

Planning exterior lighting schemes

Permanent exterior lighting schemes are required to address issues of safety after dark as well as design aspects. The following standards and recommendations outline the quality features of outdoor lighting:

→ DIN 13201 / 1 und DIN EN 13201 / 2-4 „Road Lighting“

Basic planning aids, minimum values for lighting levels and uniformities plus guidelines for lighting special situations (bends, crossings, etc.) have been published as a series of standards under section 13201 for all public lighting, i.e. lighting for motorways, main roads, footpaths and cycle paths, car parks and pedestrian areas. Parts 2-4 (Quality Features, Calculations, Measurements) apply in all European countries. Part 1 (Selection of Lighting Classes) has the quality of a safety standard and could therefore only be coordinated by the individual national standards committees. The selected 'lighting classes' represent minimum requirements, whereby the perception of a hazardous situation can just be guaranteed. This is especially with public authorities in mind, who need to keep costs under control.

→ DIN 67528 - Car parks

DIN 67528 (Dec. 1993) was originally the standard that applies for the illumination of car parks. The new European standards 12464 and 13201 also contain the requirements for car parks and multi-storey car parks and have thus replaced the original standard.

→ Pedestrian traffic

The "Guidelines for the Illumination of Areas with Pedestrian Traffic" were published by the Scientific Society for Road and Traffic Systems in 1987, and applied, as the name suggested, to areas with predominantly pedestrian traffic (e.g. pedestrian precincts, underpasses and footbridges), cycle paths and bus stops. These have now been replaced by the new DIN EN 13201 standard.

Planning documents

The more details there are available about the specific requirements of a space, the better the road lighting can be designed to accommodate the given conditions.

The following documents are required to be able to design a lighting scheme:

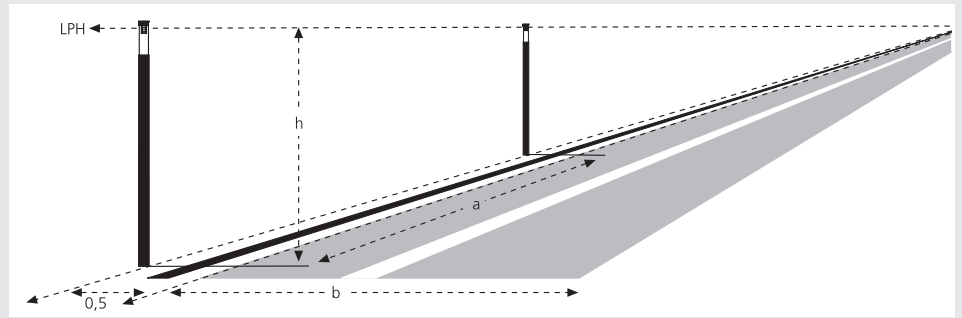
- road section (sectional drawing) M 1:50 / 1:100 and ground plan \geq M 1:250
- graphic file with the crossroads and junctions which rate as special focus zones with specific lighting requirements
- information regarding road use with data on typical speeds and user groups
- data on the traffic light systems, footbridges, bus or tram stops, existing trees, lay-bys, etc.
- desired light source (or luminous colour, colour rendering index and luminous efficacy).

Support

We are glad to be of service to you during the planning process and can provide you with information on any issues related to lighting engineering. Lighting calculation software for exterior applications can be made available to you free-of-charge: RELUX® Suite 2009 is a lighting calculation program for calculating interior lighting, exterior lighting and road lighting. All selux luminaires for exterior applications and road lighting are preconfigured as pole luminaire combinations in the RELUX® Luminaire Library. This facilitates entering luminaires considerably, since you only need to enter the position of the pole bases, which can be taken from any CAD drawing. We are happy to support you with any questions you may have related to standard outdoor lighting solutions, attainable photometric values, or constructive issues concerning individual detail solutions.

The following section contains examples of the kind of support we can provide in the form of data on the maximum spacing of our luminaires while still observing the standards laid down in DIN EN 13201. The product data sheets on our website contain detailed information that will assist you with your planning. Practice shows that the tables provide a good overview for the initial planning stage. When it comes to other spacing, such as distance between pole and curb, or detailed planning with instructions for installation firms, individual calculations are usually required, since the number of potential solutions is substantially higher than can be represented in tables. Following the tables, on page 334, you will find a form with planning data which can be copied and used as part of your specification documents. On the left-hand side there is a check list of all initial relevant planning data to tick off (geometries, dimensions, light sources, road surface and other information) and space to enter specific values. On the right you will find a list of the most important reference values as stipulated in European standards and recommendations for exterior lighting. Please use these pages as a reference when compiling your basic planning data. The above-mentioned form has also proven to be useful for compiling planning data when lighting calculations are required.

RELUX®
light simulation tools



EXELIA SX 739
single sided arrangement



Anti-glare optics		mini-road asymmetric										
Fitting		HIT-CE 70W										
h- (LPH) [m]		3,9		3,9		3,9		3,9		3,9		3,9
b- Width of road [m]		5		6		7		5		6		7
Illuminance [lx]		11,7		11,4		13,3		10,5		9,7		9,3
E_{min} [lx]		3		3		3		1,5		1,5		1,5
Luminance [cd/m ²]												
u_o												
u_e												
a- pole spacing [m]		25		23		18		28		27		25

FIORE SX 353
single sided arrangement



Anti-glare optics		MTR 135 asymm.				MTR 135		MTR 180 asymm.				SPL 190 asymm.	
Fitting		HIT-CE 70W				HIT-CE 70W		HSE-MF 70W				HSE-MF 70W	
h- (LPH) [m]		4,4	4,4	4,4	4,4	4,4	4,4	4,4	4,4	4,4	4,4	4,4	4,4
b- Width of road [m]		5	7	5	7	5	7	5	6	5	7	5	7
Illuminance [lx]		5,7	5	4	4,3	5,7	5,4	5,1	5,1	4,4	3,8	3,6	3
E_{min} [lx]		1	1	0,6	0,6	1	1	1	1	0,6	0,6	0,6	0,6
Luminance [cd/m ²]													
u_o													
u_e													
a- pole spacing [m]		28	27	32	31	27	25	27	25	31	31	32	31

DISCERA 600 SX 322
single sided arrangement



Anti-glare optics		VARIO-OPTIC									
Fitting		HST-MF 150W					HST-MF 100W				
h- (LPH) [m]		7	7	8	8	8	7	7	8	8	8
b- Width of road [m]		8	9	9	9	10	8	9	8	8	9
Illuminance [lx]											
E_{min} [lx]											
Luminance [cd/m ²]		1	1	1	0,75	0,75	0,5	0,5	0,5	0,5	0,5
u_o		0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4
u_e		0,5	0,6	0,6	0,6	0,6	0,5	0,5	0,5	0,5	0,5
a- pole spacing [m]		33	31	29	37	35	34	34	38	37	35

VECTOR 525 SX 250
single sided arrangement



Anti-glare optics		VARIO-OPTIC										
Fitting		HIT-CE 70W				HST-MF 70W			HST-MF 150W			
h- (LPH) [m]		7	8	8	8	7	7	8	7	7	7	8
b- Width of road [m]		7	7	8	9	7	8	9	7	8	9	9
Illuminance [lx]												
E_{min} [lx]												
Luminance [cd/m ²]		0,5	0,5	0,5	0,5	0,5	0,5	0,5	1,5	1,5	1,5	1
u_o		0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4
u_e		0,6	0,6	0,7	0,7	0,5	0,6	0,7	0,7	0,8	0,7	0,6
a- pole spacing [m]		34	32	29	27	33	31	27	29	27	25	35

1. DESCRIPTION OF PROJECT

CONTACT / DESIGNER

→ NAME OF PROJECT _____
 → STREET _____
 → TOWN / CITY _____
 → REPRESENTATIVE _____
 → DATE _____

→ **2. FITTING TYPE**

3. PROJECT LAYOUT

single sided
 double sided staggered

 double sided opposite
 central reservation
 free alignment

 (square, pedestrian zone

 etc.) please attach

 drawing.

4. DIMENSION FOR THE LIGHTING DESIGN

Width	kerb distance
b1 :m	u : <input type="checkbox"/> 0,5 m
b2 :m	u : <input type="checkbox"/> 0,65 m
b3 :m	u :m

Mounting height
 LPH : according to catalogue
 LPH : m

pole spacing
 a : optimised according to lighting requirement
 b : according to customers specificationm

5. LAMP TYPE

High-pressure sodium lamps
 Metal halide lamps
 Compact fluorescent lamps
 others (for example CosmoPolis):

WATTAGE

optimised
 W

6. ROAD SURFACE

(FOR LUMINANCE CALCULATIONS)

Standard R3

 $q_0 = 0,08 \text{ cd/m}^2 \cdot \text{lx}$
 $q_0 = \dots \text{cd/m}^2 \cdot \text{lx}$

If left blank, the design will be based on average road surface R3.

7. ADDITIONAL REMARKS

Please state whether the calculation should be done according to scheme A) or B):

→ A) EVALUATION ACCORDING TO CLIENT REQUIREMENT OF LIGHTING CLASS BASED ON DIN EN 13201-2:

- ME (1-6) e.g. for main road at typical speed of main user: $30\text{km/h} < V_{\text{typ}} \leq 60\text{km/h}$
- CE (0-5) e.g. Intersections, station forecourts, vehicle parks, Bus stations
- S (1-6) z.B. Zone 30, car parks, cycle paths, walkways, pedestrian precincts

Lighting class	L_m	u_o	u_l	T_i	Lighting class	E_m	u_o	Lighting class	E_m	E_{min}
ME2	1,5 cd/m ²	0,4	>0,7	<10%	CE0	50 lx	0,4	S1	15 lx	5 lx
ME3c	1 cd/m ²	0,4	>0,5	<15%	CE1	30 lx	0,4	S2	10 lx	3 lx
ME4b	0,75 cd/m ²	0,4	>0,5	<15%	CE2	20 lx	0,4	S3	7,5 lx	1,5 lx
ME5	0,5 cd/m ²	0,35	>0,4	<15%	CE3	15 lx	0,4	S4	5 lx	1 lx
ME6	0,3 cd/m ²	0,35	>0,4	<15%	CE4	10 lx	0,4	S5	3 lx	0,6 lx
					CE5	7,5 lx	0,4	S6	2 lx	0,6 lx

→ B) EVALUATION FOR LIGHTING CLASS BASED ON SPECIFIC PROJECT PARAMETERS ACCORDING TO DIN 13201-1:

Please chose appropriate parameters according to speed

Typical speed of main user

- $V_{\text{typ}} > 60\text{km/h}$
- $30\text{km/h} < V_{\text{typ}} \leq 60\text{km/h}$
- ★ $5\text{km/h} < V_{\text{typ}} \leq 30\text{km/h}$
- ▲ $V_{\text{typ}} = \text{Walking speed}$

■	Separation of carriageways	<input type="checkbox"/> yes	<input type="checkbox"/> no
■	Type of junctions	<input type="checkbox"/> Interchanges	<input type="checkbox"/> Intersections
■	Interchange spacing, distance between bridges	<input type="checkbox"/> < 3 / km	<input type="checkbox"/> ≥ 3 / km
■ ●	Intersection density	<input type="checkbox"/> < 3 / km	<input type="checkbox"/> ≥ 3 / km
■ ●	Conflict area	<input type="checkbox"/> no	<input type="checkbox"/> yes
■ ● ★ ▲	Excluded users:	<input type="checkbox"/> motorised traffic	<input type="checkbox"/> slow moving vehicles
		<input type="checkbox"/> Cyclists	<input type="checkbox"/> Pedestrians
● ★	Geometric measures for traffic calming	<input type="checkbox"/> yes	<input type="checkbox"/> no
■ ●	Traffic flow of vehicles per day	<input type="checkbox"/> < 7 000 vehicles	<input type="checkbox"/> ≥7000 vehicles
■		<input type="checkbox"/> <15 000 vehicles	<input type="checkbox"/> ≥15 000 vehicles
■		<input type="checkbox"/> < 25 000 vehicles	<input type="checkbox"/> ≥ 25 000 vehicles
■ ● ★	Separate cycle path	<input type="checkbox"/> present	<input type="checkbox"/> not present
● ★	Traffic flow of cyclists	<input type="checkbox"/> normal	<input type="checkbox"/> high
★ ▲	Traffic flow of pedestrians	<input type="checkbox"/> normal	<input type="checkbox"/> high
■ ●	Difficulty of navigational task	<input type="checkbox"/> normal	<input type="checkbox"/> higher than normal
■ ●	Parked vehicles	<input type="checkbox"/> present	<input type="checkbox"/> not present
★ ▲	Facial recognition	<input type="checkbox"/> necessary	<input type="checkbox"/> not necessary
★ ▲	Crime risk	<input type="checkbox"/> normal	<input type="checkbox"/> higher than normal
■ ●	Complexity of visual field	<input type="checkbox"/> normal	<input type="checkbox"/> high
■ ● ★ ▲	Ambient luminance	<input type="checkbox"/> rural (low)	<input type="checkbox"/> urban (normal)
			<input type="checkbox"/> city centre (high)