
- Stainless steel toggle latches and fasteners
- Silicone rubber gasket
- Removable optical / control gear tray
- IP65 optical / control gear chamber
- Natural finish

FEATURES

- 2 x 58W T8 Fluorescent lamps
- Integral electronic control gear
- Options:
  - T5 Fluorescent lamps
  - Dimming ballasts
  - DALI Control
  - Mounting brackets
  - Polyester powdercoat finish in various colours

TUNNEL PRO HIGH EFFICIENCY FLUORESCENT

Description	Type	Base	Lamp	Weight	Order Code
Tunnel Pro HE Fluorescent 2x58W	Fluorescent	G13	2x F58W/840	16.6kg	TFW601L

Note: the above codes are for standard products only. Please refer to SLA Pricelist for options.

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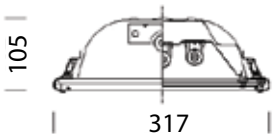
TUNNEL PRO - HIGH EFFICIENCY ASYMMETRIC

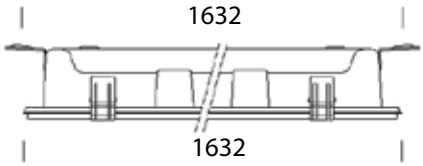
TUNNEL & UNDERPASS (FLUORESCENT)

The Tunnel Pro High Efficiency Asymmetric Fluorescent is designed for tunnel and underpass applications to provide “Basic daytime”, “Night time” and “Mains Failure” lighting. This range supplements the Tunnel Pro HID Series and shares the same high level optical design, robust construction and ease of maintenance to provide a minimum design life in excess of 20 years.

The asymmetric optic provides greater flexibility in mounting locations. In addition the increased volume of the wide body luminaire provides a cooler environment to maximise lamp and control gear life.

A single piece stainless steel body provides superiors corrosion and mechanical resistance for these arduous environments. A glass visor is supported via a stainless steel frame and secured via toggle latches which remain attached to the housing when opened for easy maintenance. The lamps, reflector and control are also mounted on a removable gear tray for ease of installation and maintenance.





LUMINAIRE CONSTRUCTION

- Stainless steel, grade 304 18/8 body and visor frame
- 5mm thick tempered glass visor
- Stainless steel toggle latches and fasteners
- Silicone rubber gasket
- Removable optical / control gear tray
- IP65 optical / control gear chamber
- Natural finish

FEATURES

- 1 x 58W T8 Fluorescent lamps
- Integral electronic control gear
- Options:
  - T5 Fluorescent lamps
  - Dimming ballasts
  - DALI Control
  - Mounting brackets
  - Polyester powdercoat finish in various colours

TUNNEL PRO HE ASYMMETRIC FLUORESCENT

Description	Type	Base	Lamp	Weight	Order Code
Tunnel Pro HE Asymmetric Fluorescent 2x58W	Fluorescent	G13	2x F58W/840	14.7kg	TFWA601L

Note: the above codes are for standard products only. Please refer to SLA Pricelist for options.