Light motivates
Lighting solutions for office worlds

Light is OSRAM
Achieving a pleasant atmosphere where employees feel at ease, with precisely the right surroundings for productive work is the task of office and management buildings, aiming to supply an ideal environment for modern office people as globally networked knowledge carriers. Light plays a decisive role in such situations, in both a functional and emotional sense.

At OSRAM and Siteco we plan and develop lighting solutions for all areas of office and management buildings, providing coordinated systems from a single source:

- Luminaires
- Light sources
- ECGs
- Light management systems

Optimal light effects for people is always focused on, combined with highly economic luminaire operation, efficient components, simple installation, flexible utilisation, modular systems, energy-saving light control and wide-ranging upgrade options.

Complete lighting solutions for all office areas

Working creatively in a concentrated way with professional Lighting Tools.

Novartis Campus/Maki building, Basel/Switzerland
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The office of the future

Mobile, open and flexible – working worlds are in a state of transformation

Office work is no longer location-specific

Around 80% of the working population in developed countries carry out their work based on knowledge, and the classic image of workers at desks is increasingly becoming a thing of the past. Modern ‘office workers’ are knowledge-bearers, trailblazers and driving forces, and are mobile and globally networked in teams, spending only some of their time at desks.

Modern offices offer more for dialogue

The trend is departing from single offices and closed doors. Today’s offices serve as meeting points and communication centres, as factories of knowledge and even as expanded habitats. This is why new open office solutions are needed with various zones for work, communication and regeneration.

Factors for well-being such as comfort and ergonomic workstations are also becoming ever more important with office design.
One desk, several workers

Ecological aspects also characterise the offices of tomorrow. Increasing costs and spiralling rent demands ever more efficient room utilisation, and desk sharing instead of a fixed desk for each employee is now an important factor. Workstations must be easily adaptable to various stipulations and needs, and modern, flexible lighting installations significantly contribute to such demands.

The right light is a part of the team as well

Lighting is an integral component when planning offices, and levels of economy and comfort are some of the most important factors both for the company and its employees. The right light makes sure of optimal visual conditions, creates an efficient and motivating work atmosphere and also serves as an attractive element of design.

Optimal ergonomic and economic lighting solutions can be flexibly modified according to individual work areas and requirements, and even according to age, for example with higher illuminance values for older employees. Light management systems (LMS) and the integration and use of natural daylight ensure greater light comfort and added energy savings potential.
Good light motivates

Greater concentration and creativity with biologically effective light

Good light is needed for good work, and concentration becomes easier with good visual conditions. A pleasant light atmosphere also makes sure of more well-being and motivation. Biologically effective light makes a valuable contribution in such situations, meaning on the one hand light with higher blue components/colour temperatures and on the other, indirect light distribution. Dynamic light with levels of brightness and light colours modified according to the course of the day support the natural biological rhythm, thus in turn increasing well-being and performance capability.

The biological effect is strongest when light is emitted from a wide-area source and from above. Indirect lighting where a large and bright surface (a wall for example) reflects the light therefore has a stronger effect than the narrow distribution light from spotlights that only illuminate small areas.

In addition to the light colour itself, a wide-area light source (indirect light) and the correct ingress angle of light rays to the eye are decisive for the activating effect of light.
Increases in performance verified in surveys

The attractive design of office workstations according to specific activity contributes to better creativity, productivity and motivation. Surveys show that offices with a high design and equipment quality can achieve productivity increases of up to 35%. In such situations, light and well-being are primary criteria for ideal office workstations.

OSRAM analysed the influence of biologically effective light on performance capability from November 2011 to March 2012. Various pupil groups were alternatively tested in a classroom with standard lighting and in a classroom equipped with chronologically optimised light. Attention spans, cognitive performance speed, retentivity and mood were tested and queried among other parameters, and the results were conclusive:
- Improved mental performance
- Activation of late personalities in the mornings, improved attention spans
- Increase in performance speed and concentration
- Lower error rates
- Pupils appeared to be active and alert

Exemplary for high productivity: SKYWHITE®

SKYWHITE® fluorescent lamps with an 880 light colour (8,000 K CCT – Correlated-Colour-Temperature – with good colour rendering) feature a special light quality, emitting a high blue light component in the 410–480 nm wavelength range to closely approximate the character of natural daylight.

In addition, SKYWHITE® also has high luminous flux and high efficiency (to 85 lm/W).

Source: 1 “Office Excellence Check” 2007 (Fraunhofer Institute for labour economics and organisation)
2 Union Investment, survey of 3145 office employees in Germany, February 2011
3 OSRAM technical survey in cooperation with the Transfer Center for Neurological Sciences and Learning
The EN 12464-1 standard defines the minimum requirements in Europe for the lighting of indoor workplaces, and is the standard to be considered when planning office lighting. Precise regulations have been formulated in accordance with various quality criteria and according to visual tasks, and it lies in the interest of all companies to fulfil and even exceed these stipulations.

**Important quality criteria for functional office lighting**

Illuminance together with the specific reflection factor ensures a corresponding lighting level, and because glare reduces visual performance and therefore well-being, glare limitation or complete elimination of glare is important with the use of louvres or prismatic covers for example. Suitability for computer screens depends on peripheral luminance, the ingress angle of light and the computer screens used.

Light colour (colour temperature) has an influence on mood, with warm white having a calming effect and neutral white being more stimulating. The colour rendering index CRI measures the rendering of colours compared to colour display in daylight, this having the best colour rendition. CRI ≥ 80 is stipulated for offices. Light distribution influences visual performance and visual comfort, and the light direction is also important. Everything should be clearly identifiable in a pleasant way, with balanced contrast as well as a balanced ratio of diffuse and directed light.
Room-oriented and workstation-oriented lighting

Two fundamental possibilities exist for the lighting of offices and workstations. Space related solutions with uniform light enable the random arrangement of workstations. Task-area related lighting planning on the other hand assumes a pre-designed arrangement of furniture and is therefore especially functional and energy-efficient.

Exemplary for ideal glare control: ELDACON®

The light-guiding ELDACON® microprismatic technology developed by Siteco guarantees a high level of illuminance at workstations without the light source being garish and dazzling. The light generated in the luminaire is specifically directed onto the working plane via the optical system of the luminaire cover, and reflected light and direct glare are reduced to a minimum. The luminous surfaces appear highly homogeneous and impart a crystal-clear, bright impression.
Innovative light saves energy and is flexible

Low costs due to complete efficiency

When planning and specifying office lighting, employers must observe legislative regulations and also the well-being of their employees. Efficiency and economy are also important of course, and 30 to 50% of energy costs for office buildings are caused by lighting, that thus becomes the most significant item in the overall energy balance.

Modern office lighting is therefore characterised by complete, overall efficiency, not only targeting minimal power consumption but also reductions in work, time and thus costs as well. In this sense, the efficiency of a lighting installation should be understood as the optimal interplay of a wide spectrum of factors and components.

Complete efficiency

Luminaire
Luminaire as an efficient system of matched components and precise optics

Planning (1)
Simple planning with online calculation, luminaire data and personal service

Installation (2)
Savings in time and money during installation due to simple, standardised systems

Operation (3)
Economic, reliable operation with savings potential via LMS (DALI, sensors)

Flexible utilisation (4)
Flexibility in use and redesign due to modular systems with upgrading options

Maintenance (5)
Future safety (lifespan and quality) plus simple replacement and guarantees
Efficiency cannot be avoided

Efficiency is being increasingly stipulated legislatively both nationally and across Europe. In addition, specific certification has motivating factors for the voluntary implementation of high sustainability with new buildings and refurbishments, and often subsidised financially and through publicly effective communication.

**OSRAM Headquarters, Munich/Germany:**
DGNB Gold award. OSRAM has been leading the transformation in the lighting market from new company headquarters since 2012. The 28,000 square metres situated in two office buildings in Schwabing in central Munich have a total of 1,200 workplaces. The new OSRAM headquarters are aimed to the standards of modern worlds of work and comply with the complete spectrum of demands for sustainable building management. The buildings were consequently certified with the gold seal of approval by the German Association for Sustainable Building (DGNB).

**Süddeutscher Verlag, Munich/Germany:**
The new headquarters moved into in 2008 enable completely energy-efficient building operation and provide enormous flexibility in terms of room concepts. The lighting concept from Siteco contributed significantly to all three factors. The publishing building was certified in gold by the U.S. Green Building Council with “Leadership in Energy and Environmental Design”. This label evaluates construction and operation, sustainability and the level of innovation in buildings in an interdisciplinary way and in precise detail.

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**European directive**
- EPBD (Energy Performance of Buildings Directive)
- Guideline for total energy efficiency of buildings in Europe

**Voluntary certifications**
- DGNB (Deutsche Gesellschaft für Nachhaltiges Bauen) Award in gold, silver and bronze
- BREEAM (Building Research Establishment Environmental Assessment Method)
- British certification method for sustainable construction
- LEED (Leadership in Energy and Environmental Design) Awarded by the U.S. Green Building Council
Intelligent light for more well-being and efficiency

Managing light according to needs and saving costs

Efficient tools for lighting are the basis for solutions with low operating overheads and high quality of light, and implementation of the right light control is decisive for the correct handling of light in accordance with usage profiles and building situations. OSRAM provides a wide assortment of DALI-based LMS solutions with suitable sensor technology for motion/daylight-dependent control. Daylight systems from Siteco are available enabling the efficient ingress of daylight without the burden of infrared radiation. In this way artificial light and daylight ideally supplement each other.

Exemplary for the natural use of light:
Siteco daylight systems

Daylight systems from Siteco make use of the physical laws of reflection, absorption and refraction to perfectly illuminate rooms and avoid excessive warmth. Energy consumption for artificial lighting and air-conditioning is reduced and room comfort increases.

Detailed information about daylight systems can be found at www.siteco.com/daylight or simply scan in the QR code with a smart phone.
Presence detection

Initial situation:
- non-continuous use of areas
- no ingress of daylight
- e.g. seldom frequented corridors
Luminaires detect persons within a specific range via sensors. They switch from dimmed orientation lighting up to the required work lighting level. When the detection range is exited, the luminaires dim again after a delay period (T).

The level of savings potential depends on:
- the maintenance factor (EN 12464-1)
- use profile of the room (motion)
- constructional conditions (ingress of daylight)

Presence and daylight

Initial situation:
- non-continuous use of areas
- ingress of daylight
- e.g. traditional offices
Daylight entering the space is used for lighting purposes. To ensure the required illuminance, the required quantity of artificial light is automatically supplemented when necessary, but only when people are in this area.

Exemplary for the perfect control of light:
DALI PROFESSIONAL

DALI PROFESSIONAL is suitable for complex applications for controlling rooms and storeys, for daylight-dependent control, RGB control and dynamic light control. The innovative OSRAM light management system for larger rooms or several single rooms enables control of 4 DALI lines with a total of 256 ECGs. Each DALI line can control 64 ECGs, 16 groups and 16 light scenes.
Good light gets better

Higher quality of light with lower costs thanks to refurbishing and upgrades

Energy-optimised technologies and intelligent Lighting Tools reduce energy consumption without the need to compromise on light quality, relieve the environment and reduce operating costs. That’s no secret. It is for this reason that the refurbishment of lighting in many European offices is highly recommended, whether to cut electricity and maintenance costs or to comply with legislation. We fundamentally recommend LEDs and T16 fluorescent lamps depending on the specific project. What are customer desires and requirements? Is planning for the short-term or long-term? Investment costs and saved energy costs are ultimately compared.

<table>
<thead>
<tr>
<th>Planning example</th>
<th>Old T26 system</th>
<th>New LED system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighting refurbishment</td>
<td>Louvre luminaire</td>
<td>Mira® LED Linear</td>
</tr>
<tr>
<td>Open Office</td>
<td>2x 58 W (CCG)</td>
<td></td>
</tr>
<tr>
<td>Office: 109.25 m²/RH: 3 m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standard reflection factors:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20/50/70 (floor/ walls/ ceiling)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintenance factor: 0.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Room-oriented</td>
<td>Nominal illuminance E_n/U_0</td>
<td>612 lx/0.86</td>
</tr>
<tr>
<td>lighting planning</td>
<td>No. of luminaires</td>
<td>18</td>
</tr>
<tr>
<td>Yearly service life: 2,750 h</td>
<td>Rated power</td>
<td>136 W</td>
</tr>
<tr>
<td>according to DIN EN 12464-1:</td>
<td>Total consumption</td>
<td>2448 W</td>
</tr>
<tr>
<td>Em ≥ 500 lx (ME: 0.75m)</td>
<td>Total consumption W/m²</td>
<td>22,4</td>
</tr>
<tr>
<td>Uniformity U_0 ≥ 0.6</td>
<td>Energy consumption KWh/year</td>
<td>6732</td>
</tr>
<tr>
<td></td>
<td>CO₂ consumption t/year</td>
<td>4039</td>
</tr>
<tr>
<td></td>
<td>&gt; compared to obsolete system</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(static – without LMS)</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Energy/CO₂ savings</td>
<td>66 %</td>
</tr>
<tr>
<td></td>
<td>&gt; compared to obsolete system</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(dynamic – with LMS)</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Energy savings potential up to:</td>
<td>80 %</td>
</tr>
</tbody>
</table>

Subsidy programs for energetic building refurbishments

It is not only you and your budget that benefit from the efficient handling of energy, and this is why the energy-related upgrading of buildings is now frequently subsidised at national or European levels. Refurbishing lighting systems is usually a simple but highly effective method of meeting specific subsidy conditions, and to ensure financial support for investments that care for the environment.
ZVEI creates a basis for the neutral evaluation of LED technology

How can LED luminaires be compared? What factors must be considered, and what reliable evaluation criteria exist? It’s a fact that the new technology also brings with it new issues, and this is why the German Electrical and Electronic Manufacturers’ Association (ZVEI) with its members has drawn up a new system for evaluating the performance capability of LED technology.

In the future this will be the basis when evaluating LEDs and LED luminaires uniformly and therefore also manufacturer-independently. As a member of the ZVEI, we explain the most important points on page 48 of this brochure.
Indoor Applications
Office buildings unite highly different areas and tasks under a single roof, and the demands on lighting are equally as diverse and challenging. The right light makes sure of optimal visual comfort and well-being everywhere in a building, and it’s also efficient, long-lasting and flexible, and therefore economic and sustainable.
Sufficient room for development

Achieving the ideal preconditions for creative and productive work is of vital importance for high levels of concentration, individuality, teamwork and communication.
Concentrated work is carried out in open offices at single and group work stations, and with or without computer screens. Thus lighting in the complete room and especially at workstations has to achieve optimal conditions for a wide variety of visual tasks. Differing lighting conditions contribute to the visual separation between work and communication zones, and homogeneous general lighting with 500 lux enables the flexible arranging of workstations.

Light management systems allow the control of light according to needs and depending on levels of daylight and occupancy, achieving especially economic and individual lighting design.

General lighting with direct and indirect components, light ceilings and wallwashers, glare-reduced direct luminaires, floorstanding luminaires for situations with low ceilings – possible solutions are as diverse and individual as the various tasks in open offices. Efficient and durable lighting technology that simultaneously cuts energy and maintenance costs is always of importance though when specifying productive lighting.

**Product recommendation**

**Lighting requirement**

- Task Area: $E_m \geq 500 \text{ lx}$  
  (uniformity $U_0: 0.6$)
- Immediate Surrounding: $E_m \geq 300 \text{ lx}$  
  (uniformity $U_0: 0.4$)
- Background: $E_m \geq 100 \text{ lx}$  
  (uniformity $U_0: 0.1$)
- Cylindrical illuminance $E_C$: $\geq 150 \text{ lx}$, for easy recognition of faces, (uniformity $U_0: 0.1$)
- UGR $\leq 19$
- Luminance: $\leq 1500/3000 \text{ cd/m}^2$ (CAT 2)$^2$
- Colour rendering: $\text{CRI} \geq 80$

---

$^1$If not otherwise specified, all lighting requirements on this and the following pages relate to the European lighting standard DIN EN 12464, Light and Lighting, Part 1: Lighting of Indoor Workplaces (abbreviated to: EN 12464-1).

$^2$depending on screen quality and application
Communication zones must be just as suitable for concentrated work as for relaxation and creative entertainment, and pleasant and attractive light is needed that also has to be functional. Easy recognition of faces and good glare control are especially important, and lighting levels should not differ too strongly from surrounding areas to avoid the taxing and constant adaptation of eyes to bright or dark conditions.

A blend of zonal and local solutions is needed for discussion areas and workstations, and controllable systems enable optimal modification to needs and visual tasks. Microprismatic luminaire covers are ideal for glare reduction and indirect light components create friendly light atmospheres. Cove lighting, diffuse illuminated surfaces and spots can also be used for accenting purposes and light highlights.

Open for new solutions

When it comes to exchanging thoughts, transferring knowledge and working in teams, communication is an essential factor for productivity and success. This is why companies are increasingly setting up discussion zones for short breaks and meetings.
No direct specifications with the EN 12464-1 standard exist for communication zones. Lighting levels can be implemented individually, but the ideal level should comply with the visual tasks at hand and should not exceed 100 lux. Glare-free lighting, the harmonious distribution of light and good recognition of faces must be ensured here as well.

**Product recommendation**

**Suitable conditions for illuminance levels and glare control**

- Discussion $E_m \geq 500$ lx, Canteens and kitchenettes $E_m \geq 200$ lx, Break rooms $\geq 100$ lx
- Cylindrical illuminance $E_C$: min. 50 lx
- UGR $\leq 19$–22
- Colour rendering: CRI $\geq 80$

- LEDVANCE® AREA Lay-in mounting/suspended mounting luminaire, direct wide distribution
- Lunis 2® micro recessed downlight diverse beam characteristics
- Lunis R® LED surface-mounted luminaire, direct wide distribution
Getting everything said and done

Conference rooms and meeting rooms are spaces with changing functions and flexible use, designed for communication and interaction and usually equipped with state-of-the-art media technology. Efficient light control achieves flexible lighting according to specific functions.

Diverse light colours and luminaire types, and direct and indirect, or horizontal and vertical light in various combinations enables wide use for highly different situations and activities, for example light for presentations or for concentrated work or more stimulating light for discussions and brainstorming. Whether the control of daylight or occupancy is needed, simple dimming or complex lighting design, conference and meeting rooms are a classic application for LMS:

Pre-specified light scenes and lighting effects according to specific room uses can be simply and conveniently called and modified with corresponding light management systems. Of general importance is homogeneous and glare-free general lighting as well as the combination of workstation-related and zonal lighting. Downlights and spots are particularly recommended for presentation surfaces, and representative or decorative luminaires are ideal as eye-catching elements.
Lighting requirements

- Task Area: \( E_m \geq 500 \text{ lx} \)  
  (uniformity \( U_0 \): 0.6)
- Immediate Surrounding:  
  \( E_m \geq 300 \text{ lx} \)  
  (uniformity \( U_0 \): 0.4)  
  Background: \( E_m \geq 100 \text{ lx} \)  
  (uniformity \( U_0 \): 0.1)
- Cylindrical illuminance \( E_C \):  
  \( \geq 150 \text{ lx} \), for easy recognition of faces, (uniformity \( U_0 \): 0.1)
- UGR \( \leq 19 \)
- Luminance:  
  \( \leq 1500/3000 \text{ cd/m}^2 \) (CAT2)
- Colour rendering: \( \text{CRI} \geq 80 \)

Product recommendation

- Lunis 2° mini LED recessed downlight diverse beam characteristics
- Lunis R° LED recessed downlight direct wide distribution
- Mira° LED surface-mounted luminaire direct wide distribution
- Quadrature° 2 LED surface-mounted luminaire direct wide distribution

Aero Pump GmbH, Hochheim am Main/Germany
Relaxing breaks for tanking new energy

Break rooms, canteens, kitchenettes and similar areas are for regeneration and relaxation. Lighting should be suitable for such purposes, but without promoting fatigue.

Appealingly designed social and relaxation rooms have positive effects on the moods of employees, contributing to relaxation in breaks and communicating a pleasant atmosphere and a personal sense of well-being. Light that is not too bright and good glare reduction are important factors, but insufficient illuminance levels should be avoided as these negatively affect the biological rhythm and make people more tired instead of actively contributing to regeneration. One possible solution is general lighting with downlights, or suspended luminaires that can also serve as decorative elements. Good colour rendering should be ensured for catering areas.
Indoor Applications  |  Social and Relaxation Rooms

**Lighting requirements**

- Illuminance break rooms: $E_m \geq 100$ lx
- Illuminance for kitchenettes, canteens and other catering areas: $E_m \geq 200$ lx

**Product recommendation**

- LEDVANCE® DOWNLIGHT XL
  - recessed downlight
  - direct wide distribution

- LEDVANCE® AREA
  - Lay-in mounting/
  - suspended mounting
  - luminaire, direct
  - wide distribution

- Lunis R® LED
  - surface-mounted downlight
  - direct wide distribution

- Siluette® LED
  - surface-mounted
  - luminaire
  - direct wide
  - distribution
The best impressions

After seeing the facade outside, visitors entering foyers and reception areas gain a second highly important impression. The right light has a welcoming function, creates atmosphere, makes sure of good orientation and also communicates corporate identity.

In the transition zone from outside into the interior and from daylight into artificial light, suitable lighting creates a gradation between bright and dark that is not a strain on the eyes, and sufficient brightness and good colour rendering contribute to greater visual comfort, orientation and safety. Lighting should however never have a monotonous impression but should always appear balanced and dynamically accentuating.

Warm white light is ideally used to create a pleasant ambience, and a combination of direct and indirect light can achieve an especially sophisticated and effective appearance. Modern Lighting Tools ensure direct light accents, professionally emphasising architectural lines and creating exciting visual contrasts. LMS solutions ensure modern and efficient lighting applications.
Lighting requirements

- Sufficient brightness for orientation and reading:
  - reception counter: $E_m \geq 300 \text{ lx}$, $UGR \leq 22$, $CRI \geq 80$
  - waiting areas: $E_m \geq 200 \text{ lx}$, $UGR \leq 22$, $CRI \geq 80$
  - reception hall: $E_m \geq 100 \text{ lx}$, $UGR \leq 22$, $CRI \geq 80$

- Cylindrical illuminance $E_c: \geq 50 \text{ lx}$ for easy recognition of faces (uniformity $U_0: 0.1$)

Product recommendation

- Siteco Louvre Luminaire M LED surface-mounted wallwasher direct asymmetric distribution
- Lunis 2° LED Surface surface-mounted downlight, diverse beam characteristics
- Novaluna® S/P LED suspended luminaire indirect/direct wide distribution
- Traxon Cove Light AC Linear LED luminaire for cove lighting or backlighting with high lumen output and various colour temperatures
Having a good run up

Corridors and stairs are part of the essential infrastructure of a building and are an important part of the interior design. They serve mainly for the rapid and safe connection and supply of various areas of the building. Corridors should be representatively designed if used for exchange and meeting purposes, with customer communication for example.

Lighting design that is diverse and rich in contrast communicates a sense of safety and a positive spatial feeling. With stairways, easy identification of the steps is important, achieved best with light from above and with short, diffuse shadowing. Long corridors have a more interesting appearance and are less monotonous with coloured light or the highlighting of pictures.

Luminaires recessed into walls or floors are ideal for route orientation and marking, for example as orientation luminaires in stairs. Lighting with emergency light functionality is mandatory for escape routes, and corridors and stairs are predestined for energy-saving light achieved with LMS, for example controlling lighting according to motion and occupancy.
Indoor Applications  |  Corridors and Stairways

**Product recommendation**

**Lighting requirements**

- Sufficient basic brightness for orientation and safety
- Clear recognition of steps due to increased contrasts
- Stairways, escalators: $E_n \geq 100 \text{ lx}$, $UGR \leq 25$, $CRI \geq 40$
- $UGR$ and $CRI$ should be similar to adjacent areas

<table>
<thead>
<tr>
<th>Product</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEDVANCE® DOWNLIGHT XL</td>
<td>recessed downlight, direct wide distribution</td>
</tr>
<tr>
<td>LEDVANCE® AREA</td>
<td>Lay-in mounting/ suspended mounting luminaire, direct wide distribution</td>
</tr>
<tr>
<td>LUMILUX® COMBI LED</td>
<td>surface-mounted luminaire, direct wide distribution</td>
</tr>
<tr>
<td>POSIVO® LED</td>
<td>surface-mounted luminaire, direct wide distribution</td>
</tr>
</tbody>
</table>

FH Regensburg, Regensburg/Germany
hier müssen eventuell Produkte von uns hinein retuschiert werden.
Looking great on the outside as well

The external appearance of a company determines first impressions with access ways, parking areas, paths and of course the exterior facade itself, and modern lighting is used as a communicator and tool for presenting architecture and brands. Light must comply with other requirements however for parking lots and access routes. The safety of employees and visitors as well as the avoidance of accidents is of primary importance, and ideal for such needs is functional lighting with LED – featuring high reliability and low maintenance.
Outdoor areas and access routes often become very busy, and functional outdoor lighting makes sure of orientation and safety as people, obstacles and signage have to be recognised clearly and quickly. When selecting lighting systems, a focus should be placed on economic operation because the areas to be illuminated are usually large and power-on durations are long. Additional energy savings can be achieved using light management systems with motion and daylight sensors, and tough materials and suitable protection ratings mean that outdoor luminaires are able to withstand adverse weather conditions and temperatures.

Modern exterior lighting can also be used specifically as a marketing tool and an instrument for design. The right facade lighting together with company logos and other image carriers is able to effectively communicate the essence or corporate identity of a company and emphasise its positive image. Decorative outdoor solutions must also have suitable protection ratings, and certification as outdoor luminaires as well according to their installation location. Damp-proof luminaires with IP64 for example can be installed in canopied areas but not in purely outdoor areas where luminaires with protection of at least IP65 are needed.

Making sure of attention

Modern exterior lighting ensures orientation and safety, and also emphasises the positive appearance of a company.
**Protection against foreign bodies and humidity**

The protection rating for a luminaire is designated using the IP code. The first character (1 to 6) specifies the level of protection against the ingress of foreign bodies and the second character (1 to 8) specifies the level of protection from humidity.

<table>
<thead>
<tr>
<th>1st character</th>
<th>Protection against foreign bodies and humidity</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP 0 X</td>
<td>unprotected</td>
</tr>
<tr>
<td>IP 1 X</td>
<td>protection against solid foreign bodies &gt; 50 mm</td>
</tr>
<tr>
<td>IP 2 X</td>
<td>protection against solid foreign bodies &gt; 12 mm</td>
</tr>
<tr>
<td>IP 3 X</td>
<td>protection against foreign bodies &gt; 2.5 mm</td>
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<tr>
<td>IP 4 X</td>
<td>protection against foreign bodies &gt; 1 mm</td>
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<tr>
<td>IP 5 X</td>
<td>dust protection</td>
</tr>
<tr>
<td>IP 6 X</td>
<td>sealed against dust</td>
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</table>

Source: DIN EN 60529 | IP code (Ingress Protection)

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</tr>
<tr>
<td>IP X 5</td>
<td>jet water protected</td>
</tr>
<tr>
<td>IP X 6</td>
<td>protection against heavy seas</td>
</tr>
<tr>
<td>IP X 7</td>
<td>protection against temporary immersion</td>
</tr>
<tr>
<td>IP X 8</td>
<td>protection against continuous immersion</td>
</tr>
</tbody>
</table>

Source: DIN EN 60529 | IP code (Ingress Protection)

**Product recommendation**

- Illumination or accenting of facades or architectural details with floodlights or wall luminaires
- Low maintenance lighting system with high system service life
- Higher illuminance at entrance areas for improved orientation and guidance

**Beleuchtungsanforderung**

- CL LED Linear surface-mounted luminaire
- CL LED Wall surface-mounted luminaire
- PURSOS® floodlight
- Traxon Nano Liner Allegro Extremely narrow linear light system
Safely getting to the destination

Well-illuminated parking spaces and garages reduce the risk of accidents and give a feeling of personal safety. They also make sure of a stress-free start to the working day and a relaxing beginning to the evening.

Uniform lighting levels without large shadow zones help with orientation and contribute to greater safety, signage, vehicles and persons are recognised more efficiently, the risk of accidents is lessened and people simply feel safer. Light management systems with sensors and controllable luminaires (e.g. with flexible configuration of luminous flux and time-dependent/constant luminous flux control) make sure of just enough light as required for standard-compliant lighting and the course of the day or weather conditions.

Supplementary, zonal LMS regulation is often advantageous according to the size of the parking areas, and ensures even lower operating overheads via presence and motion control. As with all luminaires with high visibility levels, the right look and design is important during selection.

**Lighting requirements Parking garage**

- Safety and orientation for pedestrians and drivers
- Illuminance: to 300 lux in entry and transit areas
- Entrance and exit routes (day): $E_m \leq 300 \text{ lx}$, $\text{GRL} \leq 25$, $U_r \geq 0.4$, $\text{CRI} \geq 40$
- Entrance and exit routes (night): $E_m \leq 75 \text{ lx}$, $\text{GRL} \leq 25$, $U_r \geq 0.4$, $\text{CRI} \geq 40$
- Traffic routes: $E_m \leq 75 \text{ lx}$, $\text{GRL} \leq 25$, $U_r \geq 0.4$, $\text{CRI} \geq 40$

**Product recommendation**

- Modario® IP64 trunking system
- Monsun® 2 LED damp-proof luminaire

*Excerpts from DIN EN 12464-1 and DIN EN 12464-2; During planning, the DIN or corresponding recommendations for traffic route road lighting should be observed for more precise determination of lighting requirements in relation to the application.
Goodbye to relamping: the long system lifespan of the Streetlight 10 LED of up to 50,000 operating hours cuts costs for maintenance.

**Lighting requirements**

**Parking areas**

- Entrance and exit routes (day): $E_m$ 300 lx, GRL ≤ 25, $U_e$ ≥ 0.4, CRI ≥ 40
- Entrance and exit routes (night): $E_m$ 75 lx, GRL ≤ 25, $U_e$ ≥ 0.4, CRI ≥ 40
- Traffic routes: $E_m$ 75 lx, GRL ≤ 25, $U_e$ ≥ 0.4, CRI ≥ 40
- Parking lot: $E_m$ 10–50 lx, GRL ≤ 50, $U_e$ ≥ 0.25, CRI ≥ 20
- Traffic routes/traffic surfaces/passages: $E_m$ 5–50 lx, GRL ≤ 45–50, $U_e$ ≥ 0.0, CRI ≥ 20

**Product recommendation**

- Monsun® 2 LED damp-proof luminaire
- SiCOMPACT® A2 MIDI LED floodlight 2200–6600 lm
- Streetlight 10 mini LED outdoor luminaire 2300–6100 lm
Starting a project together and achieving the common goal

Service and consultation from the beginning

Thoughts come about in heads, are formulated into ideas and grow to become solutions. The more heads used and the more knowledge, experience, creativity and passion brought into the processes, the better is the result. Our customers are experts for their specific requirements, and we have the requisite knowledge for lighting in specific applications as well as the necessary Lighting Tools. The very best solutions are created when this know-how flows together as part of a continuous dialogue between experts.

In practice this means that you can rely on us, from the initial planning phase until implementation. As part of the process a contact person is at your side for all requirements during the course of the project. Whether this concerns luminaires, lamps, control units or sophisticated light management systems, our experts are on-site and will make sure that good light helps you to achieve your aims.

Your on-site partner

You can reach us via our comprehensive network of sales subsidiaries, with almost certainly one in your area. This is the direct contact to our lighting professionals. All addresses can be found on the rear of this brochure.
For optimal specifications

Floorstanding and linear luminaires

<table>
<thead>
<tr>
<th>Mounting method</th>
<th>Future® LED</th>
<th>Quadrature® 2 LED</th>
<th>Novaluna® S/P LED</th>
<th>Mira® LED</th>
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<tr>
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<td>recessed</td>
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</table>

| Workstations             | 20          |                   |                   |           |

| Communications zones     | 22          |                   |                   |           |

| Conference rooms and meeting rooms | 24        |                   |                   |           |

| Social and meeting rooms  | 26          |                   |                   |           |

| Foyers and reception areas | 28         |                   |                   |           |

<p>| Corridors and stairways   | 30          |                   |                   |           |</p>
<table>
<thead>
<tr>
<th>Service</th>
<th>Indoor Applications: Product Application Matrix</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silhouette® LED</td>
<td>ARKTIKA-P LED</td>
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<tr>
<td><img src="image1" alt="Silhouette® LED" /></td>
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<td><img src="image1" alt="Silhouette® LED" /></td>
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</tbody>
</table>
For optimal specifications

Point light sources and compact luminaires

<table>
<thead>
<tr>
<th>Mounting method</th>
<th>Lunis 2° micro</th>
<th>Lunis 2° mini</th>
<th>Lunis 2° Surface</th>
<th>LEDVANCE® DOWNLIGHT L/XL</th>
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</thead>
<tbody>
<tr>
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<td>ceiling/wall surface-mounted</td>
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| Workstations                                         | 20             |                |                  |                         |
|                                                     | ![Image]       | ![Image]       |                  |                         |

| Communications zones                                 | 22             |                |                  |                         |
|                                                     | ![Image]       | ![Image]       |                  |                         |

| Conference rooms and meeting rooms                   | 24             |                |                  |                         |
|                                                     | ![Image]       | ![Image]       |                  |                         |

| Social and meeting rooms                             | 26             |                |                  |                         |
|                                                     | ![Image]       | ![Image]       |                  |                         |

| Foyers and reception areas                            | 28             |                |                  |                         |
|                                                     | ![Image]       | ![Image]       |                  |                         |

<p>| Corridors and stairways                               | 30             |                |                  |                         |
|                                                     | ![Image]       | ![Image]       |                  |                         |</p>
<table>
<thead>
<tr>
<th>Compact luminaires</th>
<th>Lunis R® LED</th>
<th>POSIVO® LED</th>
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</table>
For optimal specifications

Outdoor and damp-proof luminaires

<table>
<thead>
<tr>
<th>Mounting location</th>
<th>Ceiling</th>
<th>Wall</th>
<th>Floor</th>
<th>Mast</th>
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</thead>
<tbody>
<tr>
<td>Facades and paths</td>
<td>32</td>
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<td></td>
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<tr>
<td>Parking lots</td>
<td>36</td>
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<td></td>
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<tr>
<td>Parking garages</td>
<td>36</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Mounting location</th>
<th>CL LED Wand</th>
<th>CL LED Linear</th>
<th>Traxon Nano Liner Allegro</th>
<th>PURSOS*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ceiling</td>
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<tr>
<td>Wall</td>
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<tr>
<td>Service</td>
<td>Outdoor Applications: Product Application Matrix</td>
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<tr>
<td>SiCOMPACT® A2 MIDI LED</td>
<td>Streetlight 10 mini LED</td>
<td>Modario® IP64</td>
<td>Monsun® 2 LED</td>
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<td><img src="image" alt="SiCOMPACT® A2 MIDI LED" /></td>
<td><img src="image" alt="Streetlight 10 mini LED" /></td>
<td><img src="image" alt="Modario® IP64" /></td>
<td><img src="image" alt="Monsun® 2 LED" /></td>
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</tr>
</tbody>
</table>

The table above shows the product application matrix for outdoor applications. The columns represent different products, and the rows indicate the applications. Each cell contains an icon representing the application.
Good light is created with precise tools

Smart tools for planning lighting installations

Precise information about technical characteristics and exact luminaire specifications are the preconditions for planning lighting, creating not just good light but also components for your success. Professional lighting is a highly complex interaction of various factors, concerning not just a cure-all but always the best solution for individual needs.

To help you to simply and reliably plan your individual lighting, we’ve developed a series of tools for your daily work when planning indoor and outdoor lighting installations. These tools are available for free on our websites.

Siteco® Lighting Tool

The software program developed specifically for Siteco helps to locate all luminaires via the familiar catalogue structure as well as using individual characteristics. A special feature is the simple and convenient transfer of relevant data via drag and drop to RELUX and DIALUX.

www.siteco.com/eco-calculator-indoor

Indoor cost efficiency calculator

Which operating costs can be saved with new light? How is the emission of CO₂ reduced with LED technology? And how quickly is your investment amortised? The cost-efficiency calculator supplies all the answers – with comparisons of obsolete and new systems as well as the download of PDF documentation.

www.siteco.com/sample-projects

Modario® Trunking configurator

Plan comfortably, work successfully. With the Modario® trunking configurator, planning complex trunking systems becomes a simple exercise, and the program supplies information concerning availability, configurations and installation – simply, reliably and quickly. The Modario® trunking configurator is connected directly to the electronic catalogue.

www.siteco.com/lighting-calculation
Sample systems

Are there similar ranges of tasks to my specific requirements? How was the solution created. Our online sample installations have been calculated by our lighting experts so that the specific solution is always optimal in terms of compliance with standards, quality of light and system efficiency. To be used as sources of inspiration or as specific solutions.

www.siteco.com/trunking-system-configurator

Electronic catalogue

The up-to-date reference work with all Siteco and OSRAM indoor and outdoor luminaires, including all relevant data, ranging from product images and installation instructions to tender texts and photometric data, as well as plug-ins for light calculation programmes. Comprehensive, clear and user-friendly. A smart add-on is the Siteco rapid calculation tool as a random calculator for initial quantity estimations.

www.siteco.com/indoor-lighting
www.siteco.com/outdoor-lighting
www.osram.com/indoor-lighting
www.osram.com/outdoor-lighting
Planning security and transparency thanks to new ZVEI designations for LED luminaires

The market for LED applications is rapidly expanding, and a large number of new and external market players are bringing products onto the market that do not fulfil their technical claims. This causes insecurity, misunderstandings and false impressions about product performances. To achieve safety and reliability when planning lighting installations it is however vital to use uniform and standardised (and thus comparable) quality criteria when evaluating technical statements.

The German Electrical and Electronic Manufacturers’ Association (ZVEI), of which OSRAM and Siteco are members, has now drawn up a system of nomenclature that forms an obligatory basis for the evaluation of the technical performances of LED luminaires, and thus also enables uniform evaluations. The ZVEI work group recommends manufacturers to assume the following parameters and data for their technical information in the future.

**ZVEI designations**

**Rated luminaire input power** $P$ (in W) (replaces power consumption) Effective power of the luminaire measured in watts (W) with nominal voltage.

**Rated luminaire luminous flux** $\Phi_v$ (in lm) Total lumen output of a luminaire emitted in the visible spectrum in all directions; new value of luminous flux emitted according to predefined operating conditions, measured in lumens (lm).

**LED luminaire efficacy** $\eta_v$ (in lm/W) (replaces luminaire efficiency) The quotient of the emitted rated luminous flux and consumed electrical rated power, measured in lumens/watt.

**Luminous intensity distribution of luminaires** Spatial distribution of light output from a light source; Luminous intensity distribution curves (LDC’s) in C levels (0–180/90–270°).

**Colour quality**
The colour quality of white light is specified according to the following characteristics:

**Correlated colour temperature** $T_{cp}$ (in K)
The light colour of white light is specified by the closest colour temperature; measured in Kelvin (K). The designations warm white to 3300 K, neutral white between 3300K and 5300 K and daylight white (>5300K) are used. Specification of the closest colour temperature is in 100K steps.

**Color Rendering Index** (CRI) Colour rendition is specified using the colour rendering index CRI. This measures the degree of similarity of a perceived object colour with its appearance using a specific reference illuminant.

**Colour tolerance**
A classification of colour differentiation with identical colour temperature in 3/5/7 level MacAdam ellipses. These steps represent the measurement for colour difference. Light sources with a 3-step MacAdam ellipse colour difference differentiate less than two light sources with a colour difference corresponding approximately to a 5-step MacAdam ellipse.
Rated ambient temperature (t_a)
The operating behaviour of a luminaire is influenced by the ambient temperature. A value of 25° C requires no specification on the luminaire/ data sheet, but fluctuating values must be designated.

LED luminaire longevity criteria
The service life of LEDs is not only measured at the time of total failure but also with degradation, meaning that luminous output continuously reduces over time.

Rated life (L_x)
The rated or useful service life L_x, whereby luminous flux decreases to the component x of the original luminous flux, is used with regard to the luminous flux degradation of LED luminaires. Typical x values are for example 70 % (L70) or 80 % (L80) with a specific rated service life: e.g. 50,000 hours with an ambient temperature of 25° C.

Taking account of lumen loss (B_y)
The ratio of LED luminaires falling below a targeted luminous flux of x per cent (see x of L_x) at the specified end of lifespan (e.g. 50,000 h) is specified with the term luminous flux reduction (B_y). The value of B50 for example means that 50 % of a quantity of identical LED luminaires can fall below the declared x luminous flux level at the end of the rated service life L. The B50 specification (the nominal value) is used to specify the mean luminous flux of functioning LED luminaires at the defined end of their useful service life.

Taking account of abrupt failure (C_z)
The ratio of LED luminaires that have completely failed to the end of the rated service life L_x is specified with C_z. LED luminaires with LEDs that only fail singly or LED luminaires where only single LED modules from several fail are not deemed total failures. For example the value C3 means that 3 % of a quantity of identical LED luminaires have completely failed within their lifespan and thus no longer emit light.

Source/text: ZVEI guideline: Planning Safety with LED Lighting (11/2013)
OSRAM energy efficiency solutions

The OSRAM team of experts is also available for consultation and implementation with the modernising of inefficient lighting systems.

Trust our expertise

We develop lighting solutions together with you that are characterised by maximum technical and design quality, and at the same time we integrate the complete spectrum of relevant economic and ecological aspects. You are able to benefit from our many years of diverse lighting expertise in all applications (industry, office, retail, road lighting, sports, hospitality, healthcare and many others), and of course our pioneering role with technology.

Energy-efficient lighting optimisation

As an energy audit partner, OSRAM provides energy-efficient lighting optimisation processes. The analysis and optimisation of existing lighting installations is focused upon. This comprehensive service, consisting of the evaluation, planning and implementation of the broad OSRAM product and service spectrum, has already been used by many partners to achieve significant energy and cost savings.
Steps for energy-efficient lighting optimisation

1. Preparation:
You fill out a questionnaire that describes your project in more detail. OSRAM then analyses your data.

2. Location analysis:
OSRAM inspects your site, analyses the existing lighting installation and draws up new and energy-efficient lighting concepts. Together with you we then decide on the optimal solution.

3. Final report:
You see all investments, amortisation periods and possibilities for saving at a glance in a detailed final report.

4. Implementation:
OSRAM accompanies you over the complete project implementation phase.

If you require more detailed information about energy efficiency solutions, then simply send an e-mail to the OSRAM team of experts: EES@osram.de
Our light is a global player

References from the office sector

As knowledge holders, idea creators and driving forces, modern office employees integrate themselves and their ideas for the success of the company, which in turn directly benefits from the diversity of its employees. The right working surroundings though are needed so that individuality and ideas come together to form creativity and a team spirit.

Light is a decisive factor in this respect, its effects, how it motivates, how it promotes creativity, and how it achieves atmosphere in which people can work creatively and productively. Our lighting experts in the highly diverse OSRAM network know how optimal customer-specific solutions look like, which lighting concept is best suited for which requirement and can recommend the very best solutions.

A wide range of successful global projects documents this expertise and the inherent diversity of our customer-specific solutions.
Office references

- AeroPump, Hochheim/Germany
- Areva, Erlangen/Germany
- Bavarian Parliament, Munich/Germany
- BASF, Frankfurt/Germany
- BMW headquarters, Munich/Germany
- British Airways Lounge, Munich/Germany
- Burda Media Park, Offenburg/Germany
- Campus Kronberg, Kronberg im Taunus/Germany
- Capricorn-Haus, Dusseldorf/Germany
- Deutsche Bank, Milan/Italy
- DKV, Cologne/Germany
- EnBW City, Stuttgart/Germany
- Ernst&Young, Munich/Germany
- EUMETSAT, Darmstadt/Germany
- Fossil, Grabenstätt/Germany
- German Research Centre for Artificial Intelligence, Kaiserslautern/Germany
- Hackerbrücke office complex, Germany
- Haus der Ärzteschaft, Dusseldorf/Germany
- Humboldt Box, Berlin/Germany
- Infineon Campeon, Neubiberg/Munich
- Kühne + Nagel, HafenCity Hamburg/Germany

- Liebherr, Ochsenhausen/Germany
- Lufthansa Aviation Center, Frankfurt/Germany
- Militärakademie Kadettinica, Maribor/Slovenia
- Mozarteum, Salzburg/Austria
- Munich Business Towers, Munich/Germany
- Novartis Campus/Maki building, Basel/Switzerland
- Power Tower, Energie AG Oö, Linz/Austria
- Siemens Tres Cantos, Madrid/Spain
- Siemens VAI, Linz/Austria
- Süddeutscher Verlag Munich
- TaunusTower, Frankfurt/Germany
- TDR Headquarters, Rijeka/Croatia
- Telenor, Oslo/Norway
- The Crystal, London/Great Britain
- The Salvation Army Headquarters, London/Great Britain
- Upper Austria Federal Service Centre, Linz/Austria
- Upper East Side, Berlin/Germany
- Vaduz Parliament, Liechtenstein
- Voest, Linz/Austria
- Yamaha Music Central Europe, Rellingen/Germany
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