



TUNNEL LIGHTING



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C.U. Phosco
OFFICIAL UK PARTNER **heper**⁺





A LEGACY OF LIGHT: SHAPING THE FUTURE WITH CU PHOSCO AND HEPER LIGHTING

To complement our extensive range, CU Phosco are the exclusive UK partners for Heper expanding our offering to include architectural and landscape lighting. Whether it's road and pathway illumination or large-area lighting solutions, our partnership ensures a seamless and comprehensive approach to your lighting schemes.

As family-run manufacturers, both CU Phosco and Heper are committed to excellence and progress in lighting technology. Our commitment to excellence ensures we provide not only illumination but also efficiency, sustainability, and modern aesthetics.

ADVANCED TUNNEL LIGHTING SOLUTIONS

Tunnel lighting presents one of the most demanding challenges in illumination design. The enclosed environment, variable traffic conditions, and strict safety regulations require a precise and adaptive approach to ensure optimal visibility, seamless transitions between zones, and long-term performance in harsh conditions.

With decades of experience and over a hundred successfully completed projects, Heper is a trusted leader in tunnel lighting solutions. Our expertise spans the entire process—from initial design to product integration—delivering lighting systems that meet the most stringent luminance and illuminance requirements.

Heper's advanced optical designs allow for precise light distribution across different tunnel zones, minimising glare and enhancing visual comfort. Our luminaires are engineered with robust materials to withstand extreme environmental conditions, ensuring durability and reliability. Additionally, our energy-efficient control systems provide adaptive lighting, optimising power consumption without compromising safety.

With a dedicated team and a comprehensive portfolio of high-performance luminaires, Heper offers a turnkey solution for modern tunnel infrastructure, setting new standards in performance, efficiency, and safety.

TUNNEL LIGHTING

GOLEDO – Adaptive tunnel lighting: precision, efficiency, and safety

GOLEDO's advanced tunnel lighting technology ensures optimal performance, energy efficiency, and compliance with both global and local standards. Designed for the most demanding environments, our tunnel lighting solutions provide the perfect balance between cutting-edge technology and practicality.

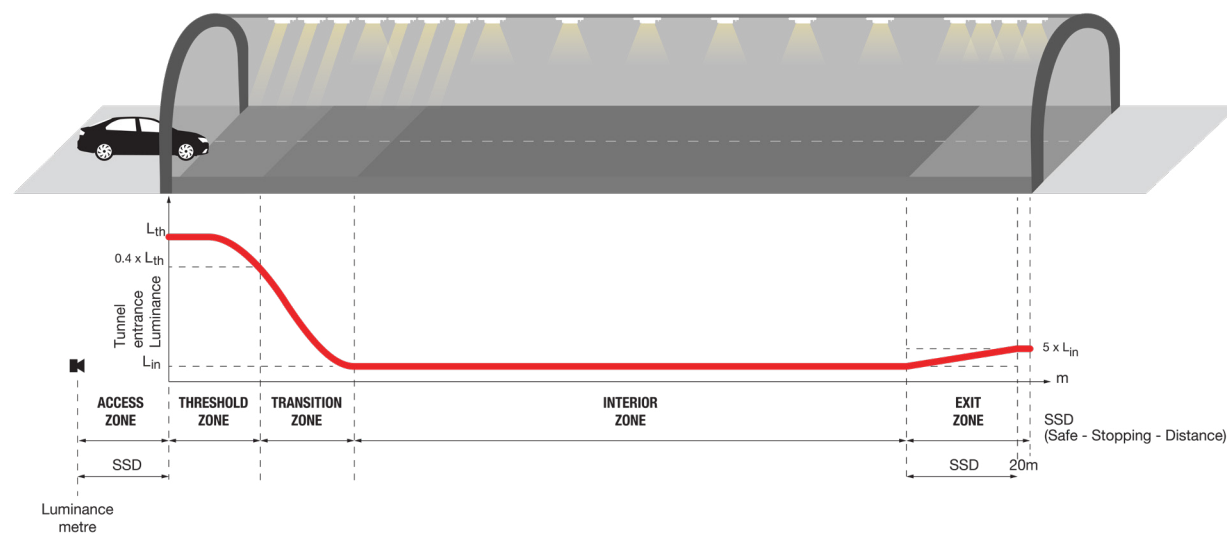
Key features:

- **Advanced Optical Technology** - Designed specifically for tunnel environments, GOLEDO offers customisable lighting distribution to ensure seamless transitions between light levels and deliver optimal visibility and comfort for tunnel users.
- **Durable, High-Quality Materials** - Built to withstand harsh tunnel conditions, we use durable materials that are resistant to heat, moisture, and physical impact, ensuring longevity and minimal maintenance.
- **Global Compliance** - GOLEDO's tunnel lighting systems are designed to meet the strictest country-specific regulations, guaranteeing both safety and efficiency.
- **Ease of Installation & Maintenance** - With a practical cable-tray or ceiling mount bracket design, GOLEDO lighting ensures quick installation and easy access for ongoing maintenance, minimising downtime and reducing costs.
- **Flexible Power & Light Distribution** - we provide adjustable power options and customisable light distribution to meet the unique needs of each tunnel or underpass, ensuring optimal energy efficiency and performance.



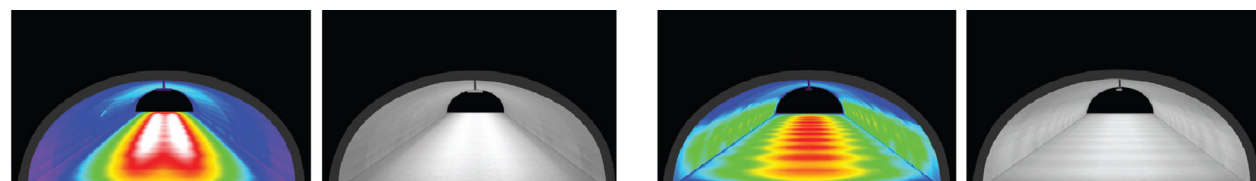
TUNNEL LIGHTING PRINCIPLES

ZONE TYPES



1. **Access Zone** - The part of the open road in front of the tunnel portal in the approach direction, covering the distance over which an approaching driver is able to see tunnel entrance. The access zone begins at the stopping distance before of the entrance portal and it ends at the tunnel entrance portal.
2. **Threshold Zone** - The first part of the tunnel, just after the entrance portal. The threshold zone starts either at the beginning of the tunnel or at the beginning of the daylight sunscreens when occurring. The length of the threshold zone is at least equal to the stopping distance.
3. **Transition Zone** - The part of the tunnel starts from just after the threshold zone and ends at the beginning of interior zone. The lighting level in the transition zone is decreasing from the level at the end of the threshold zone to the level of the interior zone.
4. **Interior Zone** - The part of the tunnel after the transition zone till to the beginning of the exit zone
5. **Exit Zone** - The exit zone begins at the end of the interior zone and ends at the exit portal of the tunnel.

DESIGN CRITERIA



Tunnel - Tunnel is the structure over a roadway that restricts the normal daytime natural illumination of a roadway section such that the driver's visual sensation is diminished. In order to classify changing lighting requirements along with the tunnel length, tunnel is evaluated in the form of sub interior zones: the access zone, the threshold zone, the transition zone, the interior zone, the exit zone and parting zone.

Traffic Flow - The number of vehicles passing a specific point in a stated time in stated direction(s). In tunnel design, peak hour traffic, vehicles per hour per lane, will be used.

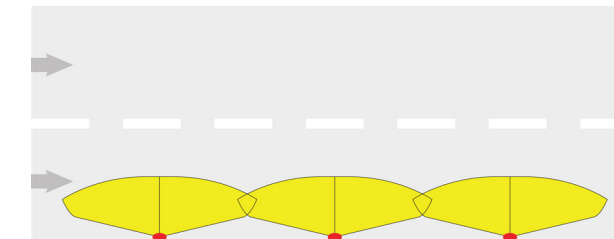
Design Speed - The design speed is the speed for which the tunnel is laid out. It is generally accepted that this speed is the maximum speed allowed on the access roads to the tunnel.

Reference Point - The reference point is in principle the point located in the centre of the approaching lanes, at a height of 1,5 m and at a distance from the entrance of the tunnel equal to the stopping distance (SD) at the design speed.

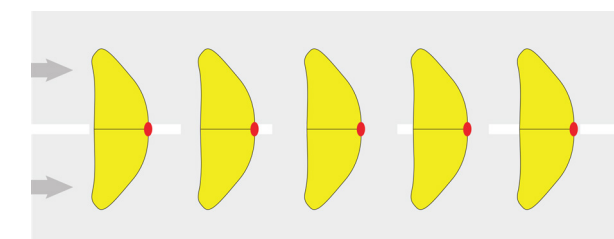
Stopping Distance - Stopping distance is the distance necessary to stop the vehicle moving at the speed in question in total safety. It comprises the distance covered during the reaction time and during the braking time.

LUMINAIRE LAYOUT

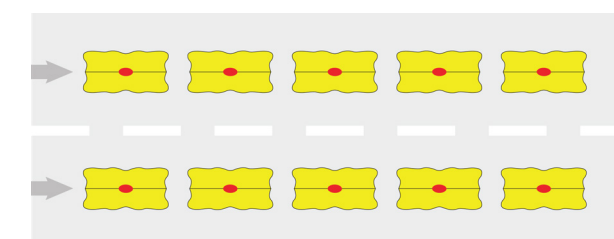
Symmetrical/Asymmetrical Lighting



Lateral Layout

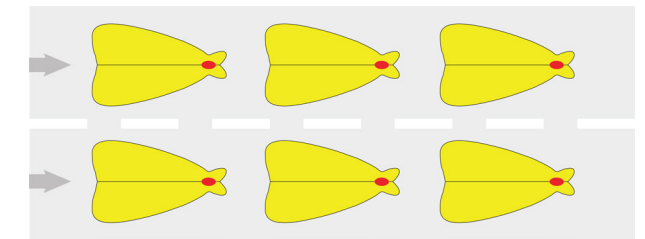


Bilateral Layout (ceiling or wall)

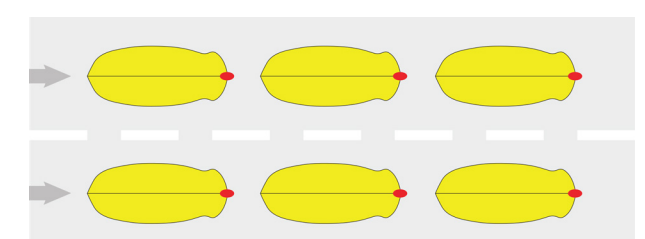


Biaxial Layout

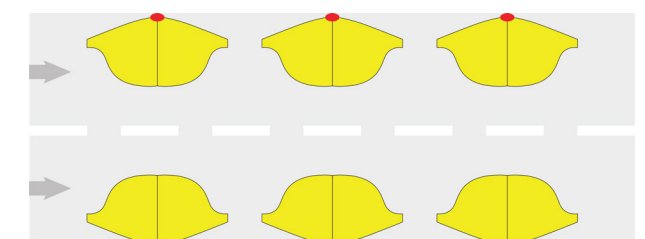
Counter / Pro Beam Lighting



Biaxial Layout (counter beam)



Biaxial Layout (pro beam)



Axial Layout

Symmetrical Lighting - The lighting where the light equally falls on objects in directions with and against the traffic. Symmetric lighting is characterised by using luminaires that show a luminous intensity distribution that is symmetric in relation to the plane normal to the direction of the traffic.

Counter-beam Lighting - The lighting where the light falls on objects from an opposite direction to the traffic. Counter-beam lighting is characterised by using luminaires that show a luminous intensity distribution that is asymmetric in relation to the plane normal to the direction of the traffic, where the maximum luminous intensity is aimed against the direction of traffic. The term refers only to the direction of normal travel.

Pro-beam Lighting - The lighting where the light falls on objects in the same direction as the traffic. Pro-beam lighting is characterised by using luminaires that show a luminous intensity distribution that is asymmetric in relation to where the maximum luminous intensity is aimed in the same direction as the direction of the traffic



About CU Phosco

CU Phosco provides an in-house, end-to-end service encompassing design, manufacturing, installation and maintenance of high masts, columns and lighting for the global market. Through design excellence, quality products, project management and a customer-centric approach, our bespoke sustainable infrastructure solutions create safer, brighter, and connected environments.

Established in 1923, our century long legacy of technical expertise and operational integrity has earned the trust and business of customers worldwide across sectors including road, telecoms, airports, ports, and sports.

Our lighting products are rigorously tested to be used in all environments and are built with circularity in mind. Our lighting columns and masts range from 3 metres to 60 metres in height and can be seen on roads, motorways, at airports and ports, shopping centres, residential areas, and sports stadiums throughout the world.

About Heper

Founded in 1996, Heper is a global leader in outdoor lighting, specialising in architectural, landscape, and tunnel lighting. Operating in over 80 countries across six continents, Heper delivers high-quality, innovative lighting solutions through its production facilities in Turkey and subsidiaries in the USA, Germany, and Dubai. With over 25 years of engineering expertise, the company excels in thermal management and produces durable, eco-friendly LED technologies.

Heper's Lighting Innovation Centre ensures all products meet international standards through rigorous in-house testing. In addition to custom lighting, Heper manufactures custom-designed, seamless aluminum poles, used in its projects worldwide. Known for its tunnel lighting expertise, Heper has successfully completed numerous prestigious national and international projects.

Committed to sustainability, Heper combines innovative, human-centric designs with eco-friendly technologies to improve life through light. To expand its societal impact, Heper works tirelessly every day to enhance its contributions to the community and the environment.