

# Light provides safety

Outstanding solutions for tunnels and underpasses

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# The arteries of modern cities

The constantly increasing traffic in cities is a controversial issue: Infrastructure is the prerequisite for economic power, but it often also means congestion, noise and unpleasant odors. One way out of this misery is tunnels. They relieve road congestion, create connections and reduce noise and fine dust in the city.

**Win-win situation for tunnel operators and municipalities**  
Tunnels reduce environmental pollution, but they need light—day and night. Thanks to economical LED solutions with an

extremely long service life, this however does not equate to high costs. SITECO offers you tailor-made solutions that meet these and many other requirements:



### Efficient

- Power-saving LED technology with a long service life
- Standard LED engines from industrial and street lighting
- Intelligent control: DALI or 10 StepDIM
- One e-box for 10–12 continuous row luminaires



### Straightforward

- Time-saving handling for avoidance of long closures
- Fast, flexible installation principle: Adjustable 2-point mounting
- Pre-assembled cable harnesses with quick connectors
- E-boxes can disappear into maintenance niches
- Through-wiring
- Optional tool-free opening



### Safe

- Almost maintenance-free operation without relamping due to failures
- Uniform illumination without glare for best visibility, in particular due to extremely innovative continuous row luminaires
- Outstanding quality due to automatic laser welding
- Interior zone luminaires with separate circuits for UPS



### Robust

- Designed for machine cleaning
- Improved stainless steel alloy 1.4404
- Aluminum heat sink according to EN573-3 for all hazard levels with a copper content less than 0.1 %
- Saltwater resistant
- Galvanic isolations for avoidance of contact corrosion

## 10 StepDIM—Control made easy

Modern light management does not have to be tricky and complex. Different luminous flux levels are activated merely by short interruptions on the LST control phase. This does not require an additional cable but simply an additional wire. The communication is robust and independent of the cable length.

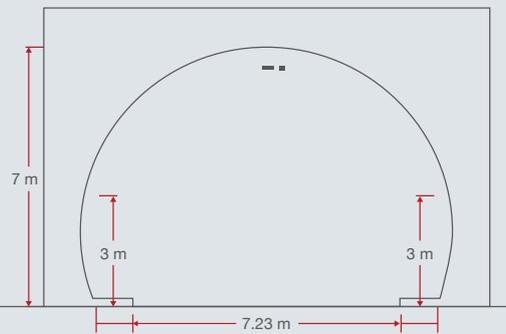
LST interruption [s]	Luminous flux [%]
0.5	> 100
1.5	100
2.5	90
3.5	80
4.5	70
5.5	60
6.5	50
7.5	40
8.5	30
9.5	20
10.5	10
> 20	> 100
11.5	-10
12.5	+10

# LED makes sense

Conventional light sources are dying out. But not only the EU and the EcoDesign Directive are pointing the way to LEDs. With high efficiencies, long lifespans and low maintenance complexity, the result is a thorough improvement to the bottom line. A comparison.

## System data

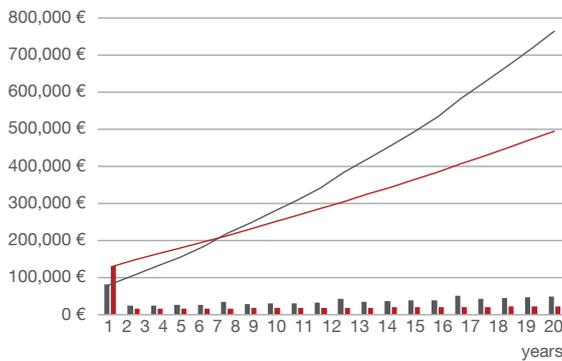
- Length of tunnel: 379 m
- Length of access zone: 102 m
- Luminance at portal: 255 cd/m<sup>2</sup>
- Luminance of interior zone: 6.11 cd/m<sup>2</sup>



## Example calculation

	LED	SON	
Entrance zone luminaires	66x Maxi	61x 400 W	
		11x 250 W	
Interior zone luminaires	9x Mini	20x 150 W	
	25x Midi	30x 150 W	
<b>Total number of luminaires</b>	<b>100</b>	<b>122</b>	<b>-18 %</b>
Connected load	32.3 kW	39.2 kW	-18 %
Luminaire costs	€ 110,000	€ 55,000	
Type of luminance control	Dimming	Step switching	
Energy consumption in first year	92,009 kWh	133,886 kWh	-31 %
Total costs of use	€ 495,293	€ 760,751	-35 %
Savings	> € 265,458		
Payback period for investment in LED	6 years		

The figures are based on an energy price of 0.17 €/kWh, a lamp replacement cycle of 16,000 hours, € 5000 costs for control components, € 4500 for a tunnel closure, an average inflation rate of 2 %, a control gear service life of 100,000 hours and a system service life of 20 years. The power consumption of sodium vapor lamps increases by 10 % over their service life. Step switching was designed with 8 steps. Dimming of the LED luminaires is implemented via DALI or 10 StepDIM. Photometric requirements are met in both cases. The actual savings are greater than specified due to the reduced installation complexity. For further information please consult our sales experts.



- Cumulative costs of SON solution
- Cumulative costs of SITECO LED solution
- Annual total costs of SON solution
- Annual total costs of SITECO LED solution

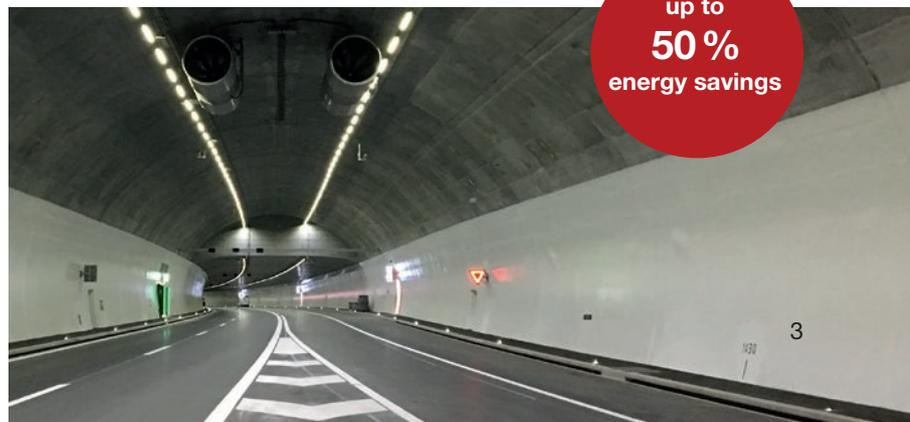
## An overview of LED benefits

- No relamping—fewer closures
- Higher luminous flux saves luminaires—less cabling complexity
- Brilliant white light—more visual comfort and safety
- Greater efficiency—up to 50 % energy savings (depending on old installation)
- Lower connected load—smaller UPS
- Lower operating costs—quick payback

Old-fashioned, unnatural light of high pressure sodium vapor lamps



Low fatigue brilliant white LED light



# Have a good trip with SITECO

Good tunnel lighting must be able to take a good beating and still reliably provide best light. Our portfolio of lighting solutions for tunnels and underpasses enable custom configurations for any situation—with pure LED technology.

## Luminaires for interior zones

### Continuous row luminaires

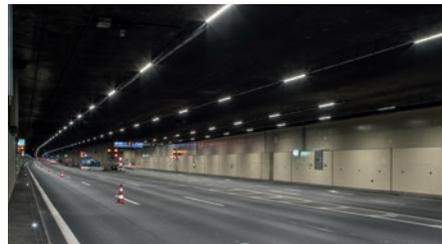
- Luminaires with very compact, innovative design, made of stainless steel 1.4404
- Outstanding efficiency > 185lm/W
- Extremely low reduction in luminous flux and therefore long service life—maintenance-free
- Very high visual comfort with extremely uniform illumination ( $U_1 > 0.9$ )
- E-box for 10–12 luminaires, exchangeable driver
- DALI & 10 StepDIM
- One-man mounting thanks to double secured quick-release catches

### Linear compact luminaires

- Similar to continuous row luminaires but with larger luminous flux package
- Variants with integrated driver or driver in E-Box (several luminaires can be operated on one E-box)
- Outstanding efficiency > 185lm/W
- Extremely low reduction in luminous flux and therefore long service life—maintenance-free
- DALI & 10 StepDIM
- Typical light point spacing 8–12 m

### Compact luminaires

- Two extremely compact sizes (Midi and Mini) made of stainless steel 1.4404
- Aluminum heat sink made of AlMg<sub>2</sub>
- Integrated control gear
- As standard also with two circuits
- DALI & 10 StepDIM
- Symmetric lenses ensure large spacing between light points of up to 18 m



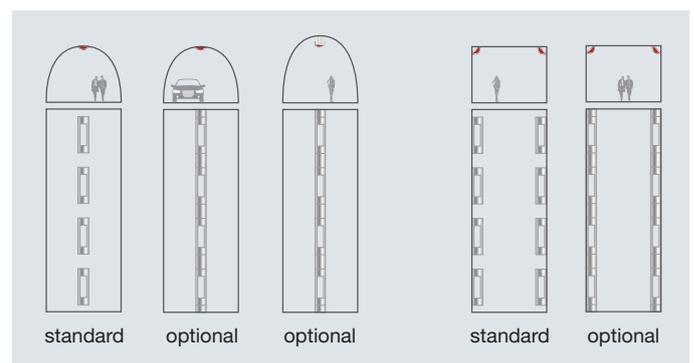
## Luminaires for the entrance zone

- Three luminous flux packages (Maxi, Midi, Mini)
- Asymmetric light distribution (counter beam), also symmetric on request
- Twice the efficiency of luminaires with high pressure sodium vapor discharge lamps
- Control gear in separate E-box
- Housing and E-box made of stainless steel 1.4404
- Aluminum heat sink made of AlMg<sub>2</sub>



## Luminaires for underpasses

- Die-cast aluminum anti-vandal luminaire with high impact resistance 2x IK10 (50 J), polycarbonate cover
- Concealed cable routing and fixing
- Robust light for underpasses, garages, stops, gas stations etc.
- Corner fixing bracket
- Blank covers and media channels on request



# Know-how in every detail

Safety is the be-all and end-all in tunnels. But no tunnel is like another. For this reason all SITECO tunnel luminaires offer sophisticated features that make our solutions precisely the right ones for you. Standard solutions can also be accordingly modified to your purposes.

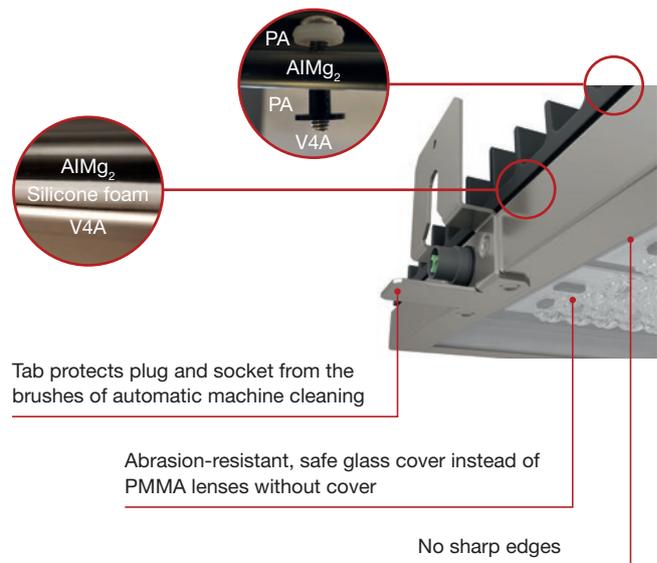
## Resistant components

- SITECO uses solely stainless steel 1.4404/X2CrNiMo17-12-2 for all load-bearing parts and the housing. Compared to 1.4571, this alloy shows advantages with corrosion (lower stress cracking, intercrystalline and pitting corrosion), as well as in its mechanical and processing properties.
- SITECO prevents contact corrosion via the galvanic isolation of different materials
- Mechanical and constructive protection against the effects of machine cleaning

## Emergency lighting and maintenance concept, configuration and installation planning

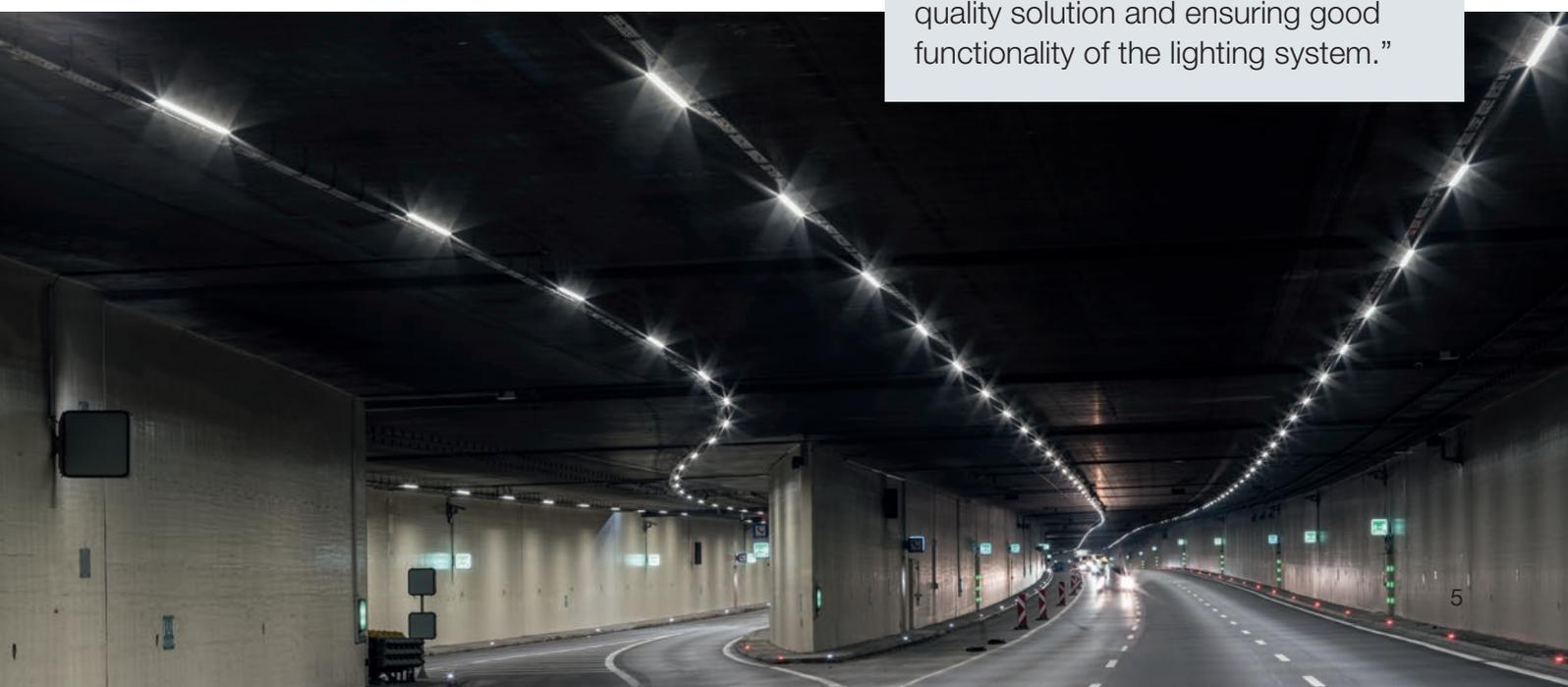
In terms of operational reliability and costs, the overall concept is decisive. This is where SITECO's long-standing experience comes into play.

- Low cabling and mounting complexity (pre-assembled quick-connect cables, few screws, 2 point fixings tiltable through 45°, one-man installation)
- Flexible modular system with optimized lumen packages, light distributions and two control options
- One connector system for all SITECO tunnel luminaires
- Optionally available with through-wiring and two drivers for two circuits (UPS)
- E-boxes can be installed in niches or maintenance tunnels and can be opened there without interference to tunnel operation. One E-box operates up to 12 luminaires.
- Simplest control system on the market with 10 StepDIM



Marcel Berner, CH expert BSA,  
Federal Roads Department (2000–2019)

“It’s worth investing in a high quality solution and ensuring good functionality of the lighting system.”



# Tunnel lighting made in Bavaria

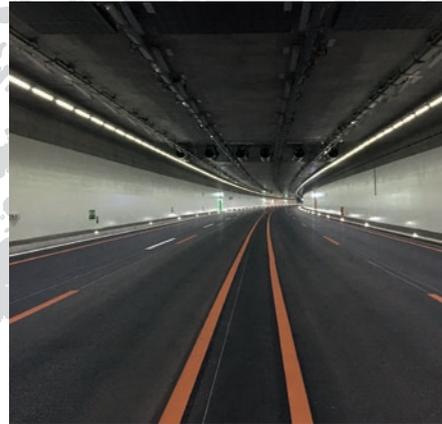
In 50 years, SITECO has equipped more than 1000 tunnel projects worldwide with the right lighting solutions. A complete LED portfolio has now been available for almost ten years. Light from Traunreut, Germany for tunnels all over the world.



## Kaisermühlentunnel, Vienna/Austria, 2018

Interior zone lighting with linear compact luminaires

- Length: 2150m
- Number of luminaires: 1610
- Central supply of luminaire groups from drivers in niches
- Central control with BUS monitoring



## Zurich north bypass/Switzerland, 2017–2026

Interior zone lighting with continuous row luminaires

- Length: 11,600m
- Number of luminaires: 8000
- Control: DALI



## Jagdbergtunnel, Jena/Germany, 2013

Interior zone lighting with compact luminaires

- Length: 3074m
- Number of luminaires: 980
- Control: SITECO system with 10 gateways



## Tunnel, Lungern/Switzerland, 2012

Entrance zone and interior zone lighting with symmetric compact luminaires, the first LED tunnel in Switzerland

- Length: 3500m
- Number of luminaires: 570
- Control: 10 StepDIM



**A9 Eyholz, Visp/Switzerland, 2015–2020**

Entrance zone and interior zone lighting with continuous row luminaires

- Length: 7400 m
- Number of luminaires: 6700
- Control: DALI



**Tunnel, Darmsheim/Germany, 2018**

Entrance zone and interior zone lighting with compact luminaires

- Length: 460 m
- Number of luminaires: 275
- Control: DALI

## We support you

Because every tunnel is different, you deserve the best individual support. This is why we have experienced tunnel experts in many countries who can help you in every phase of the project.

### Planning phase

- Lighting design
- Conceptual support (configuration of drivers, wiring, UPS, light control)

### Implementation phase

- Luminaires and light control
- Series products and customer-specific solutions
- Project management

### After end of project

- Illuminance and luminance measurements
- Training
- 3 years warranty
- Service

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