LEDVANCE.COM

LEDVANCE

YOUR PROJECT PARTNER
LIGHTING SOLUTIONS FOR THE WHOLE BUILDING

JULY 2019

OSRAM

COMPREHENSIVE PORTFOLIO AND KNOW-HOW
FOR IDEAL LIGHTING SOLUTIONS IN THE WHOLE BUILDING

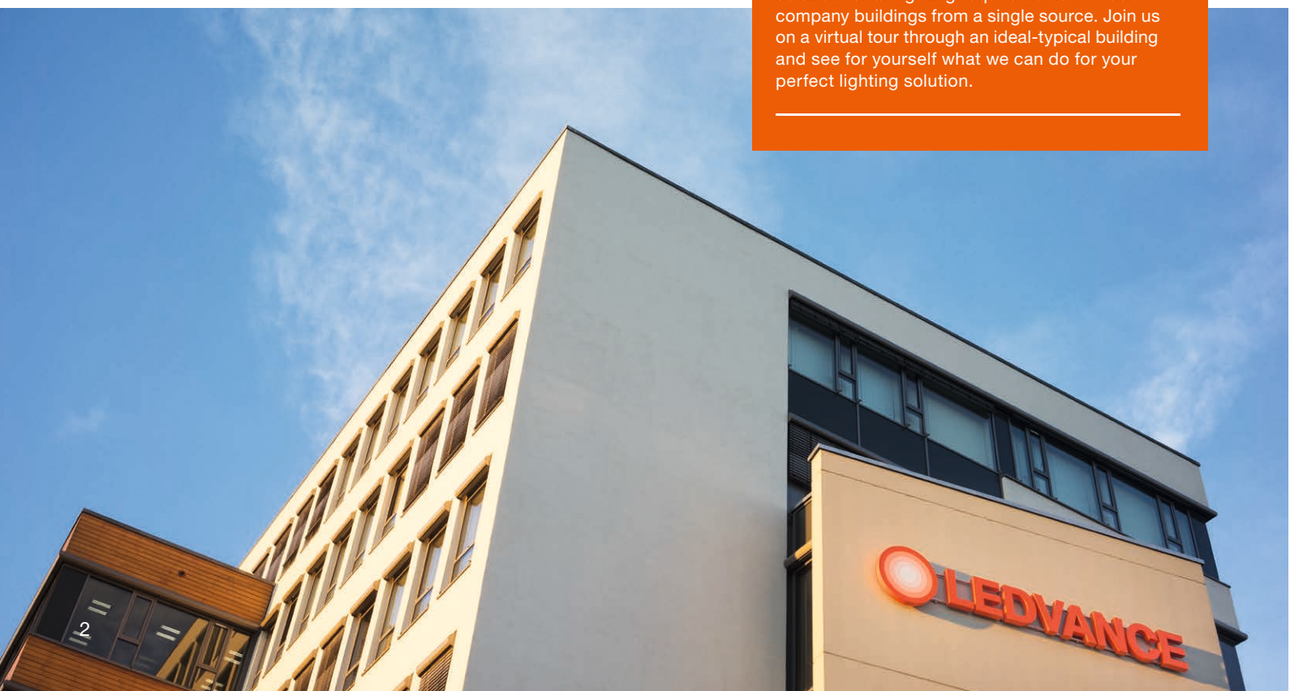
EVERYTHING FROM A SINGLE SOURCE – PROFESSIONAL LIGHTING TECHNOLOGY FROM LEDVANCE

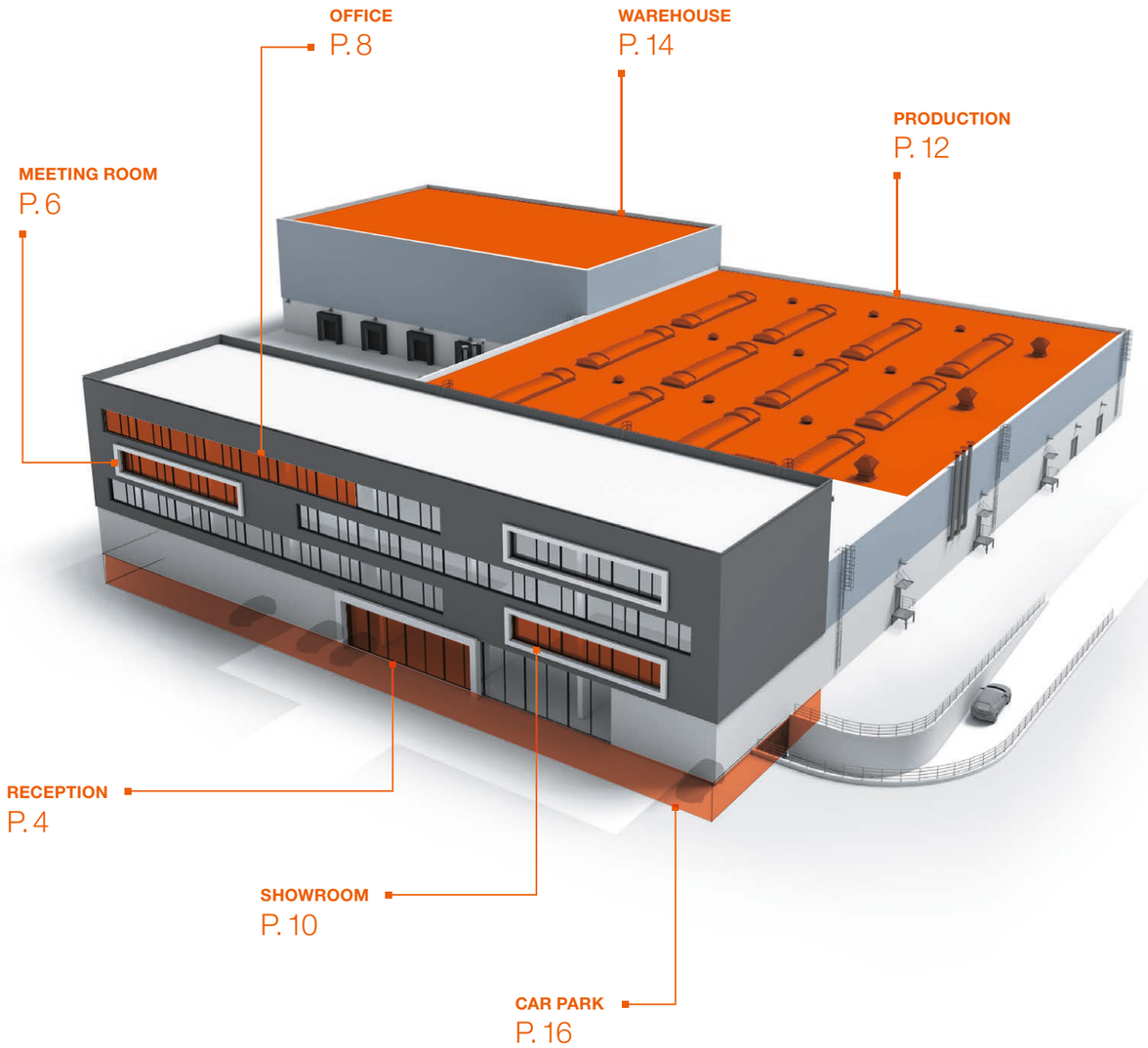
Are you looking for a lighting solution that meets all your project requirements? Saving as much energy as possible? With the right price/performance ratio and convincing quality? And you want to make sure that standards and regulations are met? And that installation is quick, easy and safe?

Then you should rely on a partner who knows what matters to you and who will be with you every step of the way. We are experts in general lighting and are here to support you in all aspects of your lighting project, offering you a versatile portfolio of high-quality, innovative luminaires, lamps, electronic components and lighting management systems as well as comprehensive, customer-oriented services from a single source. You can benefit from our international industry knowledge and our extensive experience in implementing successful lighting projects. We are happy to offer advice tailored to your needs and implement the ideal lighting solution throughout your building with you.

WE ARE HERE FOR YOU. FOR ALL ASPECTS OF LIGHTING IN COMPANY BUILDINGS.

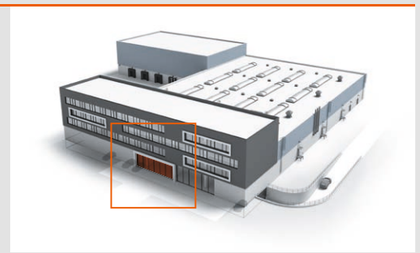
As your partner, we offer you a complete solution for all lighting requirements in modern company buildings from a single source. Join us on a virtual tour through an ideal-typical building and see for yourself what we can do for your perfect lighting solution.





RECEPTION

ACCENTUATION AND ORIENTATION THROUGH LIGHT



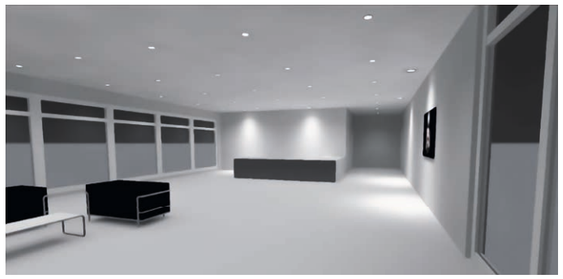
The reception area is a company's calling card. Visitors should feel comfortable here and find their way around easily. Lighting can contribute in several ways:

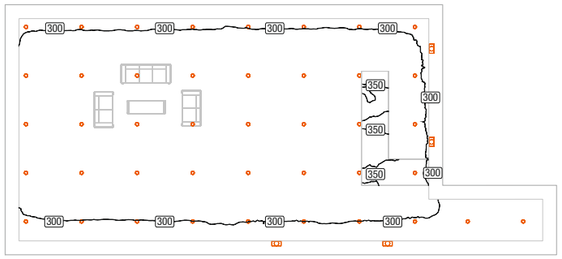
1. **Impressive accents:**
   - Combine **functional and accent lighting** for an inviting atmosphere.
   - By **accentuating the walls** you can brighten up the room.
2. **Easy orientation:**
   - Use the lighting to divide the room, for example through **separate light points** for reception, waiting areas and corridors.
3. **High functionality:**
   - **An average illuminance of 300 lux** is the standard for lighting the reception desk; and as high as 500 lux for computer screen workstations.

OUR SOLUTION FOR YOU:
MULTI-FUNCTIONAL LIGHTING CONCEPTS

For uniform general lighting of the reception area, 42 **Downlight Comfort** are used. The reduced-glare luminaires provide high visual comfort at the reception desk and in the waiting area. Four cardanic **Spot Multi** accentuate the walls.

1. LIGHTING CALCULATION





Layout with isolines

Free no-obligation lighting calculation using DIALux excluding any liability or warranty from LEDVANCE.

ROOM DEFINITION

- Room dimensions:
  - Floor space: 152 m²
  - Clear height: 3.00 m
- Reflectance:
  - Ceiling 70.0 %
  - Walls 50.0 %
  - Floor 50.0 %

BASIS FOR CALCULATION

- Applicable standard: DIN EN 12464-1
- Required illuminance E_m:
  - at the reception desk: 300 lx
  - in the foyer: 100 lx
- Required uniformity E_{min}/E_m:
  - at the reception desk: 0.6
  - in the foyer: 0.4
- Maintenance factor: 0.80
- Peripheral area: 0.50 m

RESULT: ILLUMINANCE OF GENERAL LIGHTING

Area	Result	Average (Target)	Min	Max	Uniformity E_{min}/E_m (Target):
General lighting foyer	Vertical illuminance (adaptive) [lx], height: 0.80 m	**326 lx** (100 lx)	135 lx	380 lx	**0.41** (0.4)
General lighting Reception desk (visual task)	Vertical illuminance (adaptive) [lx], height: 0.80 m	**337 lx** (300 lx)	212 lx	372 lx	**0.63** (0.6)

The calculation results for the illuminance levels refer to the general lighting of the room through 42 Downlight Comfort luminaires. Since the accent lighting through Spot Multi is only used for lighting design, it is not taken into account.

#	Luminaire	Ø(Luminaire) [lm]	Output [W]	Lum. efficacy [lm/W]
42	Downlight Comfort LED 13W	1210	**13.0**	**93.1**
4	Spot Multi LED 2x30W	5400	**60.0**	**90.0**
	Sum of all luminaires	72420	**786.0**	**92.1**

Specific connected load: 5.17 W/m² (152 m² of floor space)
The energy consumption does not take into account any lighting scenes or their dimming states.

2. PRODUCTS

SPOT MULTI
4058075113985 GTIN (EAN)
2 x 30 W / 4000 K / 2 x 2700 lm / 38° / CC[2]: 320 L x 160 W (mm)

Product benefits
- Accent and general lighting in one: swivel spotlights mounted on cardan joints (+/- 25°)
- High visual comfort thanks to reduced glare (UGR < 16)
- Low-flicker light thanks to special ECG
- Bayonet connection for quick and easy installation

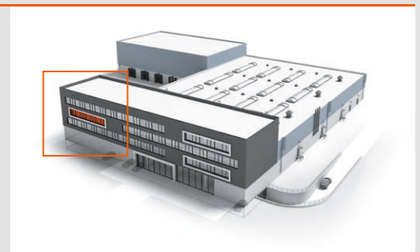
DOWNLIGHT COMFORT
4058075104068 GTIN (EAN)
13 W / 3 CCT: 1030 lm at 3000 K, 1210 lm at 4000 K, 1110 lm at 5700 K / 60° / CC[2]: Ø 125 mm

Product benefits
- Direct replacement for CFL downlights (1 × 18 W)
- Reduced-glare luminaire with UGR < 22
- Low-flicker light thanks to special ECG
- 3 color temperatures in one luminaire, selectable via DIP switch
- Tool-free installation thanks to quick-connect terminals

[1] For precise terms and conditions go to www.ledvance.com/guarantee. [2] CC = ceiling cutout.

MEETING ROOM

LIGHT FIT FOR ANY SITUATION



The following aspects should be taken into account when planning the lighting in meeting rooms:

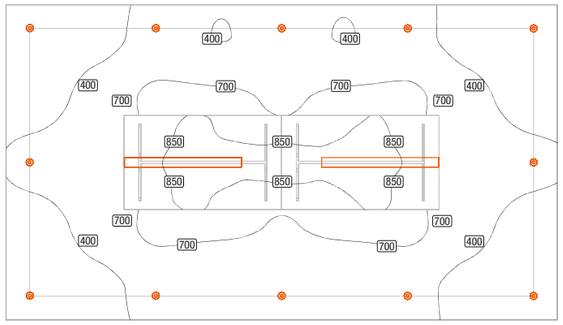
1. **Flexible lighting:**
   Meetings, workshops and presentations require different lighting conditions.
   – Either plan **multiple circuits** for lighting control.
   – Or use a **DALI light management system** that enables different lighting scenes.
2. **High quality of light:**
   – **Uniform low-glare general lighting** provides high visual comfort and improves concentration.
   – **High illuminance** can increase concentration at meetings.
3. **Attractive interior design:**
   – Add **energizing accent lighting** to general lighting.

OUR SOLUTION FOR YOU: SYSTEMATIC FLEXIBILITY

Above the conference table, two suspended direct/indirect **Linear IndiviLED®** luminaires provide high visual comfort thanks to very uniform illumination. The walls are accentuated with twelve swivel **Spots.** All the luminaires can be controlled by **DALI.**

1. LIGHTING CALCULATION

Layout with isolines



Free no-obligation lighting calculation using DIALux excluding any liability or warranty from LEDVANCE.

ROOM DEFINITION

– Meeting room for 10 people
– Room dimensions: • L x W: 7.00 m x 4.00 m
  • Clear height: 3.20 m
– Reflectance: • Ceiling 70.0 %
  • Walls 50.0 %
  • Floor 20.0 %

BASIS FOR CALCULATION

– Applicable standard: DIN EN 12464-1
– Required illuminance E_m:
  • Meeting table (visual task): 500 lx
  • Peripheral area: 300 lx
– Required uniformity E_{min}/E_m:
  • Meeting table: 0.60
  • Peripheral area: 0.40
– Glare reduction: UGR < 19
– Maintenance factor: 0.80
– Peripheral area: 0.30 m

RESULT: ILLUMINANCE ON THE TABLE AND IN THE ROOM

Area	Result	Average (Target)	Min	Max	Uniformity E_{min}/E_m (Target):
Meeting table (visual task)	Vertical illuminance (adaptive) [lx], height: 0.80 m	**834 lx** (500 lx)	743 lx	880 lx	**0.89** (0.6)
Peripheral meeting room area	Vertical illuminance (adaptive) [lx], height: 0.80 m	**506 lx** (300 lx)	329 lx	765 lx	**0.65** (0.4)

2. PRODUCTS

LINEAR INDIVILED® D/I DALI
4058075109063 GTIN (EAN)
56 W / 4000 K / 6550 lm / D 70° / I 120° / 1488 L x 120 W x 40 H (mm)

Product benefits
– Homogeneous light distribution and reduced glare (UGR < 16) thanks to IndiviLED optics
– High lighting comfort thanks to direct and indirect lighting
– Powerful and efficient: 6550 lm, 115 lm / W

Accessories
– Suspension Kit DALI, 4058075133303 GTIN (EAN): Socket, 2 x plug connections, steel suspension wire and transparent cable; connection with 5-pin terminal connector

SPOT ROUND ADJUST DALI
4058075219922 GTIN (EAN)
8 W / 4000 K / 720 lm / 36° / CC²: Ø 83 mm

Product benefits
– Direct replacement for halogen spotlights 75 W
– The spotlight swivels through +/- 20°
– Quick and easy installation

IK06 · 5 year guarantee[1] · TÜV SÜD

[1] For precise terms and conditions go to www.ledvance.com/guarantee. [2] CC = ceiling cutout.

3. ENERGY SAVINGS

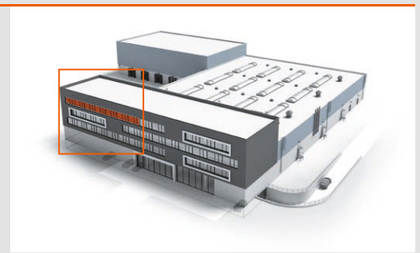
Lighting technology	Rated luminous flux/ luminaire	Number of luminaires	Output incl. losses/ luminaire	Total connected load	Total energy consumption per year	Total electricity costs per year	Savings in electricity costs per year compared to old system	Relative energy savings compared to old system
Conventional: Halogen spotlight 75 W	700 lm	12	75 W	900 W	1404 kWh	€ 280.80		
NEW: SPOT ADJUST DALI LED 8 W	720 lm	12	8 W	96 W	150 kWh	€ 29.95	**€ 250.85**	**89 %**
Conventional: Pendant lamp T5 2 x 49 W	6353 lm	2	103 W	206 W	321 kWh	€ 64.27		
NEW: LINEAR INDIVILED LED 56 W	6550 lm	2	56 W	112 W	175 kWh	€ 34.94	**€ 29.33**	**46 %**
Total energy savings of new LED lighting solution							**€ 280.18**	**81 %**

OPERATING DATA: Operation per year (days): 260 · Operation per day (hours): 6 · Electricity price: € 0.20/kWh
Specific connected load of the new LED lighting solution: 7.43 W/m² (28.00 m² of floor space).

The energy consumption values do not take into account any lighting scenes or their dimming states.

OFFICE

HIGH VISUAL COMFORT AND EFFICIENCY



The aim in offices is to create ergonomic and cost-effective lighting, with these factors playing an important role in planning:

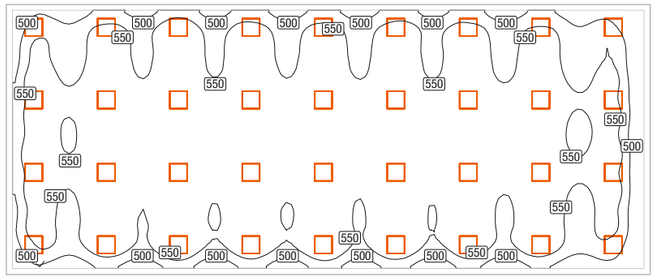
1. **Efficient lighting technology:**
   - Choose **LED luminaires with a high luminous efficacy (lm/W):** This allows you to use fewer light points compared to less efficient luminaires.
   - A **DALI light management system** makes controlling the lighting particularly flexible.
2. **Comfortable lighting:**
   - Only **use low-glare luminaires** (at least **UGR < 19**) at computer screen workstations. **Luminaires with a microprismatic cover** are ideal.
   - Factor in **at least a standard-compliant 500 lux** on average and high uniformity (0.60).

This also allows you to choose flexible furnishings for open-plan offices.

OUR SOLUTION FOR YOU: A PERFECT WORK-LIGHT BALANCE

In open-plan offices a very uniform illumination is achieved using 36 **Panel DALI** luminaires. Thanks to UGR < 19, the luminaires are particularly suited for ergonomic workplace lighting. Using **DALI** the lighting can be controlled as required.

1. LIGHTING CALCULATION



Layout with isolines

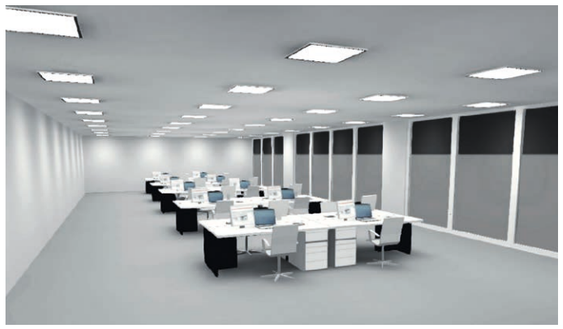
Free no-obligation lighting calculation using DIALux excluding any liability or warranty from LEDVANCE.

ROOM DEFINITION

- Open-plan office with 20 workplaces
- Room dimensions: • L x W: 22.00 m x 9.30 m
  • Clear height: 3.00 m
- Reflectance: • Ceiling 70.0 %
  • Walls 50.0 %
  • Floor 20.0 %

BASIS FOR CALCULATION

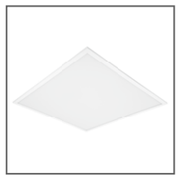
- Applicable standard: DIN EN 12464-1
- Required illuminance E_m: 500 lx
- Required uniformity E_{min}/E_m: 0.60
- Glare reduction: UGR < 19
- Maintenance factor: 0.80
- Peripheral area: 0.20 m



RESULT: ILLUMINANCE OF THE OFFICE LIGHTING

Area	Result	Average (Target)	Min	Max	Uniformity E_{min}/E_m (Target):
Open-plan office	Vertical illuminance (adaptive) [lx], height: 0.80 m	**567 lx** (500 lx)	338 lx	639 lx	**0.60** (0.6)

2. PRODUCTS



PANEL 600 DALI
4058075113305 GTIN (EAN)
36 W / 4000 K / 4320 lm / 90° / CC[2]: 600 x 600 mm

Product benefits
- Homogeneous and reduced-glare lighting UGR < 19 thanks to microprismatic cover
- Aluminum luminaire housing
- Improved efficiency of 120 lm/W
- Long life of up to 60,000 hours L80 / W50

PANEL 600
MOUNTING FRAME
4058075108769 GTIN (EAN)

Product benefits
- Pre-assembled ready to install
- Cross brace allows for greater stability
- Material: aluminum

Optional accessory for even greater flexibility

Save even more energy: Combination with OSRAM DALI ACU BT Lighting control (p. 22)

[1] For precise terms and conditions go to www.ledvance.com/guarantee.
[2] CC = ceiling cutout

3. ENERGY SAVINGS

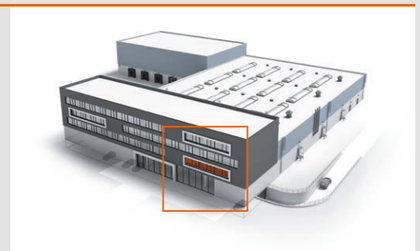
Lighting technology	Rated luminous flux/ luminaire	Number of luminaires	Output incl. losses/ luminaire	Total connected load	Total energy consumption per year	Total electricity costs per year	Savings in electricity costs per year compared to old system	Relative energy savings compared to old system	Savings in electricity costs per year compared to old system with LMS	Relative energy savings compared to old system with LMS
Conventional: Louver luminaire T8 4 x 18 W	3091	50*	74 W	3700 W	11544 kWh	€ 2,308.80				
NEW: PANEL 600 DALI 36 W	4320	36	36 W	1296 W	4044 kWh	€ 808.70	**€ 1,500.10**	**65 %**	**€ 1,872.08****	**81 %****

OPERATING DATA: Operation per year (days): 260 · Operation per day (hours): 12 · Electricity price: € 0.20/kWh
Specific connected load of the new LED lighting solution: 6.28 W/m² (206.48 m² of floor space).
This energy consumption value refers to the LED lighting solution without LMS and does not take into account any lighting scenes or their dimming states.

* Due to the lower luminous flux of the T8 louver luminaires, the number of conventional luminaires was adjusted for reasons of direct comparison.
**Assumed savings through LMS in relation to the new system with LEDs: 46 %; based on the following assumptions:
Maintenance factor compensation 12.50 % · Planning value (relating to 500 lx) 8.00 % · Daylight control (general assumption) 30.00 % · Motion detector (0.5 h of passive time) 4.17 %
The assumptions made for the LMS savings calculations are approximate and are based on practical experience from the lighting industry.
Energy savings through LMS always need to be calculated based on the specific project.

SHOWROOM

ACCENTUATION AND PRESENTATION



The right lighting draws attention to product displays, stirs emotions and highlights brand worlds. This is how you can implement it:

1. **Atmospheric lighting:**
   - Create the right mood by using different types of lighting, for example a combination of **product-related, high-contrast accent lighting** and **indirect lighting.**
   - Make sure to also highlight the architecture: **bright/dark contrasts** create an attractive spatial experience.
2. **Outstanding product presentation:**
   Adaptive power track-mounted spotlights are ideal for accentuation; pay attention to the following:
   - **High illuminance** on merchandise attracts attention.
   - **Brilliant accents** through narrow-beam spot optics.
   - **Excellent color rendering** (CRI > 90) and **light color** matched to product quality.

OUR SOLUTION FOR YOU: FLEXIBLE AND STIMULATING

In the showroom, a combination of indirect lighting and accent lighting creates a stimulating atmosphere. Eight **Tracklight Spots** on power rails highlight the products in the central presentation area; walls and cabinets are illuminated by 17 cardanic **Spot Multi** luminaires. Indirect cove lighting with 60 **Linear Compact** luminaires adds to the lighting solution.

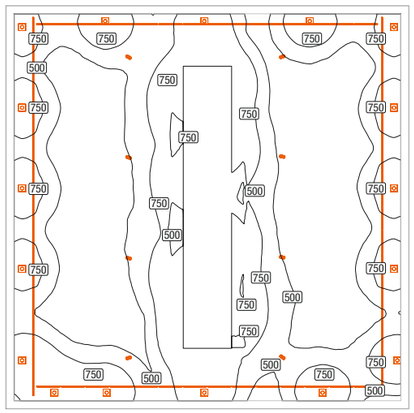
1. LIGHTING CALCULATION

ROOM DEFINITION

- Showroom for metal components
- Room dimensions: • Floor space: 100.00 m²
  • Clear height: 3.20 m
- Reflectance: • Ceiling 70.0 %
  • Walls 50.0 %
  • Floor 50.0 %

BASIS FOR CALCULATION

- Applicable standard: DIN EN 12464-1
- Required illuminance E_m: 300 lx
- Required uniformity E_{min}/E_m: 0.40
- Maintenance factor: 0.80
- Peripheral area: 0.20 m



Layout with isolines

Free no-obligation lighting calculation using DIALux excluding any liability or warranty from LEDVANCE.

RESULT: ILLUMINANCE IN THE SHOWROOM

Area	Result	Average (Target)	Min	Max	Uniformity E_{min}/E_m (Target):
Showroom	Vertical illuminance (adaptive) [lx], height: 0.80 m	**659 lx** (≥ 300 lx)	345 lx	137 lx	**0.52** (0.4)

#	Luminaire	Ø (Luminaire) [lm]	Output [W]	Lum. efficacy [lm/W]
8	Tracklight Spot LED 55 W, 38°	4200	55.0	76.4
60	Linear Compact Batten LED 10 W	1000	10.0	100.0
17	Spot Multi LED 30 W	2700	30.0	90.0
	Sum of all luminaires	139500	1550.0	90.0

Specific connected load: 15.50 W/m² (100.00 m² of floor space)

The energy consumption does not take into account any lighting scenes or their dimming states.

2. PRODUCTS

TRACKLIGHT SPOT
4058075113664 GTIN (EAN)
55 W / 4000 K / 4200 lm / 24° / Ø 95 mm / black

Product benefits
- Compact spotlight for 3-phase track-mounted spotlight in the functional SCALE design
- Great flexibility: Rotating (0°–350°) and swiveling (0°–90°)
- Replaceable reflectors (15°, 24° and 38°)
- High quality of light: CRI > 90; SDCM < 3; UGR < 16; low-flicker thanks to special ECG

Accessory
- Reflector 38°, 4058075113909 GTIN (EAN)

SPOT MULTI
4058075113947 GTIN (EAN)
30 W / 4000 K / 2700 lm / 38° / CC[2]: 164 L x 160 W (mm)

LINEAR COMPACT BATTEN
4058075099715 GTIN (EAN)
10 W / 4000 K / 1000 lm / 140° / 575 L x 27 W x 38 H (mm)

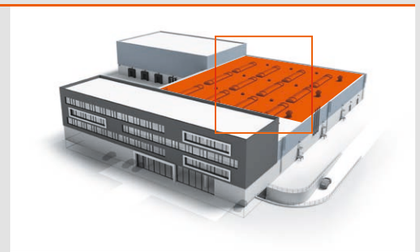
Product benefits
- Small space requirements thanks to compact dimensions
- Seamless strip lighting with up to 10 luminaires
- Batten version with rear wiring
- Complete installation and connection accessories included with the luminaires

Product benefits
- Cardanic cassette spotlight (+/- 25°) for accent and general lighting
- High quality of light: UGR < 16, low-flicker thanks to special ECG
- Bayonet connection for quick and easy installation

[1] For precise terms and conditions go to www.ledvance.com/guarantee. [2] CC = ceiling cutout.

PRODUCTION

ROBUST AND EFFICIENT LIGHTING



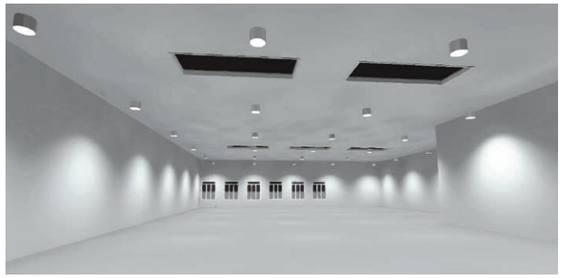
Lighting a factory depends on the type of production and the activities related to it; generally, the following needs to be taken into consideration:

1. **High efficiency:**
   - In continuous operation, economical **LED technology** and a **DALI light management system** are particularly important (including presence detection and daylight control if necessary).
   - Luminaires with a **constant luminous flux** (CLO technology) offer additional energy savings throughout their entire life.
2. **Impressive quality of light:**
   - **Bright and uniform lighting** can contribute to minimizing the risk of accidents.
3. **High luminaire quality:**
   - If robustness is required, luminaires with **increased shock resistance (IK 08), a dustproof design and protection against jets of water (IP 65)** should be used.

OUR SOLUTION FOR YOU: ROBUST AND EFFICIENT

In accordance with the standard, the factory for metal processing is illuminated very uniformly by 28 deep-beam **High Bay DALI CLO** luminaires. For increased visual comfort, the luminaires are equipped with a **reflector**. An **OSRAM DALI Professional** lighting control system provides increased energy efficiency.

1. LIGHTING CALCULATION

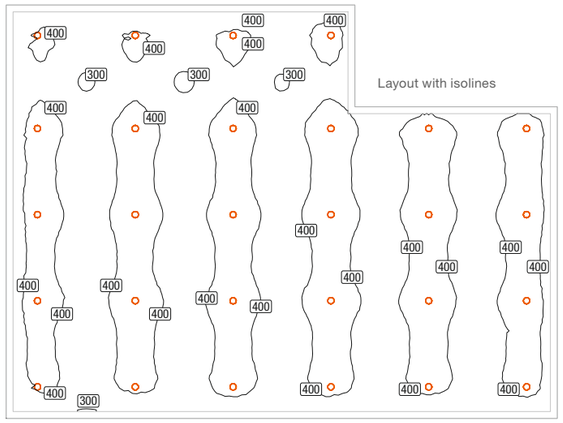


ROOM DEFINITION

- Production: Metal working and processing/ rough and medium machine work
- Room dimensions:
  - Floor space: 1091.50 m²
  - Clear height: 7.50 m
- Reflectance:
  - Ceiling 70.0 %
  - Walls 50.0 %
  - Floor 20.0 %

BASIS FOR CALCULATION

- Applicable standard: DIN EN 12464-1
- Required illuminance E_m: 300 lx
- Required uniformity E_{min}/E_m: 0.60
- Maintenance factor: 0.80
- Peripheral area: 0.50 m



Layout with isolines

RESULT: ILLUMINANCE IN PRODUCTION

Area	Result	Average (Target)	Min	Max	Uniformity E_{min}/E_m (Target):
Production	Vertical illuminance (adaptive) [lx], height: 0.80 m	**386 lx** (≥ 300 lx)	289 lx	439 lx	**0.75** (0.6)

Free no-obligation lighting calculation using DIALux excluding any liability or warranty from LEDVANCE.

2. PRODUCTS

HIGH BAY DALI CLO
4058075130654 GTIN (EAN)
155 W / 4000 K / 17500 lm
throughout lifetime (CLO) / 115° /
Ø 333 mm x 131.5 H (mm)

HIGH BAY DALI REFLECTOR
4058075157477 GTIN (EAN)

Product benefits

- CLO (Constant Lumen Output): throughout the entire life (50,000 h, L80/W50)
- Excellent robustness: IP 65 and IK 08
- High compatibility with light management systems thanks to DALI-2 certification
- Low-flicker light thanks to special electronic control gear
- Simple electrical connection thanks to terminal connector

Accessory

- Reduced-glare lighting thanks to 80° aluminum reflector

IP65 · IK08 · SCALE DESIGN · LEDVANCE 5 year guarantee[1] · 25 · TÜV SÜD

[1] For precise terms and conditions go to www.ledvance.com/guarantee.

Save even more energy: Combination with OSRAM DALI Professional system (see p. 22)

Good to know: CLO: A constant luminous fluxthanks to constant lumen output throughout the entire life allows for additional energy savings.

3. ENERGY SAVINGS

Lighting technology	Rated luminous flux/ luminaire	Number of luminaires	Output incl. losses/ luminaire	Total connected load	Total energy consumption per year	Total electricity costs per year	Savings in electricity costs per year compared to old system	Relative energy savings compared to old system	Savings in electricity per year compared to old system with LMS	Relative energy savings compared to old system with LMS
Conventional: High bay downlighter 400 W HID	22195 lm	28	450 W	12600 W	52416 kWh	€ 10,483.20				
NEW: HIGH BAY DALI CLO LED 155 W	22000 lm	28	Ø ca. 140 W*	3920 W	16307 kWh	€ 3,261.44	**€ 7,221.76**	**69 %**	**€ 8,653.23****	**83 %****

OPERATING DATA: Operation per year (days): 260 · Operation per day (hours) (two shifts): 16 · Electricity price: €0.20/kWh

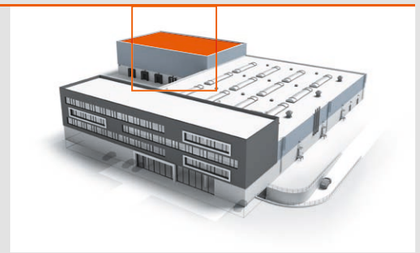
Specific connected load of the new LED lighting solution: 3.85 W/m² (1091.50 m² of floor space)
This energy consumption value refers to the LED lighting solution without LMS and does not take into account any lighting scenes or their dimming states.

* **Since the High Bay DALI CLO (Constant Lumen Output) independently readjusts the decline in luminous flux between 125 W and 155 W,** an average power consumption of approx. 140 W is expected throughout the entire life of the luminaire.

**Assumed savings through LMS in relation to the new system with LEDs: 44 %; based on the following assumptions: Maintenance factor compensation 0 % (because of CLO) · Planning value (relating to 300 lx) 15.00 % · Daylight control (general assumption – alignment, window size ...) 30.00 % · Motion detector (1 h of passive time) 6 %
The assumptions made for the LMS savings calculations are approximate and are based on practical experience from the lighting industry.
Energy savings through LMS always need to be calculated based on the specific project.

WAREHOUSE

HIGH LUMINOUS FLUX AND HIGH EFFICIENCY



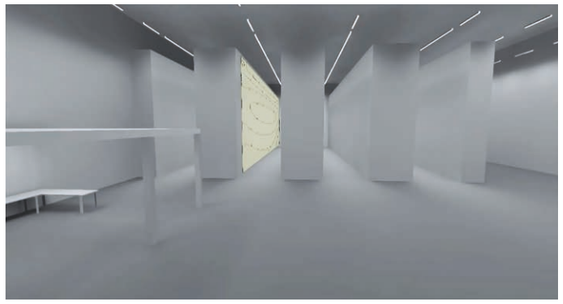
The typical high-bay warehouse is characterized by high ceilings, hardly any natural daylight and narrow aisles.
This is how you can take it into account for lighting planning:

1. **Required quality of light:**
   - For high-bay warehouses: plan using an illuminance of **at least 200 lux** on average on the front so that product labels are easy to read.
   - Warehouses and packaging areas should be illuminated with **at least 300 lux** on average.
2. **Functional lighting technology:**
   - Use deep-beam lighting systems with a high luminous flux and special optics for **homogeneous shelf illumination**.
   - Long-life, low-maintenance and efficient LED luminaires reduce operating costs.

OUR SOLUTION FOR YOU: REACHING NEW HEIGHTS

The **TruSys® DALI** LED trunking system is used in high-bay warehouses: 72 luminaire modules featuring narrow-beam optics illuminate the shelf fronts with at least 200 lux on average. The walkways are also illuminated with **TruSys®** – in this case using 42 wide-beam luminaires for high uniformity. The packaging station is illuminated by four **Damp Proof Compact** luminaires.

1. LIGHTING CALCULATION

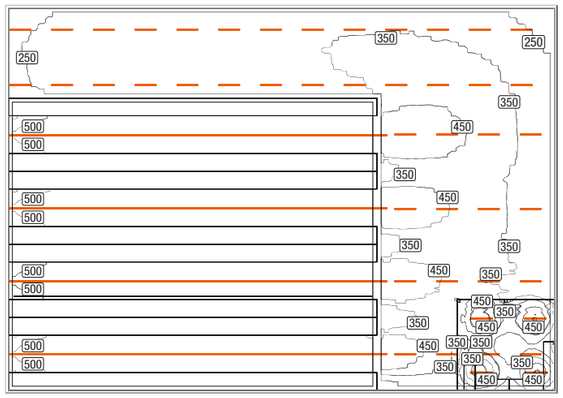


ROOM DEFINITION

- High-bay warehouse including storage areas and packaging station
- Room dimensions:
  - L x W: 40.00 m x 28.00 m
  - Clear height: 10.00 m
- Mounting height of the luminaires:
  - For shelves and walkways: 8.50 m
  - For packaging station: 3.00 m
- Reflectance: Ceiling 70.0 % / Walls 50.0 % / Floor 20.0 %

BASIS FOR CALCULATION

- Applicable standard: DIN EN 12464-1
- Required illuminance E_m:
  - On the shelf front: 200 lx
  - For packaging and storage areas: 300 lx
- Required uniformity E_{min}/E_m:
  - Shelf front and walkways: 0.40/packaging: 0.60
- Maintenance factor: 0.80
- Peripheral area: 0.00 m



Layout with isolines

Free no-obligation lighting calculation using DIALux excluding any liability or warranty from LEDVANCE.

RESULT:
ILLUMINANCE FOR THE WORK SPACES IN THE WAREHOUSE

Area	Result	Average (Target)	Min	Max	Uniformity E_{min}/E_m (Target):
High-bay shelf front (72 TruSys DALI 53 W, narrow-beam)	Vertical illuminance (grid) (lx), height: 3.94 m	**227 lx** (≥ 200 lx)	148 lx	260 lx	**0.65** (0.4)
Storage areas (42 TruSys DALI 53 W, wide-beam)	Vertical illuminance (adaptive) [lx], height: 0.80 m, peripheral area: 0.30 m	**363 lx** (≥ 300 lx)	205 lx	662 lx	**0.56** (0.4)
Packaging station (4 Damp Proof Compact 55 W)	Vertical illuminance (adaptive) [lx], height: 0.80 m, peripheral area: 0.00 m	**358 lx** (≥ 300 lx)	240 lx	499 lx	**0.67** (0.6)

2. PRODUCTS

TRUSYS® DALI
4058075102545 GTIN (EAN)
narrow-beam – 25° (NFL) / 6700 lm
53 W / 4000 K / 1534 L x 71 W x 53 H (mm)
4058075102484 GTIN (EAN)
wide-beam – 105° (W) / 7200 lm
53 W / 4000 K / 1534 L x 71 W x 53 H (mm)

Product benefits
- High-quality design: Anodized aluminum housing, continuous lens technology, built-in mounting bracket
- Very quick and simple luminaire installation thanks to click system
- Very high luminous efficacy of up to 135 lm/W
- Increased flexibility thanks to various beam angles: narrow, wide, asymmetrical, double asymmetrical

Accessories (selection)
- Mounting rails for DALI luminaires 4.50 m, 7 x 2.5 4058075103498 GTIN (EAN)
- Feeder for DALI luminaires 7 x 2.5 4058075155589 GTIN (EAN)
- Mounting kit including hook, 4058075100374 GTIN (EAN)

DAMP PROOF COMPACT
4058075210103 GTIN (EAN)
55 W / 4000 K / 6700 lm / 120° / 1590 L x 86 W x 68 H (mm)

Stock availability: August 2019

Product benefits
- Very robust LED damp-proof luminaire with IP 66 and IK 08
- Efficiency of 120 lm/W
- Easy installation and connection:
  - Free positioning of the mounting bracket on the luminaire
  - End caps with bayonet lock make access to the connecting terminal easier
  - Tool-free connection by means of terminal connector
  - Pre-installed three-core through-wiring (L, N, E)

[1] For precise terms and conditions go to www.ledvance.com/guarantee.

3. ENERGY SAVINGS

Lighting technology	Rated luminous flux/ luminaire	Number of luminaires	Output incl. losses/ luminaire	Total connected load	Total energy consumption per year	Total electricity costs per year	Savings in electricity per yearcompared to old system	Relative energy savings compared to old system
Conventional: Trunking system T5 2 x 80 W	7407 lm	114	161 W	18354 W	57264 kWh	€ 11,452.90		
NEW: TRUSYS DALI LED 53 W	6700 lm/7200* lm	114	53 W	6042 W	18851 kWh	€ 3,770.21	**€ 7,682.69**	**67 %**
Conventional: Damp-proof luminaire T8 2 x 58 W	6339 lm	4	124 W	496 W	1548 kWh	€ 309.50		
NEW: DAMP PROOF COMPACT LED 55 W	6700 lm	4	55 W	220 W	686 kWh	€ 137.28	**€ 172.22**	**56 %**
Total energy savings of new LED lighting solution							**€ 7,854.91**	**67 %**

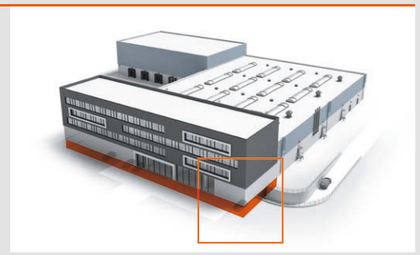
OPERATING DATA: Operation per year (days): 260 · Operation per day (hours): 12 · Electricity price: €0.20/kWh

High-bay shelf front: Specific connected load: 6.60 W/m² (577.84 m² of floor space),
storage areas and packaging station: Specific connected load: 4.53 W/m² (542.16 m² of floor space).

The energy consumption values do not take into account any lighting scenes or their dimming states.
*Two different optics with different luminous fluxes were used for planning.

CAR PARK

BETTER VISIBILITY AND INCREASED COST EFFICIENCY



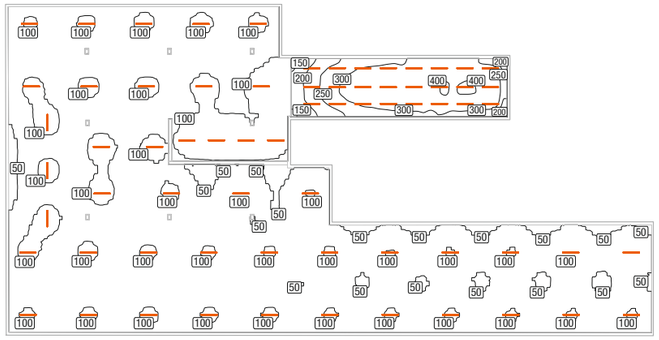
In car park lighting, safety and efficient light switching are particularly important. This is how you can implement it:

1. **Lighting as a safety factor:**
   - **Standard-compliant roadway lighting** with at least 75 lux on average; uniformity: plan using 0.4. Ideal because of the low ceiling height: **wide-beam lighting**.
   - Please note that **entrances and exits** are illuminated brighter: on average **300 lux during the day and 75 lux at night**. This helps the eyes adjust when entering and exiting the car park.
2. **Demand-based lighting:**
   - Integrate **motion sensors with two-stage dimming functionality** in the lighting solution: Use step switching for increased energy savings: 0 % / 100 %; for an **increased sense of safety** through existing background lighting, use 20 % / 100 %.

OUR SOLUTION FOR YOU: LIGHT MANAGEMENT MADE EASY

For lighting car parks, advanced lamp technology is used: 69 LED tubes of the **OSRAM SubstiTUBE T8 Advanced UO Connected** type, installed in robust **Damp Proof IP 65** housings. The lamps are controlled by a wireless light management system: the LED tubes are connected through six **LEDVANCE Connected sensors** via Zigbee. Two-stage switching (0 % / 100 % and 20 % / 100 %) is also integrated in the system.

1. LIGHTING CALCULATION



Layout with isolines

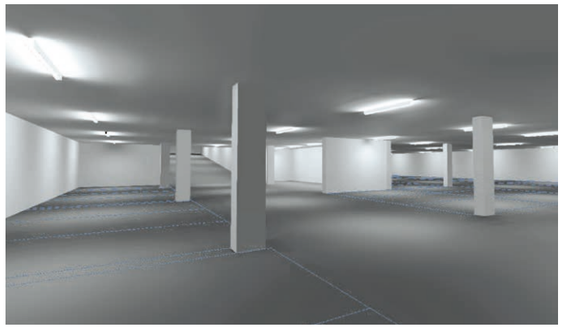
Free no-obligation lighting calculation using DIALux excluding any liability or warranty from LEDVANCE.

ROOM DEFINITION

- Car park with 45 parking spaces
- Room dimensions: • Floor space: 1453.17 m²
  • Clear height: 2.80 m
- Reflectance: • Ceiling 70.0 %
  • Walls 50.0 %
  • Floor 20.0 %

BASIS FOR CALCULATION

- Applicable standard: DIN EN 12464-1
- Required illuminance E_m: 75.0 lx
- Required uniformity E_{min}/E_m: 0.40
- Maintenance factor: 0.80
- Peripheral area: 0.30 m



RESULT: ILLUMINANCES FOR CAR PARK AND ENTRANCE/EXIT

Area	Result	Average (Target)	Min	Max	Uniformity E_{min}/E_m (Target):
Car park	Vertical illuminance (adaptive) [lx], height: 0.00 m	**77.3 lx** (≥ 75 lx)	38.7 lx	162 lx	**0.50** (0.4)
Area: Entrance/exit	Vertical illuminance (louver) (lx), height: 0.00 m	**303 lx** (≥ 300 lx)	135 lx	407 lx	**0.45** (0.4)

2. PRODUCTS

DAMP PROOF HOUSING
4058075312470 GTIN (EAN)
Luminaire housing IP 65 /
1500 mm / 1x LED-tube

Stock availability: August 2019

Product benefits
- Prewired for easy installation of T8 LED tubes
- Suitable for SubstiTUBE® EM/UN and SubstiTUBE® Connected
- Durable: robust, corrosion-resistant luminaire housing made of polycarbonate
- Quick and easy installation
- Installation: stainless steel brackets and safety screws included

IP65 IK08 5 year guarantee [1]

OSRAM SubstiTUBE® T8 ADVANCED ULTRA OUTPUT CONNECTED
for CCG luminaires and mains voltage
4052899970571 GTIN (EAN)
L: 1500 mm / 24 W / 4000 K / 3600 lm / CRI > 80 / 160° / EEK A++

Product benefits
- Excellent performance with a luminous efficacy of 150 lm/W
- Simple, fast and safe lamp replacement with no rewiring of the CCG
- Can handle frequent on/off switching (200,000)
- Simple light management in combination with Connected sensors (wireless Zigbee® connection between sensors and luminaires, no wiring of individual luminaires required / step switching [0 % / 100 % and 20 % / 100 %])

5 year guarantee [1]

LEDVANCE is the licensee of product trademark OSRAM in general lighting

Available from August 2019:
Generation 2,
GTIN: 4058075187634

OSRAM

LEDVANCE
CONNECTED SENSOR ST8 CR
4058075801448 GTIN (EAN)

Product benefits
- PIR sensor with motion detection and step switching (0 % / 100 % and 20 % / 100 %)
- One Connected sensor can control up to 50 SubstiTUBE® Connected tubes
- Installation: ceiling and corridor, recommended mounting height: up to 4.00 m
- High IP rating: IP 54

zigbee

5 year guarantee [1]

Available from November 2019:
Generation 2, GTIN: 4058075232969

[1] For precise terms and conditions go to www.ledvance.com/guarantee.

3. ENERGY SAVINGS

Lighting technology	Rated luminous flux/ luminaire	Number of luminaires	Output incl. losses/ luminaire	Total connected load	Total energy consumption per year	Total electricity costs per year	Savings in electricity costs per year compared to old system at 100 % switching	Relative energy savings compared to old system	Savings in electricity per year compared to old system with LMS	Relative energy savings compared to old system with LMS
Conventional: Damp-proof luminaire T8 1 x 58 W	3454 lm	69	70 W	4830 W	20093 kWh	€ 4,018.56				
NEW: DAMP PROOF HOUSING with SubstiTUBE Advanced T8 Connected LED 24 W	3156 lm	69	24 W	1656 W	6889 kWh	€ 1,377.79	**€ 2,640.77**	**66 %**	**€ 3,191.88***	**79 %***

OPERATING DATA: Operation per year (days): 260 · Operation per day (hours): 16 · estimated active times per day (hours) 8 · Electricity price: € 0.20/kWh

Specific connected load of the new LED lighting solution: 1.15 W/m² (1453.17 m² of floor space).
This energy consumption value refers to the LED lighting solution without LMS and does not take into account any lighting scenes or their dimming states.

* Assumed savings through LMS in relation to the new system with LEDs: 40 %; based on the following assumptions: Motion detector with comfort dimming 40 %. During operating times, the lighting system will only be dimmed down to 20 %. This is more comfortable for users because they do not have to enter the space in complete darkness. The assumptions made for the LMS savings calculations are approximate and are based on practical experience from the lighting industry. Energy savings through LMS always need to be calculated based on the specific project.

CORRIDORS

FAST AND SAFE ORIENTATION

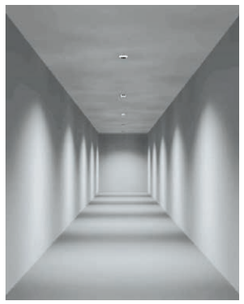
The lighting in corridors guides the way through the company; take into account the following aspects:

Demand-based lighting:
- In accordance with the standard, the illuminance in corridors is at least 100 lux on average.
- Combine the lighting with motion detectors so that the light is switched on only when needed.
- Also brighten up the walls for a positive atmosphere; wide-beam lights are recommended.
- Because corridors are also escape routes, you should use safety lighting in addition (see p. 21).

OUR SOLUTION FOR YOU:
SENSOR-CONTROLLED LIGHTING

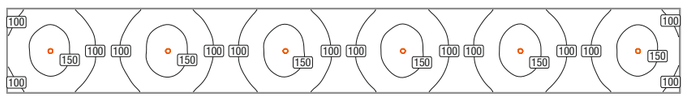
Six **Downlight Comfort** illuminate the corridor very uniformly (0.53) with an average illuminance of 120 lux. The wide-beam angle also illuminates the walls. The combination with two **OSRAM Vision** motion sensors enables individual and precise light control.

1. LIGHTING CALCULATION



ROOM DEFINITION
- Room dimensions: • Floor space: 50.00 m²
  • Clear height: 3.00 m
- Reflectance: • Ceiling 70.0 %
  • Walls 50.0 %
  • Floor 20.0 %

BASIS FOR CALCULATION
- Applicable standard: DIN EN 12464-1
- Required illuminance E_m: 100 lx
- Required uniformity: E_{min}/E_m: 0.40
- Maintenance factor: 0.80
- Peripheral area: 0.00 m; height: 0.00 m



Layout with isolines

Free no-obligation lighting calculation using DIALux excluding any liability or warranty from LEDVANCE.

RESULT: 6 Downlight Comfort, total output: 108 W · E_m: 120 lx · E_{min}/E_m: 0.53 · Specific connected load: 2.16 W/m²

2. PRODUCT

DOWNLIGHT COMFORT
4058075104082 GTIN (EAN)
18 W / 3 CCT: 1040 lm at 3000 K; 1620 lm at 4000 K
1470 lm at 5700 K / 60° / CC²: Ø 155 mm

Product benefits
- Direct replacement for CFL downlights (2 × 18 W)
- 3 color temperatures in one luminaire, selectable via DIP switch
- Reduced-glare luminaire with UGR < 22
- Low-flicker light thanks to special ECG
- Simple installation thanks to tool-free quick-connect terminal

Save even more energy: Combination with OSRAM Vision sensor (p. 22)

IP20 / IP54 · LEDVANCE 5 year guarantee [1] · ENEC 25 · TÜV SÜD

[1] For precise terms and conditions go to www.ledvance.com/guarantee. [2] CC = ceiling cutout.

STAIRWELL

LIGHT THAT SHOWS THE WAY

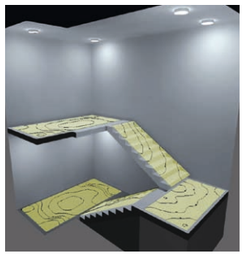
The lighting is an important safety factor in stairwells so consider the following:

Diffuse general lighting:
- Use wide-beam luminaires so that the steps are clearly visible. Avoid hard shadows created by focused, directional light.
- Choose a suitable position for the luminaires: light from above creates short, soft shadows, making it easier to see each individual step.
- According to the standard, stairs need to be illuminated with at least 100 lux on average (uniformity: 0.4). Safety lighting should also be taken into account (see p. 21).

OUR SOLUTION FOR YOU:
BRIGHTNESS EVERY STEP OF THE WAY

The two-story stairwell is immersed in an extremely homogeneous light (uniformity at least 0.73) using six **Surface Compact** with more than 100 lux on average. The ceiling luminaires illuminate the steps well, making them clearly visible. Thanks to IK10 and Torx screws, the Surface Compact are also well protected against vandalism.

1. LIGHTING CALCULATION

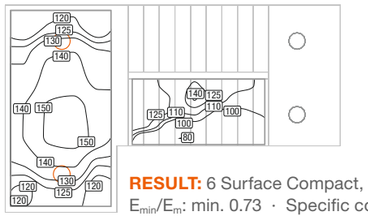


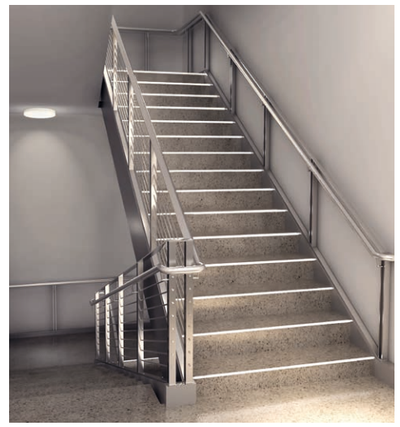
ROOM DEFINITION
- Room dimensions: • Floor space: 17.49 m²
  • Clear height: 4.66 m - 6.06 m
- Reflectance: • Ceiling 70.0 %
  • Walls 50.0 %
  • Floor 20.0 %

BASIS FOR CALCULATION
- Applicable standard: DIN EN 12464-1
- Required illuminance E_m: 100 lx
- Maintenance factor: 0.80

Layout with isolines

Free no-obligation lighting calculation using DIALux excluding any liability or warranty from LEDVANCE.





RESULT: 6 Surface Compact, total output: 144 W · E_m: min. 100 lx
E_{min}/E_m: min. 0.73 · Specific connected load: 8.23 W/m²

Since the lighting calculation includes several areas, minimum values were specified for the uniformity and average illuminance.

2. PRODUCT

SURFACE COMPACT IK 10
4058075062221 GTIN (EAN)
24 W / 4000 K / 1920 lm / 120° / Ø 300 mm, 61 H (mm)

Product benefits
- Great resistance to vandalism thanks to very high IK 10 shock resistance and Torx screws
- Extremely homogeneous light distribution with a beam angle of 120°
- Simple installation thanks to rear wiring with quick-connect terminal

IP65 · IK10 · LEDVANCE 5 year guarantee [1] · D · ENEC 25 · TÜV SÜD

[1] For precise terms and conditions go to www.ledvance.com/guarantee.

OUTDOOR LIGHTING

FOCUS ON ORIENTATION AND SAFETY

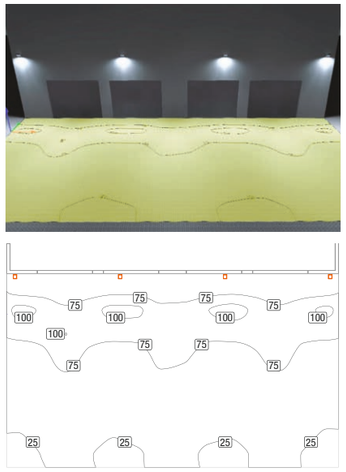
The EN 12464-2 standard also requires demand-based lighting for outdoor work; this is what needs to be considered:

- Heavily frequented areas require higher illuminance levels; illuminate loading and unloading zones with at least 50 lux on average.
- Choose luminaires with a high IP rating of at least IP 44 (in covered outdoor areas) for adequate protection against moisture and dirt.
- To uniformly illuminate areas in depth, asymmetrical distribution of light is ideal.

OUR SOLUTION FOR YOU:
UNIFORM ILLUMINATION

Using four **Floodlight Asymmetric** (installation height 6.50 m) you can achieve uniform illumination of the loading and unloading zone with 57 lux on average across a depth of more than 17 m.

1. LIGHTING CALCULATION



ROOM DEFINITION

- Heavily frequented loading and unloading zone
- Illuminated area: L x W: 30.00 m x 17.50 m
- Reflectance:
  - Walls 50.0 %
  - Floor 20.0 %

BASIS FOR CALCULATION

- Applicable standard: DIN EN 12464-2
- Required illuminance E_m: 50 lx
- Maintenance factor: 0.80
- Peripheral area: 0.00 m

RESULT: 4 Floodlight Asymmetric, total output: 600 W · E_m: 57 lx
Specific connected load: 1.14 W/m²

Layout with isolines

Free no-obligation lighting calculation using DIALux excluding any liability or warranty from LEDVANCE.

2. PRODUCT

FLOODLIGHT ASYMMETRIC
4058075321823 GTIN (EAN), 150 W / 4000 K / 15000 lm / 38° x 80°

Stock availability: September 2019

Product benefits

- Modern LED lens technology: asymmetrical light distribution for uniform illumination
- Robust luminaire quality: lens cover made of tempered safety glass, aluminum housing, IP 65 and IK 08
- Simplified installation: easily adjustable mounting bracket with a great rotation range, ready-to-install product with a 1 m cable and prepared wire ends

IP65 IK08 5 year guarantee[1] TÜV SÜD

[1] For precise terms and conditions go to www.ledvance.com/guarantee.

INTELLIGENT LIGHTING CONTROL SYSTEMS FOR EVEN MORE EFFICIENCY

OSRAM

Products of Osram GmbH, distributed by LEDVANCE

You can combine the lighting in the following applications with lighting control systems from OSRAM to save even more energy.

CORRIDOR

OSRAM Vision stand-alone sensors – The easy way to control light

Easy and effective: Simply by using a sensor solution, you can achieve energy savings of up to 35%* compared to manual switching. It particularly lends itself to walkways such as corridors. In our application example on **p. 18** we use two OSRAM Vision motion sensors so that the light is switched on only when needed (delay time: 30 s–20 min).

* average figure based on market experience

	Product type	Product name	GTIN (EAN)	Number
	Motion sensor with 5A switch contact – Suitable for up to 15 luminaires – Approx. 140° detection angle, detection area: max. diameter of 21 m, installation height max. 4.5 m	**OSRAM Vision**	4008321957047	2

OFFICE

OSRAM DALI ACU BT – Lighting control via Bluetooth made easy

In the open plan office **(p. 8/9)** an OSRAM DALI ACU BT control is used: the 36 LED panels can be controlled by simply using a conventional pushbutton and smartphone – via Bluetooth. Eight OSRAM DALI sensors complete the system for presence- and daylight-dependent lighting control.

	Product type	Product name	GTIN (EAN)	Number
	DALI controller with Bluetooth® interface	**OSRAM DALI ACU BT**	4008321957047	2
	Recessed ceiling sensor for daylight and presence detection	**OSRAM DALI LS/PD CI**	4052899930292	8

With the proposed lighting control system you can achieve energy savings of up to 81% in open-plan offices compared to a conventional lighting system without lighting control (see also **p. 8/9**)

PRODUCTION

OSRAM DALI Professional – Ideal lighting control for the entire building

You can dynamically control up to 1024 individually addressed luminaires* across rooms and floors using OSRAM DALI Professional; they can be operated by simply using a pushbutton or app for smartphones/tablets. The same applies in production (see **p. 12/13**): the 28 High Bay DALI LED luminaires are controlled using an OSRAM DALI Professional system in combination with matching light and movement sensors – seven OSRAM High Bay sensors for a mounting height of up to 13 m, connected by means of OSRAM DALI sensor couplers.

	Product type	Product name	GTIN (EAN)	Number
	DALI Professional controller	**OSRAM DALI PRO CONT-4 RTC**	4008321710871	1
	DALI Professional pushbutton coupler	**OSRAM DALI PRO PB Coupler**	4008321496461	1
	Motion sensor with switch contact	**OSRAM HIGH BAY Sensor**	4008321410078	7
	Sensor coupler with built-in light sensor for DALI controllers	**OSRAM DALI HIGHBAY ADAPTER**	4008321774132	7

With OSRAM DALI Professional control, energy savings of up to 83% can be achieved in production compared to conventional lighting technology without light management (see also **p. 12/13**).

(*Connection of up to four OSRAM DALI PRO controllers possible via network; each controller can address up to 256 single luminaires.)

FULL RANGE AND ALL-ROUND SERVICE FOR YOUR LIGHTING PROJECT

WE HELP YOU ADVANCE

With our broad product portfolio that we are continually expanding, we offer you great freedom of design for future-proof lighting solutions. As an international full-service partner with in-depth expertise, many years of experience and a worldwide sales and service network, we can offer you individual advice and support and take the pressure off you from the planning stage through to implementation.

EVERYTHING FOR YOUR PROJECT NEEDS

LEDVANCE offers a complete, innovative and high-quality lighting portfolio that satisfies virtually any requirement for building lighting:

- LED luminaires
- LED lamps
- Electronic components, drivers, LED modules
- Flexible LED strips
- Smart light management systems
- Traditional lamps

SERVICE FROM START TO SUCCESS

Take advantage of our comprehensive project support to achieve optimum results and at the same time reduce time and effort spent on your side:

- Individual lighting and product advice for your project
- Clever lighting calculation from LEDVANCE luminaires with DIALux and Relux software
- International sales network for personal contacts around the globe
- eLearning courses for professional users (on training.ledvance.com), new from 08.2019
- User-optimized online catalog for efficient product search (at www.ledvance.com)

TOP REFERENCES

Illustrative examples of complex projects that we have successfully implemented with our customers can be found at **www.ledvance.com/projects.**

NOTES

ABOUT LEDVANCE

With offices in more than 50 countries and business activities in more than 140 countries, LEDVANCE is one of the world's leading general lighting providers for professional users and end consumers. Having emerged from the general lighting business of OSRAM GmbH, LEDVANCE offers a wide-ranging assortment of LED luminaires for a broad spectrum of application areas, intelligent lighting products for smart homes and smart buildings, one of the largest LED lamps portfolios in the industry as well as traditional light sources.

LEDVANCE

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