

LIGHTING REQUIREMENTS

Date: Thursday, 15 February 2018
From: Q-Park BV, IPM | Corporate Real Estate & Facility Management
Subject: Q-Park Lighting Requirements 2018

This document enlists the Lighting Requirements for Q-Park parking facilities, including light product specifications, requirements for creating the lighting calculation, specifications on lighting controls, manufacturer and contractor conditions and cable tray and trunking requirements. Contracted partners (developers, contractors, suppliers and manufacturers) in all Q-Park countries need to comply with these lighting requirements.

LIGHTING CALCULATION REQUIREMENTS

Lighting levels

Area	Average Lux Levels [Eav]	Measured
Parking space – driving aisle – parking space	85	At floor level
Vehicle entry / exit (day time)	300	At floor level
Vehicle entry / exit (night time)	75	At floor level
Parking equipment area (Entry/Exit Barrier)	200	At equipment
Staircase and Lift lobbies	100	At floor level
Payment area (Pay Stations)	300	At equipment
Toilets	100	At floor level
Lodge work desk	350	At counter area

- I Preference to have the possibility to dim light levels mentioned above in the future
- I Overall uniformity of light levels: 0,5 at floor level (in all areas above)
- I Maintenance factor: 0,80
- I Colour Rendering Index (CRI): > 80

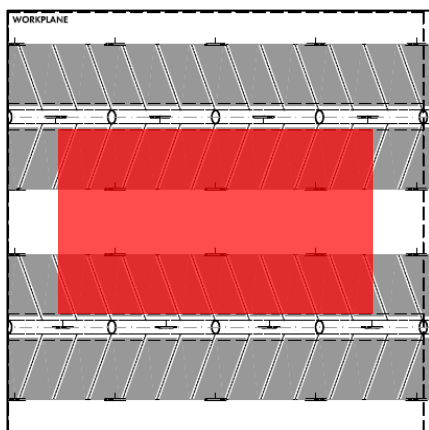
Reflection values

- I Floors:
 - I Floor coating according to Q-Park colour scheme: 31%
 - I Driving lanes RAL 7042: 31% (ratio 38%)
 - I Parking spaces RAL 7021: 6% (ratio 62%)
 - I Tarmac or asphalt with lineation: 5%

Walls (Caparol Pacific 25 / RAL 7047):	59%
Columns (RAL 9003):	85%
Ceilings (from dark to light):	
Sikkens FN.02.27 (dark brown/grey)	10%
RAL 7037 (dusty grey):	23%
RAL 7036 (platinum grey):	32%

Definition of the workplane

- | Ensure the calculation is excluding influences of outer walls
 - | Edge zone: minimum of 0,5 meter around perimeters
 - | Raster settings: 128 x 128
 - | Height of the workplane: floor level (Z-axis = 0.0)
- | Calculation surface
 - | The calculation surface consists of an area including 'parking spaces – driving aisle – parking spaces' at a representative length (see the reference area below in red).
 - | In case columns are positioned between parking spaces, these should be incorporated in the calculation model and fittings have to be positioned between columns
- | Mounting height and position
 - | Main light fittings are positioned longitudinal in the driving aisle and left and right from the driving aisles (at the transition of the parking spaces, not in the centre of the driving aisles)
 - | The mounting height of light fittings are project specific and need to be determined per site. The light fittings always needs to be the lowest installed technical installation.
 - | Additional fittings in the back of parking spaces might be necessary but are preferably to be prevented due to additional cabling, increased investment and energy consumption.



LIGHT PRODUCT SPECIFICATIONS

LED products in general intend to have specifications with long life times (> 50.000 burning hours). We need to ensure that premature maintenance of LED products is prevented in order to prevent unwanted operational interventions. Therefore, we standardize and define the light product requirements for LED products in this chapter.

Light fittings characteristics

- | Colour temperature 4000K or 5000K (dependant on country specific preferences)
- | Minimum IP 65 classified
 - | IP 6X – Protection against dust
 - | IP X5 – Limited protection against moisture

Lumen maintenance life and Product rated life

The product rated life and lumen maintenance life of LED products are essential reliability values for Q-Park. Specifications below have to be performed according to LM-80/TM-21 methodology.

- | Light products is expected to have a specification complying with:
 - | L80/B50 at 50.000 hours at 25 degrees Celsius
- | Lumen maintenance life
 - | Minimum L80 at 50.000 burning hours
 - | L80 ensures that minimal 80% of the lumen output is given after a duration of 50.000 hours at 25 degrees Celsius (ambient temperature)
- | Product rated life
 - | B50 specifies that no more than 50% of the tested products have failed* within 50.000 hours at 25 degrees Celsius (ambient temperature)
- | Provide lifetime values for
 - | L80/B10 with guaranteed burning hours
 - | L90/B50 with guaranteed burning hours
 - | L90/B10 with guaranteed burning hours
- | As product life is critical in the business model on assessing LED products, manufacturer product life claims is expected to be backed up by recognised independent test verifications.

*The definition of failure is either a broken fitting (0% lumen) or a reduction of more than 20% of the initial lumen output (<80% lumen).

LIGHTING CONTROLS

Motion detection sensors are to be installed for dimming or switching lighting on and off automatically, depending on occupancy/customer movement. In case of new built projects, dimming is always preferred over switching. When changing the light system in an existing environment, the solution for lighting controls is always dependent on the business in consultation with Q-Park.

Principles on lighting controls

- | Positioned at entry lanes, pedestrian entrances and throughout the car park floors in order to detect movement in multiple directions (to cover pedestrian movements throughout the parking floor). Depending on the size of parking floors, several zones are to be created.
- | Time setting before the lighting switches off/dims down in case of no movement or presence is detected is to be set on 10 minutes per level/zone.
- | Manual switch to override detection is always to be provided in the lodge or technical room.
- | Inside main pedestrian staircases lights are not controlled, but are always on 100%.

Dimming (standard for new build parking facilities; optional for existing parking facilities)

Dimming is to be implemented when the parking floor layout is large and suitable for creating zones in which customers can easily orientate. Dimming lighting is preferred over switching lights on and off.

- | A master / slave (internal or externally mounted) dimming solutions controlling a large number of fittings on a level / in a zone is preferred.
- | The dimming option is to be determined per project as this requires an additional investment in the specification of luminaires.
- | A wireless dimming solution is preferred, as this results in less additional cable works.
- | When no customers are present, the lighting is expected to dim down to 10% in a zone. In case presence is detected the lighting in that specific zone is expected to dim up to 100%. This way a customer does not look into complete darkness from one zone to another.

Switching (only applicable for existing parking facilities)

Switching light systems on and off: This is always to be implemented in sections 30%, 70% and 100% depending on occupancy.

- | Cabling is to be connected in the three phases (L1, L2 and L3) so every first, second and third light fitting in a row is connected to a different phase. This way the 30% or 70% setting still provides a certain uniformity.
- | Circuit schemes for cabling are to be provided up front for approval by Q-Park

Daylight detection

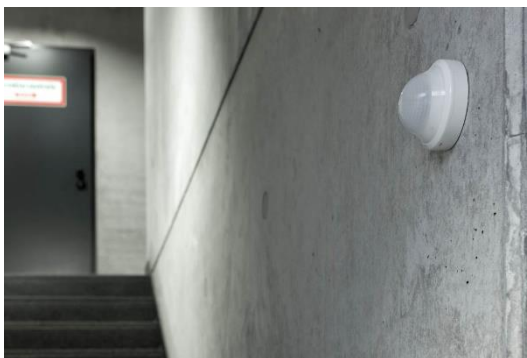
Daylight detection (e.g. multi-storey): At least the luminaires along building perimeters are to be connected to photocell daylight sensors (depending on the openness of the elevations)

Transition lighting

Transition lighting in the entrance and exit areas is necessary so customers can adapt to the light levels present in the parking facility or in the outside. During evening and night hours the level of transition lighting can be decreased as less light is needed then.

- | In the table Lighting Levels a differentiation has been made between day time and night time for the entrance / exit area;
- | During day time the average lux level is expected to be 300 lux in the entrance area (achieving a transition from daylight, being between 1.000 and 20.000 lux, to an average of 85 lux (light level on parking floor));
- | During night time the lux level in the entrance / exit area is expected to be reduced to 75 lux. This creates a transition from the parking floor lighting (85 lux) to the outside (more dark) environment.

The application of dynamic transition lighting is dependent on the lighting controls concept that is present or implemented and the flexibility in settings that this controls solution provides.



LIGHTING MANUFACTURER CONDITIONS

The lighting manufacturer is expected to have an established track record of manufacturing lighting products for at least 10 years and in addition have specific experience with LED products of at least 5 years.

Manufacturing capability

The supplier is expected to have capacity and capability to supply the volumes required by Q-Park without limitation on available manufacturing facilities;

- | Manufacturing and final assembly is expected to be carried out in house. Any subcontract operations are expected to be limited to component level items or sub-assemblies only.
- | Products ordered are expected to be produced and available by the agreed date to ensure that Installation program dates are met.

Manufacturing Systems

The Manufacturing partner is expected to be able to demonstrate robust Quality and Manufacturing systems.

- | Quality systems – ISO 9001 and/or ISO 14001.
- | ERP/MRP – a solid computerised manufacturing and supply chain system is expected to be in place to provide effective management of internal production and sub-supplier requirements.

Key sub-suppliers

If the supplier is not a company with international presence, the supplier has to prove to have strong relationships with major international LED manufacturers e.g. Phillips, Cree, Samsung and the like to provide a strong back-up to product life claims and credibility.

Product range and roadmap

The supplier is expected to have a range of products that covers the core range of products for Q-Park.

- | There is expected to be a clear product roadmap and the supplier is expected to be able to brief Q-Park on potential new products and technologies in advance of release.

Continuity

Supplier declares that the economic and financial situation of his company is such that the continuity of the provision of services of the requested products and services will not be at risk. Supplier provides, in Euros, the consolidated balance, turnover, profit / loss details over the past three closed fiscal years. The numbers is expected to relate to the company/part that might deliver the service.

References

The manufacturer is expected to provide a list of sector relevant reference projects in the car parking industry, which have been equipped in the last 5 years. Q-Park is allowed to visit these locations with up front approval of the manufacturer and is allowed to contact its clients for customer feedback.

Communications

The manufacturer is expected to provide accurate and timely information regarding order status and product availability. They will also need to interface with Q-Park project managers and the appointed lighting contractor who will typically manage on site installation.

Product warranty

- | Minimum 5 years parts with a preference for 7 and 10 years
- | Advance replacement stock is expected to be available to replace any installed product that fails within the warranty period or to meet the terms of any supplementary maintenance agreement.
- | Spare parts of the products is expected to be available for delivery up to 10 years after initial delivery.

Key Attributes and selection criteria

Attribute	Required response
Financial strength	Provide details on financial stability from the last 3 years
Company Pedigree	Reputable and established minimal 10 years
LED Lighting Experience	Minimum 5 years LED light manufacturer
Manufacturing capacity and Capability	Sufficient manufacturing flexibility to handle expected volumes
Global manufacturing and Logistics capability	Distribute network in all 10 Q-Park countries (NL, DE, BE, FR, UK, IE, SE, DK, NO & FI)
Product Range	R&D department for developing light products in-house
Product Roadmap	Agreement to share roadmap information
Product Warranty	Minimum 5 years, preferable extension 7 and 10 years
Robust Supply Chain	Demonstrate strong established relationships
Reference projects	Supplier provides a list of relevant references with projects from the last 5 years

ELECTRICAL CONTRACTOR REQUIREMENTS

Lighting plans and As-Built file

- | Prior to the start of works, electrical plans including light layouts, cabling details and mounting details are to be provided for approval by Q-Park.
- | A zoning scheme with the phased execution is to be created by the electrical contractor, including the expected duration per zone. The schedule is to be approved up front by Q-Park.
- | After completion of the works a complete set of As-Built file is to be provided by the contractor and handed to Q-Park. This includes revision plans, technical datasheets and circuit plans of the created electrical installation.

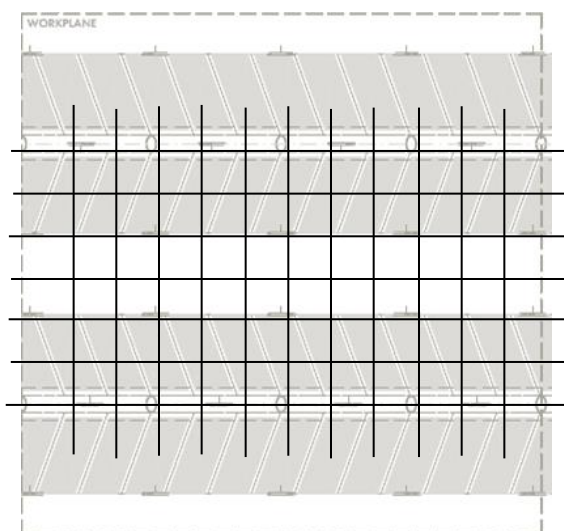
Warranty conditions contractor

The electrical contractor confirms to cover the warranty provided by the manufacturer(s) of the installed products. The contractor furthermore provides warranty on the performance of each installed component, cabling circuit boards and other, including labour, for a minimum duration of 24 months.

- | Options need to be provided to extend the warranty to 7 and 10 years, both parts and labour.

Lighting measurement

- | After completion of the installation a lighting measurement is to be arranged by the contractor in order to create a baseline reference for warranty conditions.
- | A grid of measurement points of 2,5 x 2,5 meter is to be applied in a representative area of the parking floor in order to receive representative values to calculate:
 - | Average lux level (Eav)
 - | Uniformity level (Emin / Eav)



CABLE TRAYS AND TRUNKING REQUIREMENTS

As described in the Project Functional Requirements (PFR), the cabling of all technical installations has to be coordinated in detail. This is a crucial part of the Design-and-Engineering phase. Each project requires its own approach on how cabling routes need to run and how to facilitate this.

The layout for cable trays and trunking is expected to always follow the lighting layout. This means all cabling for additional installations, such as fire detection, CCTV, PMS, et cetera is to be integrated and placed in the main cable trays and ceiling mounted cabling for the electrical lighting installation. The following types of cable trays and trunking are to be applied.

I Suspended galvanized steel cable trays

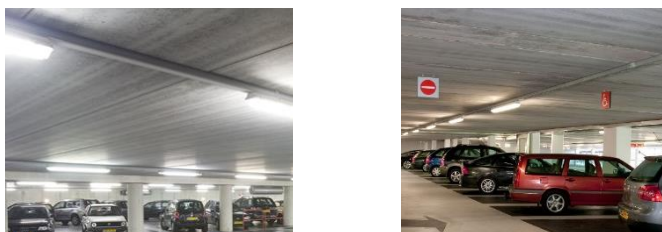
I Legrand-Van Geel P31 trunking

- I Width 60x100/150mm, depending on the number and type of cables to be installed and measurement of the luminaires



I Ceiling mounted

I Galvanized box trunking 50x50mm



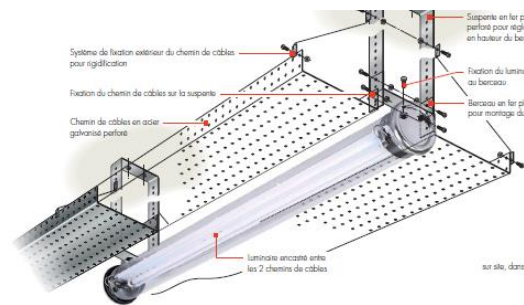
I Surface mounted conduits

- I Halogen free conduits
- I Colour to match ceiling colour

Design considerations

In case cabling of safety systems are to be separated from lighting and ventilation cabling the following design/layout can be considered.

Note that this type of cable trays requires a proper engineering.



No wire mesh cable tray is to be used as this results in exposed cabling.

