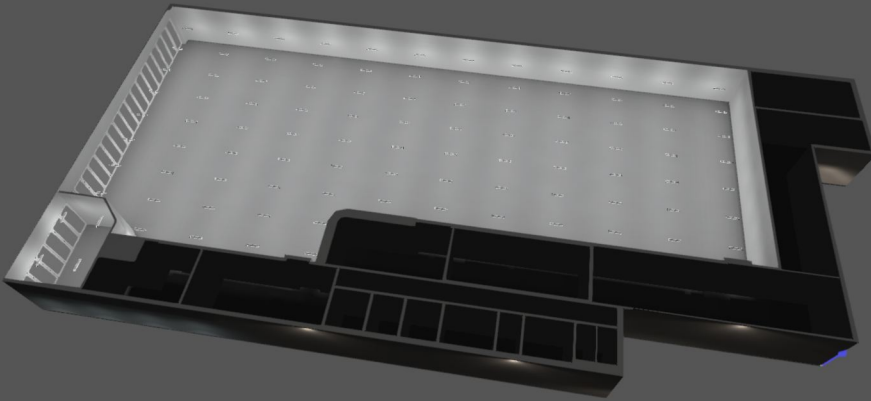




08998L LIDL Brecon

Calculation Summary for the Lighting Impact Assessment at LIDL Brecon.
P01 - Preliminary Issue - 14.08.2026

Object

Land off A470,
Brecon, Powys,
LD3 8LA

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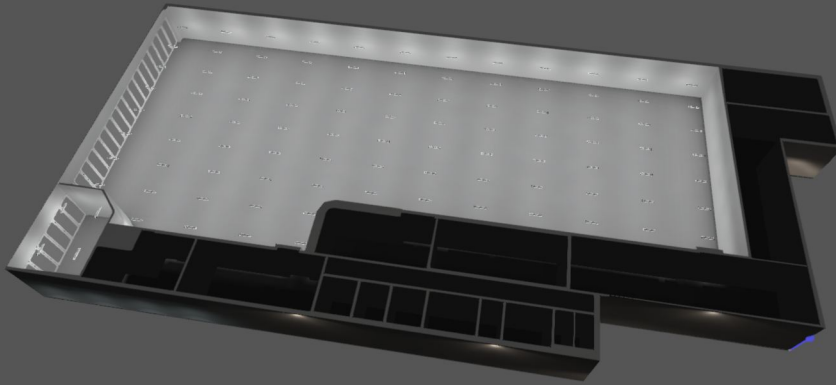
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Description

Calculation Summary for the Lighting Impact Assessment at LIDL Brecon.

This Lighting Impact Assessment has been undertaken in accordance with ILP Guidance Note 01/26 The Avoidance of Obtrusive Light and ILP Guidance Note 08/23 Bats and Artificial Lighting at Night (ALAN).

Internal lighting has been designed in line with BS EN 12464-1:2021.

External lighting has been designed in line with BS EN 12464-2:2024.

Vertical calculation planes have been set up to represent sensitive site boundaries as indicated by the project ecologist at Powys County Council.

The findings from this calculation indicate that the anticipated light spill onto the sensitive boundaries of the site are predicted to be below the 0.5 lux required to preserve the dark corridor/zones.

The value of 0.5 lux is given as a moonlit night where bats have adapted to this low level of illuminance. This is why the lighting impact assessment ensures that the values do not exceed 0.5 lux

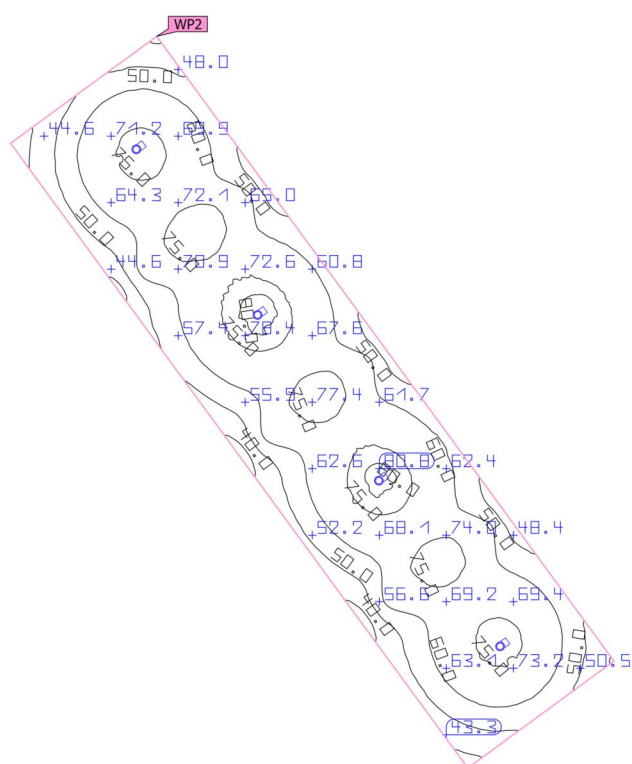
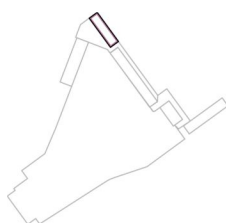
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on the vertical calculation planes. This is covered across multiple guidance documents.

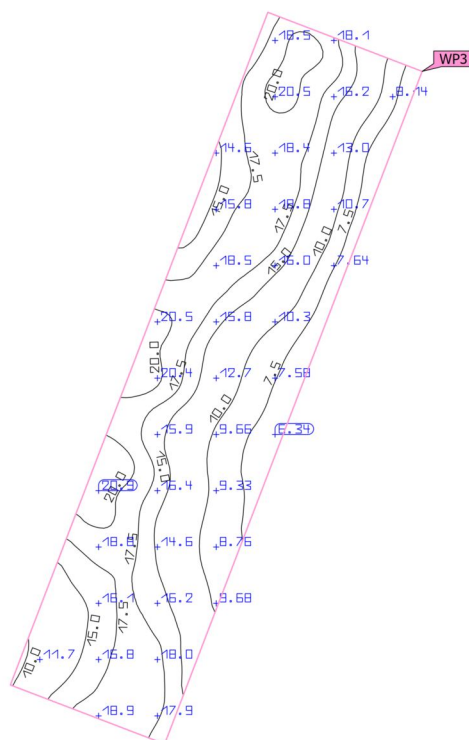
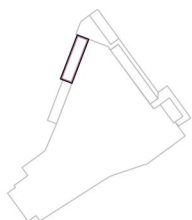
Canopy Entrance (Light scene 1)

Working plane (Canopy Entrance)

Properties	$\bar{E}$ (Target)	E_{min}	E_{max}	$U_o (g_1)$ (Target)	g_2	Index
Working plane (Canopy Entrance)	63.1 lx	32.4 lx	83.0 lx	0.51	0.39	WP2
Perpendicular illuminance (adaptive)	(≥ 50.0 lx)			(≥ 0.40)		
Height: 0.000 m, Wall zone: 0.500 m	✓			✓		

Utilisation profile: DIALux presetting (5.1.4 Standard (outdoor transportation area))

Car Parking (Light scene 1)

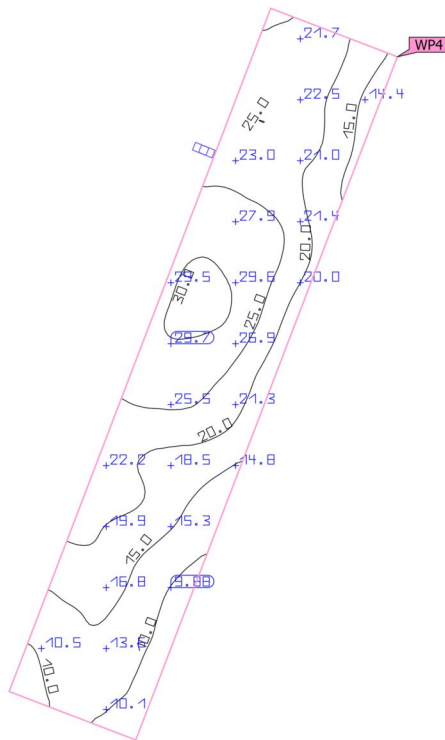
Working plane (Car Parking)

Properties	$\bar{E}$ (Target)	E_{min}	E_{max}	$U_o (g_1)$ (Target)	g_2	Index
Working plane (Car Parking)	14.6 lx	5.63 lx	22.0 lx	0.39	0.26	WP3
Perpendicular illuminance (adaptive)	≥ 5.00 lx			≥ 0.25		
Height: 0.000 m, Wall zone: 0.500 m	✓			✓		

Utilisation profile: Parking areas (5.9.1 Light traffic, e.g. parking areas of shops, terraced and apartment houses, cycle parks)

Car Parking (Light scene 1)

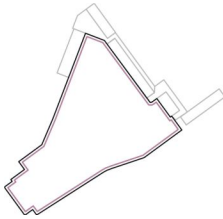
Working plane (Car Parking)



Properties	E (Target)	E _{min}	E _{max}	U _o (g ₁) (Target)	g ₂	Index
Working plane (Car Parking) Perpendicular illuminance (adaptive) Height: 0.000 m, Wall zone: 0.500 m	19.9 lx (≥ 5.00 lx) ✓	6.47 lx	31.0 lx	0.33 (≥ 0.25) ✓	0.21	WP4

Utilisation profile: Parking areas (5.9.1 Light traffic, e.g. parking areas of shops, terraced and apartment houses, cycle parks)

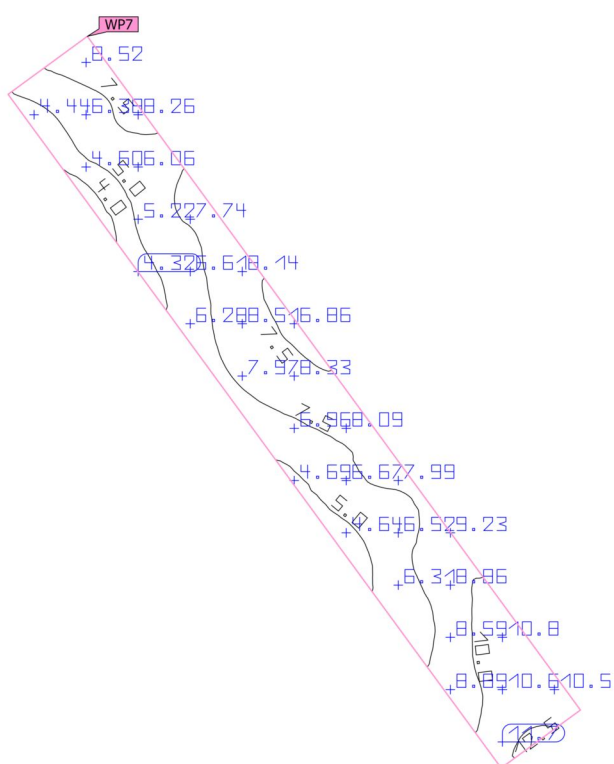
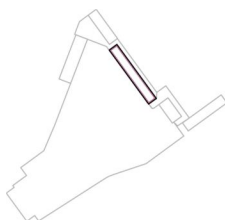
Car Parking (Light scene 1)

Working plane (Car Parking)

Properties	$\bar{E}$ (Target)	E_{min}	E_{max}	$U_o (g_1)$ (Target)	g_2	Index
Working plane (Car Parking)	5.22 lx	1.31 lx	21.9 lx	0.25	0.060	WP6
Perpendicular illuminance (adaptive)	(≥ 5.00 lx)			(≥ 0.25)		
Height: 0.000 m, Wall zone: 1.250 m	✓			✓		

Utilisation profile: Parking areas (5.9.1 Light traffic, e.g. parking areas of shops, terraced and apartment houses, cycle parks)

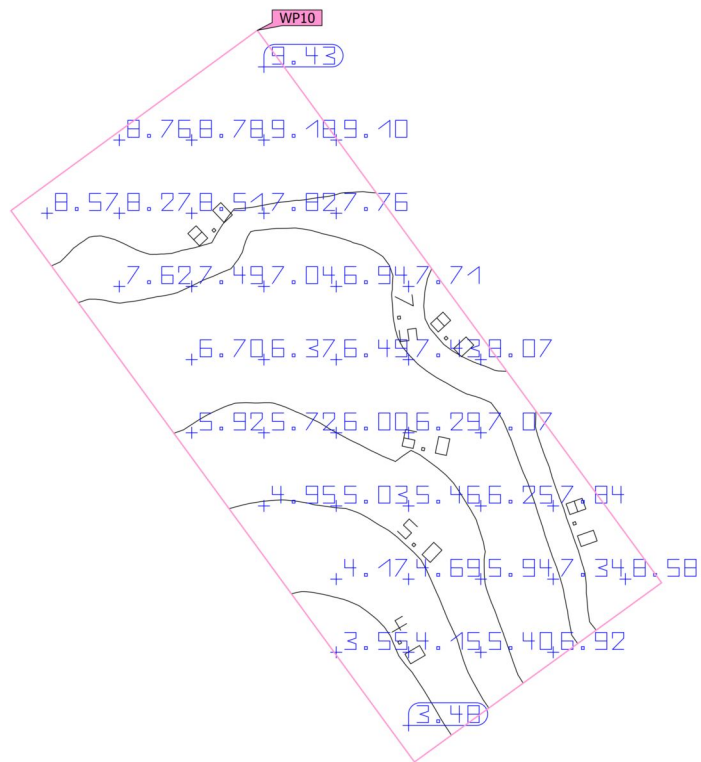
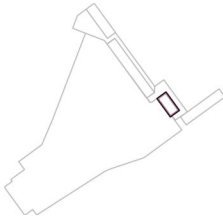
Car Parking (Light scene 1)

Working plane (Car Parking)

Properties	$\bar{E}$ (Target)	E_{min}	E_{max}	$U_o (g_1)$ (Target)	g_2	Index
Working plane (Car Parking)	7.51 lx	3.68 lx	13.0 lx	0.49	0.28	WP7
Perpendicular illuminance (adaptive)	(≥ 5.00 lx)			(≥ 0.25)		
Height: 0.000 m, Wall zone: 0.500 m	✓			✓		

Utilisation profile: Parking areas (5.9.1 Light traffic, e.g. parking areas of shops, terraced and apartment houses, cycle parks)

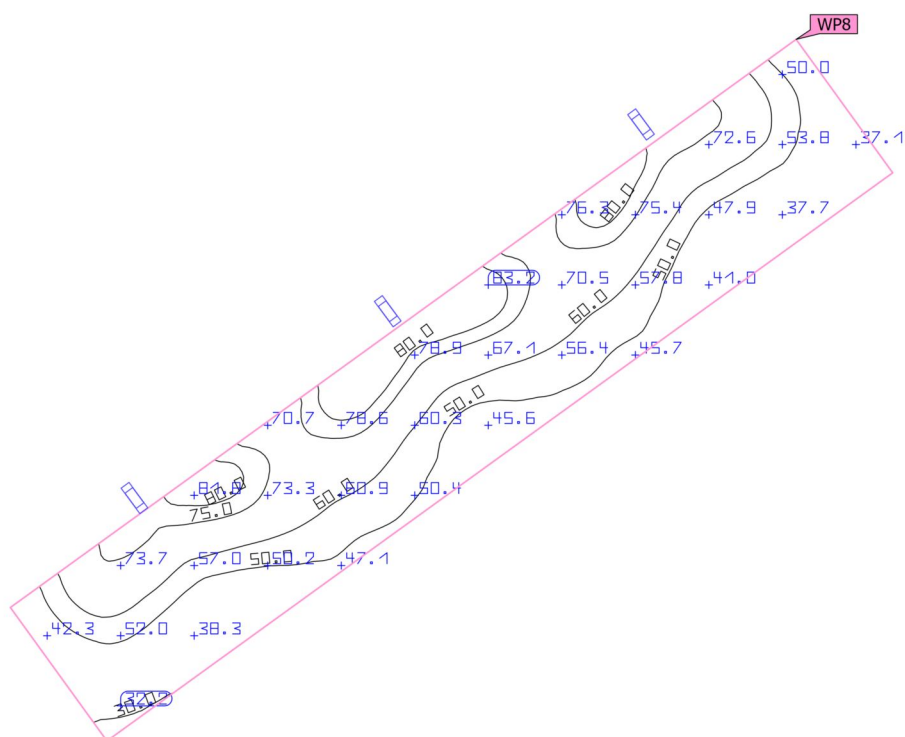
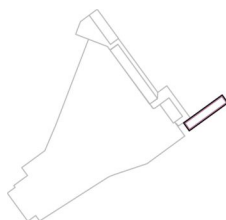
Car Parking (Light scene 1)

Working plane (Car Parking)

Properties	$\bar{E}$ (Target)	E_{min}	E_{max}	$U_o (g_1)$ (Target)	g_2	Index
Working plane (Car Parking)	6.82 lx	3.31 lx	9.56 lx	0.49	0.35	WP10
Perpendicular illuminance (adaptive)	(≥ 5.00 lx)			(≥ 0.25)		
Height: 0.000 m, Wall zone: 0.500 m	✓			✓		

Utilisation profile: Parking areas (5.9.1 Light traffic, e.g. parking areas of shops, terraced and apartment houses, cycle parks)

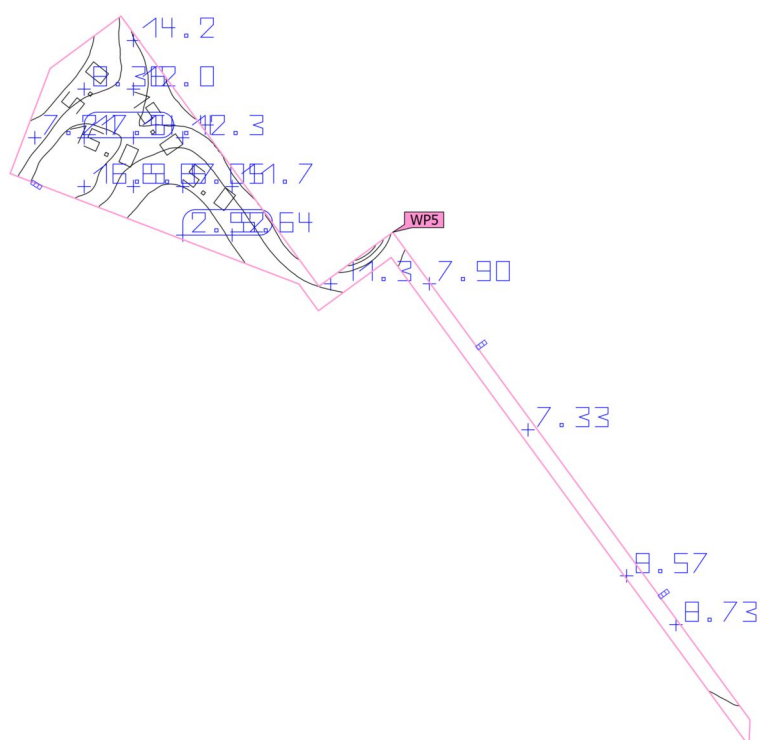
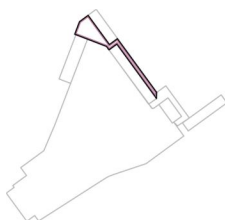
Loading & Unloading (Light scene 1)

Working plane (Loading & Unloading)

Properties	$\bar{E}$ (Target)	E_{min}	E_{max}	$U_o (g_1)$ (Target)	g_2	Index
Working plane (Loading & Unloading)	58.7 lx	27.6 lx	86.3 lx	0.47	0.32	WP8
Perpendicular illuminance (adaptive)	(≥ 50.0 lx)			(≥ 0.40)		
Height: 0.000 m, Wall zone: 0.500 m	✓			✓		

Utilisation profile: General circulation areas at outdoor workplaces (5.1.4 Pedestrian passages, vehicle turning, loading and unloading points)

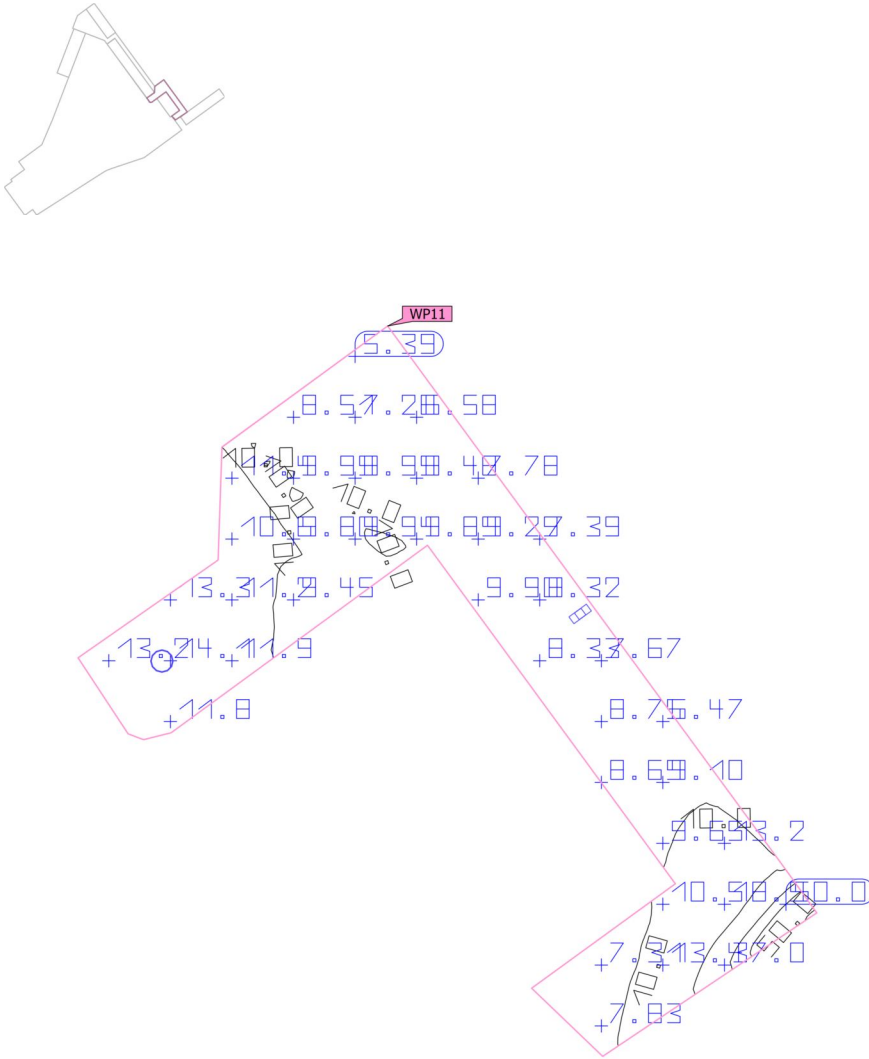
Walkway (Light scene 1)

Working plane (Walkway)

Properties	$\bar{E}$ (Target)	E_{min}	E_{max}	$U_o (g_1)$ (Target)	g_2	Index
Working plane (Walkway)	10.1 lx	2.41 lx	28.7 lx	0.24	0.084	WP5
Perpendicular illuminance (adaptive)	≥ 5.00 lx			≥ 0.25		
Height: 0.000 m, Wall zone: 0.500 m	✓			✗		

Utilisation profile: General circulation areas at outdoor workplaces (5.1.1 Walkways exclusively for pedestrians)

Walkway (Light scene 1)

Working plane (Walkway)

Properties	$\bar{E}$ (Target)	E_{min}	E_{max}	$U_o (g_1)$ (Target)	g_2	Index
Working plane (Walkway)	11.1 lx	3.78 lx	71.1 lx	0.34	0.053	WP11
Perpendicular illuminance (adaptive)	≥ 5.00 lx			≥ 0.25		
Height: 0.000 m, Wall zone: 0.000 m	✓			✓		

Utilisation profile: General circulation areas at outdoor workplaces (5.1.1 Walkways exclusively for pedestrians)

Glossary

A

A	Formula symbol for a surface in the geometry
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B

Background area	The background area borders the direct ambient area according to DIN EN 12464-1 and reaches up to the borders of the room. In larger rooms, the background area is at least 3 m wide. It is located horizontally at floor level.
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C

CCT	(Engl. correlated color temperature) Body temperature of a thermal radiator which serves to describe its light color. Unit: Kelvin [K]. The lesser the numerical value the redder; the greater the numerical value the bluer the light color. The color temperature of gas-discharge lamps and semi-conductors are termed "correlated color temperature" in contrast to the color temperature of thermal radiators. Allocation of the light colors to the color temperature ranges acc. to EN 12464-1: Light color - color temperature [K] warm white (ww) < 3,300 K neutral white (nw) ≥ 3,300 – 5,300 K daylight white (dw) > 5,300 K
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Clearance height	The designation for the distance between upper edge of the floor and bottom edge of the ceiling (in the completely furnished status of room).
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Control group	A group of luminaires that are dimmed and controlled together. For each lighting scene, a control group provides its own dimming value. All luminaires within a control group share this dimming value. The control groups with their luminaires are automatically determined by DIALux on the basis of the created light scenes and their luminaire groups.
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CRI	(Engl. color rendering index) Designation for the color rendering index of a luminaire or a lamp acc. to DIN 6169: 1976 or CIE 13.3: 1995. The general color rendering index Ra (or CRI) is a dimensionless figure that describes the quality of a white light source in regards to its similarity with the remission spectra of defined 8 test colors (see DIN 6169 or CIE 1974) to a reference light source.
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Glossary

D

Daylight autonomy	Describes what percentage of the daily working time the required illuminance is met by daylight. The nominal illuminance is used from the room profile, unlike described in EN 17037. The calculation is not done in the centre of the room but at the placed sensor measuring point. A room is considered sufficiently supplied with daylight if it achieves at least 50% daylight autonomy.
Daylight factor	Ratio of the illuminance achieved solely by daylight incidence at a point in the inside to the horizontal illuminance in the outer area under an unobstructed sky. Formula symbol: D (Engl. daylight factor) Unit: %
Daylight quotient effective area	A calculation surface within which the daylight quotient is calculated.

E

Energy evaluation	Based on an hourly calculation procedure for daylight in indoor spaces, considering the project geometry and any existing daylight control systems. Orientation and location of the project are also considered. The calculation uses the specified system power of the luminaires to determine the energy demand. A linear relationship between power and luminous flux in the dimmed state is assumed for daylight-controlled luminaires. Times of use and nominal illuminance are determined from the usage profiles of the spaces. Switched-on luminaires that are explicitly excluded from control also consider the specified times-of-use. The daylight control systems use a simplified control logic that closes them at an outdoor horizontal illuminance of 27,500lx. The calendar year 2022 is used as a reference only. It is not a simulation of this year. The reference year is only used to assign the days of the week to the calculated results. The changeover to summer time is not considered. The reference sky type used is the average sky described in CIE 110 without direct sunlight. The method was developed together with the Fraunhofer Institute for Building Physics and is available for review by the Joint Working Group 1 ISO TC 274 as an extension of the previous annual regression-based method.
Environmental zones	The assessment of intrusive light and light immission depends on the environment of the lighting installation. Depending on the standard, 4-6 different zones are defined, ranging from highly protected areas in natural settings to urban areas, commercial zones, and industrial zones.
Eta (η)	(light output ratio) The light output ratio describes what percentage of the luminous flux of a free radiating lamp (or LED module) is emitted by the luminaire when installed. Unit: %

Glossary

G

g_1	Often also U_o (Engl. overall uniformity) Designates the overall uniformity of the illuminance on a surface. It is the quotient from E_{min} to $\bar{E}$ and is required, for instance, in standards for illumination of workstations.
g_2	Actually it designates the "non-uniformity" of the illuminance on a surface. It is the quotient of E_{min} to E_{max} and is generally only relevant for certifying the emergency lighting acc. to EN 1838.

I

Illuminance	Describes the ratio of the luminous flux that strikes a certain surface to the size of this surface ($lm/m^2 = lx$). The illuminance is not tied to an object surface. It can be determined anywhere in space (inside or outside). The illuminance is not a product feature because it is a recipient value. Luxometers are used for measuring. Unit: Lux Abbreviation: lx Formula symbol: E
Illuminance, adaptive	For the determining of the middle adaptive illuminance on a surface, this is rastered "adaptively". In the area of large illuminance differences within the surface, the raster is subdivided finer; within lesser differences, a rougher classification is made.
Illuminance, horizontal	Illuminance that is calculated or measured on a horizontal (level) surface (this can be for example a table top or the floor). The horizontal illuminance is usually identified by the formula letter E_h .
Illuminance, perpendicular	Illuminance that is calculated or measured plumb-vertical to a surface. This needs to be taken into account for tilted surfaces. If the surface is horizontal or vertical, then there is no difference between the perpendicular and the horizontal or vertical illuminance.
Illuminance, vertical	Illuminance that is calculated or measured on a vertical surface (this can be for example the front of some shelves). The vertical illuminance is usually identified by the formula letter E_v .

K

k_s	The glare effect of a light source can be described by the glare metric k_s . It relates the solid angle of the glaring light source as seen from the point of immission, the ambient luminance, and the maximum allowable luminance.
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Glossary

L

LENI	(Engl. lighting energy numeric indicator) Lighting energy numeric indicator acc. to EN 15193 Unit: kWh/(m² * a)
LLMF	(Engl. lamp lumen maintenance factor)/acc. to CIE 97: 2005 Lamp flux maintenance factor that takes the luminous flux reduction into account of a luminaire or an LED module in the course of the operating time. The lamp flux maintenance factor is specified as a decimal digit and can have a maximum value of 1 (no luminous flux reduction existing).
LMF	(Engl. luminaire maintenance factor)/acc. to CIE 97: 2005 Luminaire maintenance factor that takes the soiling into account of the luminaire in the course of the operating time. The luminaire maintenance factor is specified as a decimal digit and can have a maximum value of 1 (no soiling existing).
LSF	(Engl. lamp survival factor)/acc. to CIE 97: 2005 Lamp survival factor that takes the total failure into account of a luminaire in the course of the operating time. The lamp survival factor is specified as a decimal digit and can have a maximum value of 1 (no failures existing within the time concerned or prompt replacement after the failure).
Luminance	Dimension for the "brightness impression" that the human eye has of a surface. The surface itself can emit light thereby or light striking it can be reflected (emitter value). It is the only photometric value that the human eye can perceive. Unit: Candela per square metre Abbreviation: cd/m² Formula symbol: L
Luminous efficacy	Ratio of the emitted luminous flux Φ [lm] to the absorbed electrical power P [W] Unit: lm/W. This ratio can be formed for the lamp or LED module (lamp or module light output), the lamp or module with control gear (system light output) and the complete luminaire (luminaire light output).
Luminous flux	Dimension for the total light output that is emitted from one light source in all directions. It is thus an "emitter value" that specifies the entire emitting output. The luminous flux of a light source can only be determined in a laboratory. A difference is made between the lamp or LED module luminous flux and the luminaire luminous flux. Unit: Lumen Abbreviation: lm Formula symbol: Φ

Glossary

Luminous intensity	Describes the intensity of the light in a certain direction (emitter value). The luminous intensity is a matter of the luminous flux Φ that is emitted in a certain spherical angle Ω. The radiation characteristics of a light source are presented graphically in a light distribution curve (LDC). The luminous intensity is an SI base unit. Unit: Candela Abbreviation: cd Formula symbol: I
M	
Maintenance factor	See MF
MF	(Engl. maintenance factor)/acc. to CIE 97: 2005 Maintenance factor as decimal number between 0 and 1 that describes the ratio of the new value of a photometric planning parameter (e.g. of the illuminance) to a maintenance value after a certain time. The maintenance factor takes into account the soiling of luminaires and rooms as well as the luminous flux reduction and the failure of light sources. The maintenance factor is taken into account either overall or determined in detail acc. to CIE 97: 2005 by the formula $RMF \times LMF \times LLMF \times LSF$.
O	
Obtrusive light/Light immission	To protect the nocturnal environment and minimize problems for humans, flora, and fauna, it is necessary to limit obtrusive light (also known as light pollution), which can cause serious physiological and ecological issues for individuals and the environment. Light immission refers to the disturbing influence of emitted light from artificial light sources.
Operating times	The assessment of obtrusive light and light immission depends on the operating times of the lighting installation. Depending on the standard, 1-3 different operating times are specified. In the absence of specific details, an operating time between 06:00 and 22:00 can be assumed.
P	
P	(Engl. power) Electric power consumption Unit: watt Abbreviation: W

Glossary

R

$R_{(UG)} \max$	Measure of the psychological glare in indoor spaces. In addition to the luminance of luminaires, the level of the $R_{(UG)}$ value also depends on the observer position, the viewing direction and the ambient luminance. The calculation is made according to the table method, see CIE 117. Among other things, EN 12464-1:2021 specifies maximum permissible $R_{(UG)}$- values $R_{(UGL)}$ for various indoor workplaces.
R_{DLO}	The ratio of the luminous flux emitted below the horizontal plane to the total lamp luminous flux of a luminaire or lighting installation in its operational position.
R_G	The glare directly caused by luminaires of an outdoor lighting installation is determined using the CIE Glare Rating (RG) method. To calculate this, the equivalent veiling luminance of the surroundings is needed. There are four options for determining this: • An exact calculation according to CIE 112, based on the scene area. • A simplified method according to EN 12464-2, based on the scene area. • Using a custom calculation area to determine the equivalent veiling luminance. • Specifying a fixed value for easy comparability.
R_{UF}	upward flux ratio The ratio of the luminous flux emitted directly or reflected above the horizontal plane to the luminous flux that cannot be avoided under ideal conditions to achieve the illuminance level on a deliberately illuminated area.
R_{UL}	upward light ratio The ratio of the luminous flux emitted above the horizontal plane to the luminous flux of a luminaire or lighting installation in its operational position. The luminaire efficiency is considered in this calculation.
R_{ULO}	upward light output ratio The ratio of the luminous flux emitted above the horizontal plane to the total lamp luminous flux of a luminaire or lighting installation in its operational position.
Reflection factor	The reflection factor of a surface describes how much of the striking light is reflected back. The reflection factor is defined by the color of the surface.
RMF	(Engl. room maintenance factor)/acc. to CIE 97: 2005 Room maintenance factor that takes the soiling into account of the space encompassing surfaces in the course of the operating time. The room maintenance factor is specified as a decimal digit and can have a maximum value of 1 (no soiling existing).
$RUG \max$	(unified glare rating) Measure for the psychological glare effect in interiors. In addition to luminaire luminance, the RUG value also depends on the position of the observer, the viewing direction and the ambient luminance. Among other things, EN 12464-1 specifies maximum permissible RUG values for various indoor workplaces.

Glossary

RUG observer	Calculation point in the room, for the DIALux the RUG value is determined. The location and height of the calculation point should correspond to the typical observer position (position and eye level of the user).
S	
Surrounding area	The ambient area directly borders the area of the visual task and should be planned with a width of at least 0.5 m according to DIN EN 12464-1. It is at the same height as the area of the visual task.
V	
Visual task area	The area that is needed for carrying out the visual task in accordance with DIN EN 12464-1. The height corresponds with the height at which the visual task is executed.
W	
Wall zone	Circumferential area between working plane and walls which is not taken into account for the calculation.
Working plane	Virtual measuring or calculation surface at the height of the visual task that generally follows the room geometry. The working plane may also feature a wall zone.