



Environmental Lighting Impact Assessment Report

Old Sarum, Salisbury, Wiltshire

Project number: SHD969

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SHD

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1. INTRODUCTION

1.1 General

- 1.1.1 This report has been prepared by SHD Lighting Consultancy Ltd on behalf of Persimmon Homes, Wessex to support the planning application for the development of an area accessed off Roger Way, Old Sarum, Salisbury (hereafter referred to as the *proposed development*).
- 1.1.2 The report has been prepared by SHD Lighting Consultancy Ltd to the best of our knowledge using information provided by Persimmon Homes, Wessex.
- 1.1.3 The report assesses the potential effects of obtrusive light that could arise from the existing floodlighting installation adjacent to the proposed development.
- 1.1.4 This lighting assessment has been carried out by a Level 4 competent person as per the competency framework provided by the Institution of Lighting Professionals.
- 1.1.5 SHD Lighting Consultancy specialises in lighting impact studies and has the knowledge, experience, and professional qualifications to undertake lighting design calculations and environmental lighting impact assessment reports.
- 1.1.6 SHD Lighting Consultancy Ltd accepts no responsibility or liability for:
- The consequence of this documentation being used for any purpose or project other than that for which it was commissioned.
 - The issue of this document to any third party with whom approval for use has not been agreed.
- 1.1.7 The principal objective is to identify the effects associated with obtrusive light on various sensitive receptors.
- 1.1.8 Obtrusive light or light pollution is any light that strays to areas other than where it is intended and can include light intrusion (spill light) into neighbouring properties, upward light (which can create sky glow), and visual source intensity (glare).
- 1.1.9 The lighting impact assessment considers the maximum adverse scenario concerning the existing lighting, to assess the significance of the potential effects on identified receptors.

2. LEGISLATION, PLANNING AND POLICY GUIDANCE

2.1 Legislative Background

- 2.1.1 Light pollution was introduced within the Clean Neighbourhoods and Environment Act (2005) as a form of statutory nuisance under the Environmental Protection Act (the 'EPA', 1990), which was amended in 2006 to include the following nuisance definition:

“Artificial light emitted from premises so to be prejudicial to health or nuisance”

- 2.1.2 Although light was described as having the potential to cause statutory nuisance, no prescriptive limits or rules were set for impact assessment purposes.

2.2 National Planning Policy Framework

- 2.2.1 The National Planning Policy Framework (NPPF), published on 20th July 2021, sets out the Government planning policies for England and how they are expected to be applied and provides a framework for local plans.
- 2.2.2 Planning policies and decisions should also ensure that the proposed development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions, and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the proposed development.

2.3 Relevant Lighting Standards

Guidance Notes for the Reduction of Obtrusive Light; GN01/21 (2021): The Institution of Lighting Professionals (ILP)

- 2.3.1 The ILP has proposed lighting guidance and criteria with a recommendation that these be incorporated into the local planning applications.
- 2.3.2 Guidance notes produced by The Institution of Lighting Professionals (ILP) are among the most commonly referenced guidance notes for good practice within the lighting design industry.
- 2.3.3 The ILP guidance notes define various forms of light pollution and describe a series of environmental zones and suitable criteria against which the effects of artificial lighting can be assessed.
- 2.3.4 Guidance Notes for the Reduction of Obtrusive Light; GN01/21 (2021) as published by The Institution of Lighting Professionals (ILP) should be used in conjunction with CIE 150:2017 and CIE 216:1997 and is not a replacement for the procedures contained therein.
- 2.3.5 Guidance Notes for the Reduction of Obtrusive Light GN01/21 produced by The Institution of Lighting Professionals (ILP) has, therefore, been referred to for this assessment.

CIE 150: Guide on the limitations of the effects of obtrusive light from outdoor lighting installations (2017)

- 2.3.6 The purpose of this guide is to help formulate guidelines for assessing the environmental impacts of outdoor lighting and to give recommended limits for relevant lighting parameters to contain the obtrusive effects of outdoor lighting within tolerable levels

CIE 126: Guidelines for Minimising Sky Glow (1997)

- 2.3.7 This document gives general guidance for lighting designers and policymakers on the reduction of sky glow. The report gives recommendations about maximum permissible values for exterior lighting installations.
- 2.3.8 These values are regarded as limiting values. Lighting designers should strive to meet the lowest criteria for the design. Practical implementation of the general guidance is left to national regulations.

The Exterior Environment: Lighting Guide 6 (2016): The Chartered Institution of Building Services Engineers (CIBSE)

- 2.3.9 Lighting Guide 6 provides information and guidance on lighting in the exterior environment particularly light pollution, energy use, and long-term sustainability.

Public Lighting Guide 04: Guidance on Undertaking Environmental Lighting Impact Assessments (2013): The Institution of Lighting Professionals (ILP)

- 2.3.10 Guidance is provided within Public Lighting Guide 04 which outlines the best practice approach to preparing lighting assessments.

3. ASSESSMENT METHODOLOGY

3.1 Environmental Zone Classification

- 3.1.1 All standards consulted are nationally recognised documents, (some internationally also) which deal with all design issues associated with external lighting.
- 3.1.2 CIE Standards, the CIBSE, and the Society of Light & Lighting guidance documents, all apply a common Environmental Zoning system.
- 3.1.3 Using Table 3.1, the proposed development would be classified as having an environmental zone of **E2 Low district brightness**.

ENVIRONMENTAL ZONE CLASSIFICATION AND PARAMETERS			
Zone	Surrounding	Lighting Environment	Example
E0	Protected	Dark	UNESCO Starlight Reserves, IDA Dark Sky Parks
E1	Natural	Intrinsically dark	National Parks, Areas of Outstanding Natural Beauty
E2	Rural	Low district brightness	Village or relatively dark outer suburban location
E3	Suburban	Medium district brightness	Small town centres or suburban locations
E4	Urban	High district brightness	Town or City centres with high levels of night-time activity

Table 3.1: Environmental Zone Classification

Extract from Guidance Notes for the Reduction of Obtrusive Light; GN01/21 (2021):
The Institution of Lighting Professionals (ILP)

- Where an area to be lit lies on the boundary of two zones the obtrusive light limitation values used should be those applicable to the most rigorous zone.
- Rural zones under protected designations should use a higher standard of policy.
- Zone E0 must always be surrounded by an E1 Zone.
- Zoning should be agreed upon with the local planning authority and due to local requirements, a more stringent zone classification may be applied to protect special/specific areas.
- SQM (Sky Quality Measurements) referenced by the International Dark-Sky Association (IDA), the criteria for E0 being revised in mid-2019 but not retrospective.
- Astronomical observable dark skies will offer clearer views of the Milky Way and other objects such as the Andromeda galaxy and the Orion Nebula.
- Although values of SQM 20 to 20.5 may not offer clear views of astronomical dark sky objects such as the Milky Way, these skies will have their relative intrinsic value in the UK.

3.2 Obtrusive Light Limitation for Outdoor Lighting Installations

- 3.2.1 The ILP Guidance Notes for the Reduction of Obtrusive Light (ILP GN01/21) provide guidelines and threshold values applicable to each environmental zone, which are reproduced in Table 3.2 below.

OBTRUSIVE LIGHT LIMITATIONS FOR EXTERIOR LIGHTING INSTALLATIONS						
Zone	Sky Glow Upward Light Ratio % (i)	Light intrusion into windows, measured in Lux (ii)		Luminaire intensity, measured in kilo candelas (iii)		Building luminance, (cd/m ²) (iv)
		Pre-curfew	Post-curfew	Pre-curfew	Post-curfew	Pre-curfew
E0	0	0	0	0	0	0
E1	0	2	0 (1*)	2.5	0	0
E2	2.5	5	1	7.5	0.5	5
E3	5.0	10	2	10	1	10
E4	15	25	5	25	2.5	25

Table 3.2: Obtrusive Light Limitations

Extract from Guidance Notes for the Reduction of Obtrusive Light; GN01/21 (2021):

The Institution of Lighting Professionals (ILP)

Upward light ratio of the installation – the maximum permitted percentage of luminaire flux for the total installation that goes directly into the sky

- I. Vertical illuminance measured flat at the glazing at the centre of the window
- II. Light intensity in kilo candelas
- III. Luminance in candelas per square metre (cd/m²)
 - From public road lighting installations only

- 3.2.2 The proposed development is within an E2 Environmental Zone, with Table 3.2 providing the maximum permissible values of lux for light intrusions into windows.
- 3.2.3 Pre-curfew is considered before 23:00, with a maximum value of 5 lux must not be exceeded, and post-curfew after 23:00, with a maximum value of 1 lux must not be exceeded.
- 3.2.4 It is assumed that no training or events will take place after 23:00, therefore it is expected that the floodlighting units will not be in operation after 23:00.

3.3 Obtrusive Light

- 3.3.1 Obtrusive light (sometimes referred to as light pollution) refers to any light emitted in a direction in which it is not required or wanted and as such is detrimental to other users.
- 3.3.2 Nuisance/intrusion, the spilling of light beyond the area or property being lit. Light nuisance can include intrusion into windows of neighbouring properties, but it can also cause issues to habitats and areas of high biodiversity interest.
- 3.3.3 Sky glow, this is the glow that is visible around urban areas resulting from the scattering of artificial light. Sky glow is light from reflected surfaces and badly directed light sources illuminating air molecules and other particles. A major effect of sky glow at night is to reduce contrast in the sky. This is the most pervasive form of light pollution and can affect areas many miles from the original light source.
- 3.3.4 Glare, the uncomfortable brightness of a light source when viewed against a contrasting darker background. Glare forms a veil of luminance from poorly controlled and directed lighting that reduces contrast and visibility.

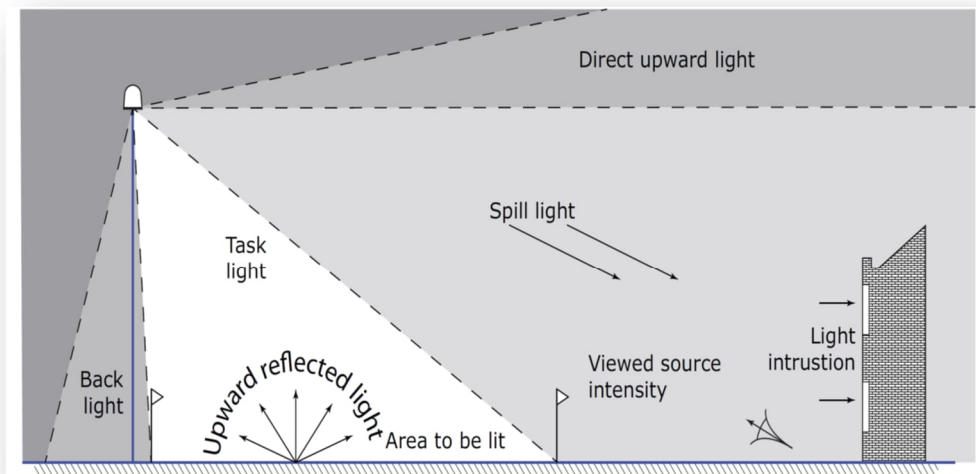


Figure 3.1: Obtrusive light diagram

Extract from Guidance Notes for the Reduction of Obtrusive Light; GN01/21 (2021):

The Institution of Lighting Professionals (ILP)

BASELINE CONDITIONS

3.4 Site Overview

- 3.4.1 The site for the proposed development is off Roger Way, Old Sarum, Salisbury, Wiltshire which is adjacent to an existing football ground, and is located southwest of the proposed development.
- 3.4.2 The area in the vicinity of the proposed development is fairly rural with several new build developments surrounding the site.
- 3.4.3 Information in this report will assess the impact of the existing floodlighting system which will illuminate the football pitch during the hours of darkness for training and other events on the proposed house plots.



Figure 3.2: Proposed development boundary outline (Aerial View)

3.5 Existing Lighting

- 3.5.1 The proposed development is mostly open grassland within the boundaries of the existing developed area and is located between the existing houses and the football ground to the northeast edge.
- 3.5.2 The existing road system in the vicinity of the proposed development has a series of street lighting columns which are owned and maintained by the Local Authority and illuminate the adopted highway during the hours of darkness.
- 3.5.3 Figure 3.3 shows the existing street lighting columns on Roger Way along with the existing floodlighting masts.



Figure 3.3: Existing street lighting columns

4. LIGHTING STRATEGY

4.1 Lighting Brief

4.1.1 Lighting performance details outlined in this section of the document are to be considered in conjunction with the following key documents:

- SHD969-SHD-HLG-SALI-DR-EO-Lighting Calculation-R4

4.2 Lighting Criteria

4.2.1 Floodlighting is currently provided in the area edge in yellow below.:



Figure 4.1: Salisbury Football Club pitch

4.3 Lighting Calculations and Modelling

- 4.3.1 The existing lighting luminaire parameters were extracted from a previous lighting design completed in 2021 by another lighting consultancy.
- 4.3.2 SHD Lighting Consultancy then used the existing luminaire information and replicated the design using a revised housing development layout plan (162 Model 1.2) provided by Persimmon Homes, using Dialux lighting simulation software.
- 4.3.3 Dialux is a lighting calculation package that utilises manufacturers photometric data files to simulate the lighting output of chosen light fittings.
- 4.3.4 It is to be noted that the Dialux calculation report has been produced with a luminaire maintenance factor of 1.0 as specified in the ILP publication, Public Lighting Guide 04 – Guidance on undertaking an Environmental Assessment Report.
- 4.3.5 It defines a maintenance factor of 1.0 as being the worst-case scenario as all the outdoor lighting will be performing at peak intensity as it does not factor light source depreciation, environment conditions, or luminaire driver deterioration which would all occur over the lifespan of the floodlighting installation.
- 4.3.6 Light spill calculations and isolux contour lines are all based on the luminaires at full output, with a maintenance factor of 1.0, as this will represent the worst-case scenario.
- 4.3.7 The calculation model does not include any proposed or existing planting/ hedgerows/ trees on site, or in the surrounding area.

4.4 Sensitive Receptors

- 4.4.1 The proposed development is to be built northeast of an existing football pitch. The geometry of the house plots means several plots face the existing football pitch.

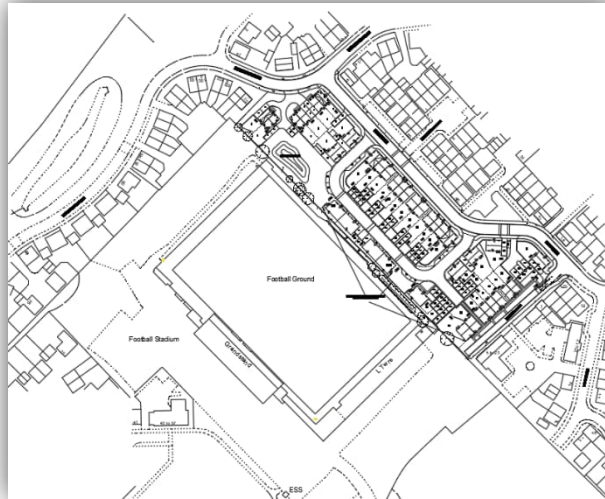


Figure 4.2: Development layout adjacent to existing football pitch

- 4.4.2 The house plots nearest the pitch have been designed so there are no external windows on the facades facing the pitch.
- 4.4.3 House plots 9/10, 11, 12, 13/14 and 27/28 are the closest properties facing the pitch, each having no windows that face the pitch surface.

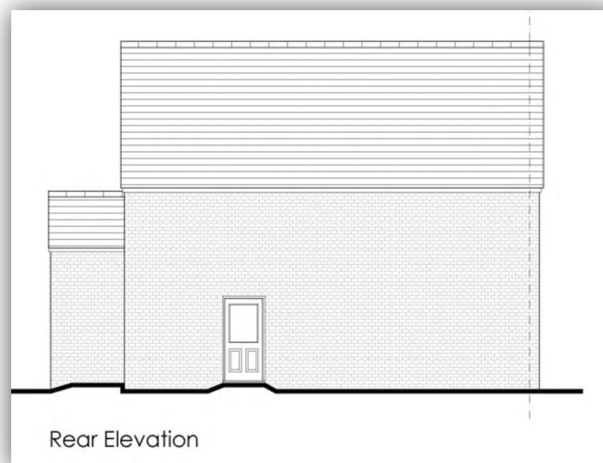


Figure 4.3: Plot style 9/10, 13/14 & 27/28

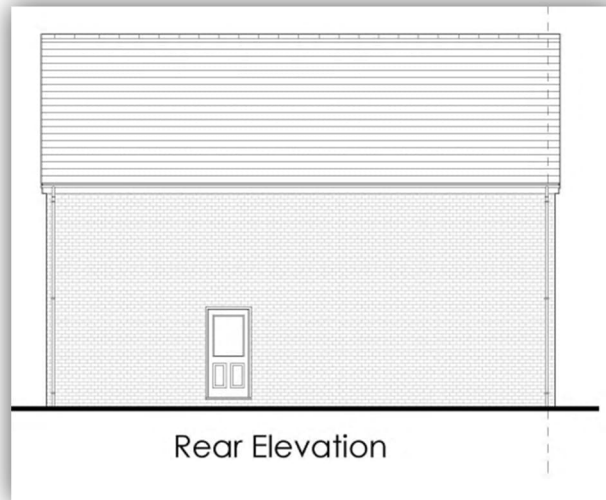


Figure 4.4: Plot style 11 & 12

CONCLUSION

4.5 Expected Lighting Times

- 4.5.1 Consultee comments raised concerns with the possibility of lighting remaining on past 23:00.
- 4.5.2 For context the latest a football match in the UK will kick off is 20.00, it is noted that Salisbury FC had 3 home games within the 2023/24 season kicking off at 19.45 midweek this year with only one being a game that had the possibility of running into extra time.
- 4.5.3 It is, therefore, sensible to look at the timings as such with a standard football match being 90 minutes with a 15 minute break for halftime, when considering any additional stoppage, normal games that are not cup games (i.e. no possibility of Extra Time) will cease at around 21.45 with the stadium vacant shortly after.
- 4.5.4 If considering a cup game kicking off at the same time and duration but the possibility of 30 minutes extra time and the possibilities of penalties the match under any normal circumstances would cease before 22.30 again with the stadium vacant shortly after.
- 4.5.5 There are very little circumstances under which lights should remain on past 23:00 (curfew).

4.6 Design Commentary

- 4.6.1 This assessment outlines the existing floodlighting at Salisbury Football Club, to ensure that the lighting is fit for purpose whilst maintaining sensitivity towards the environment.
- 4.6.2 In summary it is our considered opinion that the existing floodlighting will not have any significant negative impact on the immediate environment concerning lighting pollution.

5. APPENDIX A

5.1 Light Calculation Report

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SHD969-SHD-HLG-SALI-CA-EO-Lighting Calculation-R4

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Luminaire list

Φ_{total} 4111952 lm	P_{total} 58436.0 W	Luminous efficacy 70.4 lm/W
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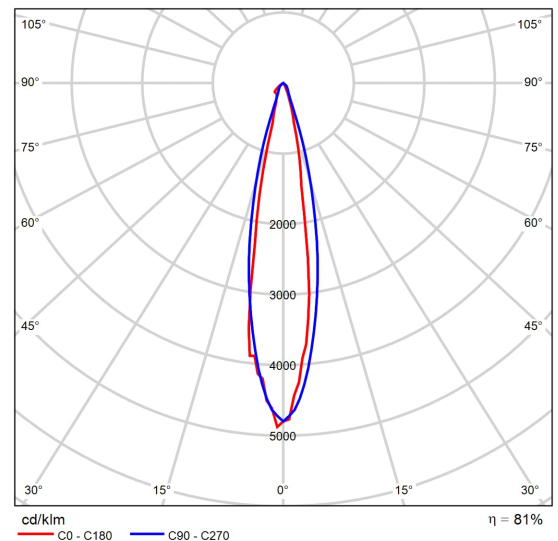
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4	Thorn Lighting	96263374 (STD - standard)	ALTIS 2KW R5 HQITS-S CL1 WI	2075.0 W	162620 lm	78.4 lm/W
12	Thorn Lighting	CHAMP2SL A(V1)	Champion 2KW Osram HQI-TS long arc. V1	2089.0 W	140333 lm	67.2 lm/W
12	Thorn Lighting	CHAMP2SL A(V2)	Champion 2KW Osram HQI-TS long arc. V2	2089.0 W	148123 lm	70.9 lm/W

Product data sheet

Thorn Lighting - ALTIS 2KW R5 HQITS-S CL1 WI



Article No.	96263374 (STD - standard)
P	2075.0 W
Φ_{Lamp}	200000 lm
$\Phi_{\text{Luminaire}}$	162620 lm
η	81.31 %
Luminous efficacy	78.4 lm/W
CCT	3000 K
CRI	100



Polar LDC

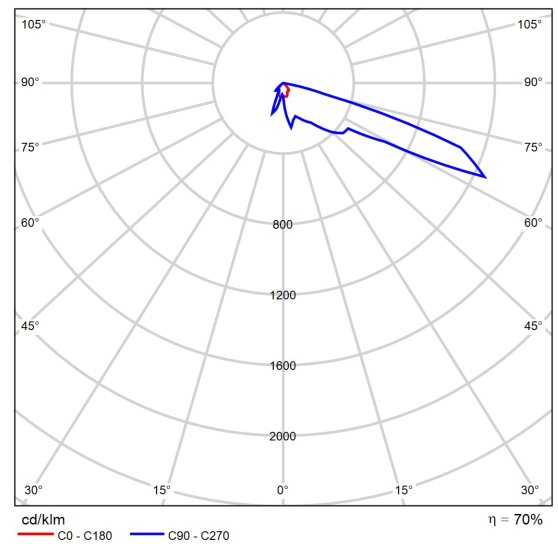
Cone diagram

Product data sheet

Thorn Lighting - Champion 2KW Osram HQI-TS long arc. V1



Article No.	CHAMP2SLA(V1)
P	2089.0 W
Φ_{Lamp}	200000 lm
$\Phi_{\text{Luminaire}}$	140333 lm
η	70.17 %
Luminous efficacy	67.2 lm/W
CCT	4000 K
CRI	100



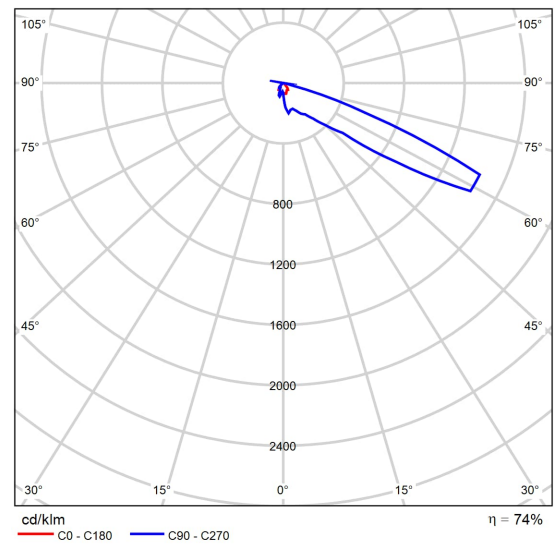
Polar LDC

Product data sheet

Thorn Lighting - Champion 2KW Osram HQI-TS long arc. V2



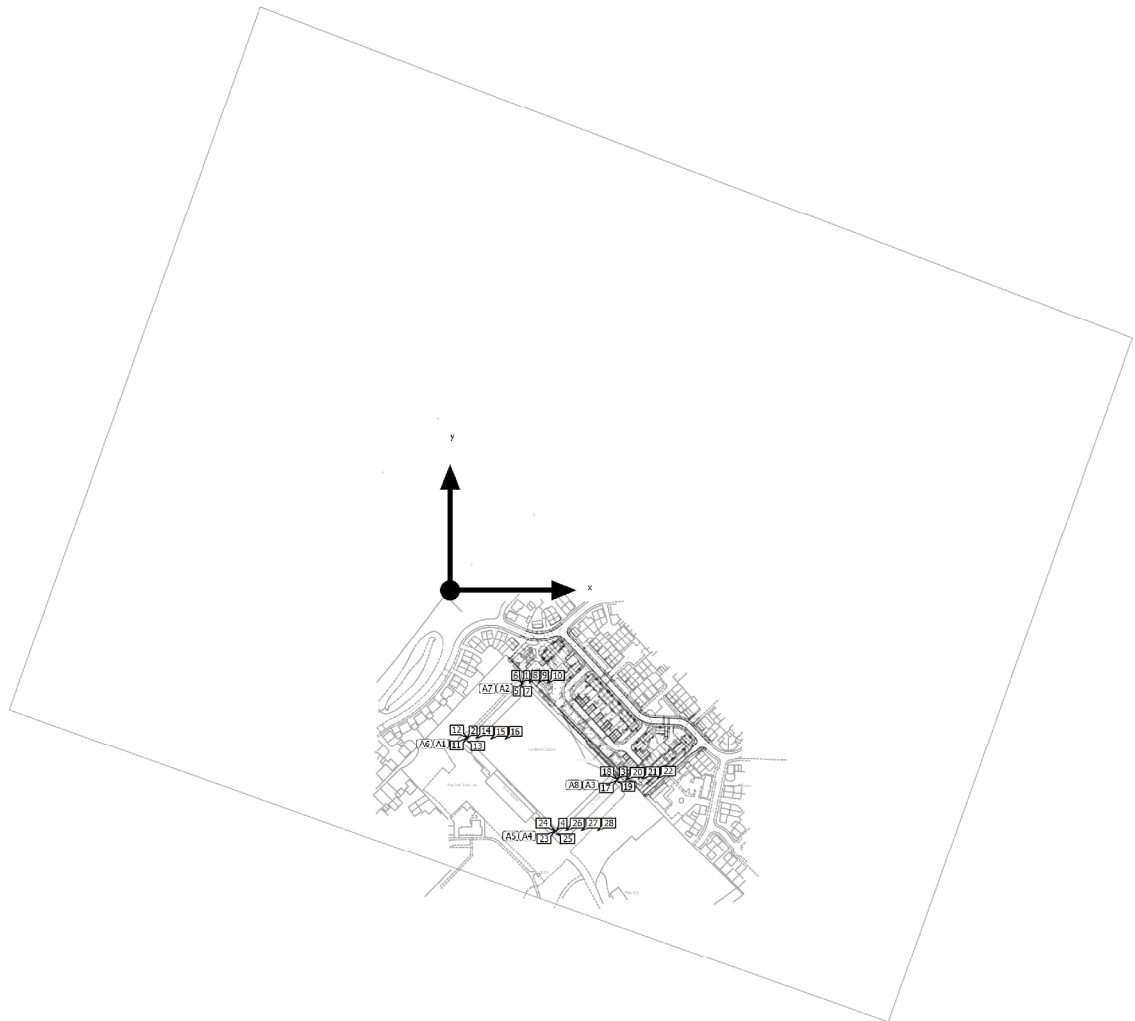
Article No.	CHAMP2SLA(V2)
P	2089.0 W
Φ_{Lamp}	200000 lm
$\Phi_{\text{Luminaire}}$	148123 lm
η	74.06 %
Luminous efficacy	70.9 lm/W
CCT	4000 K
CRI	100



Polar LDC

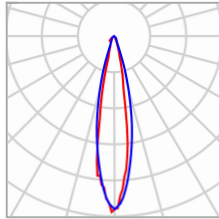
Site 1

Luminaire layout plan



Site 1

Luminaire layout plan



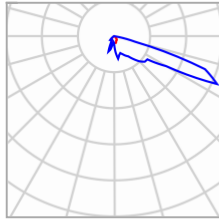
Manufacturer	Thorn Lighting	P	2075.0 W
Article No.	96263374 (STD - standard)	$\Phi_{\text{Luminaire}}$	162620 lm
Article name	ALTIS 2KW R5 HQITS-S CL1 WI		
Fitting	1x HIT-DE OSS 2000W		

Individual luminaires

X	Y	Mounting height	Luminaire
70.478 m	-91.973 m	19.000 m	1
16.679 m	-145.470 m	19.000 m	2
164.069 m	-186.187 m	19.000 m	3
103.819 m	-236.391 m	19.000 m	4

Site 1

Luminaire layout plan



Manufacturer	Thorn Lighting	P	2089.0 W
Article No.	CHAMP2SLA(V1)	$\Phi_{\text{Luminaire}}$	140333 lm
Article name	Champion 2KW Osram HQI-TS long arc. V1		
Fitting	1x 1 x 2000W MHN- TD, MHW-TD, MHD- TD, MHD		

3 x Thorn Lighting Champion 2KW Osram HQI-TS long arc. V1

Type	Line arrangement	X	Y	Mounting height	Luminaire
1st luminaire (X/Y/Z)	16.759 m / -144.800 m / 18.000 m	16.759 m	-144.800 m	18.000 m	11
X-direction	3 pcs., Centre - centre, 0.667 m	16.656 m	-145.459 m	18.000 m	13
		16.554 m	-146.117 m	18.000 m	15
Arrangement	A1				

3 x Thorn Lighting Champion 2KW Osram HQI-TS long arc. V1

Type	Line arrangement	X	Y	Mounting height	Luminaire
1st luminaire (X/Y/Z)	71.129 m / -91.831 m / 18.000 m	71.129 m	-91.831 m	18.000 m	5
X-direction	3 pcs., Centre - centre, 0.667 m	70.472 m	-91.947 m	18.000 m	6
		69.816 m	-92.063 m	18.000 m	7
Arrangement	A2				

3 x Thorn Lighting Champion 2KW Osram HQI-TS long arc. V1

Site 1

Luminaire layout plan

Type	Line arrangement	X	Y	Mounting height	Luminaire
1st luminaire (X/Y/Z)	163.954 m / -186.819 m / 18.000 m	163.954 m	-186.819 m	18.000 m	17
		164.069 m	-186.162 m	18.000 m	18
X-direction	3 pcs., Centre - centre, 0.667 m	164.185 m	-185.506 m	18.000 m	19
Arrangement	A3				

3 x Thorn Lighting Champion 2KW Osram HQI-TS long arc. V1

Type	Line arrangement	X	Y	Mounting height	Luminaire
1st luminaire (X/Y/Z)	103.152 m / -236.409 m / 18.000 m	103.152 m	-236.409 m	18.000 m	23
		103.819 m	-236.409 m	18.000 m	25
X-direction	3 pcs., Centre - centre, 0.667 m	104.486 m	-236.409 m	18.000 m	27
Arrangement	A4				

Site 1

Luminaire layout plan



Manufacturer	Thorn Lighting	P	2089.0 W
Article No.	CHAMP2SLA(V2)	$\Phi_{\text{Luminaire}}$	148123 lm
Article name	Champion 2KW Osram HQI-TS long arc. V2		
Fitting	1x 1 x 2000W MHN- TD, MHW-TD, MHD- TD, MHD		

3 x Thorn Lighting Champion 2KW Osram HQI-TS long arc. V2

Type	Line arrangement	X	Y	Mounting height	Luminaire
1st luminaire (X/Y/Z)	103.152 m / -236.409 m / 18.500 m	103.152 m	-236.409 m	18.500 m	24
		103.819 m	-236.409 m	18.500 m	26
X-direction	3 pcs., Centre - centre, 0.667 m	104.486 m	-236.409 m	18.500 m	28
Arrangement	A5				

3 x Thorn Lighting Champion 2KW Osram HQI-TS long arc. V2

Type	Line arrangement	X	Y	Mounting height	Luminaire
1st luminaire (X/Y/Z)	16.759 m / -144.800 m / 18.500 m	16.759 m	-144.800 m	18.500 m	12
		16.656 m	-145.459 m	18.500 m	14
X-direction	3 pcs., Centre - centre, 0.667 m	16.554 m	-146.117 m	18.500 m	16
Arrangement	A6				

Site 1

Luminaire layout plan

3 x Thorn Lighting Champion 2KW Osram HQI-TS long arc. V2

Type	Line arrangement	X	Y	Mounting height	Luminaire
1st luminaire (X/Y/Z)	71.130 m / -91.852 m / 18.500 m	71.130 m	-91.852 m	18.500 m	8
X-direction	3 pcs., Centre - centre, 0.667 m	70.474 m	-91.967 m	18.500 m	9
Arrangement	A7	69.817 m	-92.083 m	18.500 m	10

3 x Thorn Lighting Champion 2KW Osram HQI-TS long arc. V2

Type	Line arrangement	X	Y	Mounting height	Luminaire
1st luminaire (X/Y/Z)	163.935 m / -186.822 m / 18.500 m	163.935 m	-186.822 m	18.500 m	20
		164.049 m	-186.165 m	18.500 m	21
X-direction	3 pcs., Centre - centre, 0.667 m	164.163 m	-185.509 m	18.500 m	22
Arrangement	A8				

Site 1

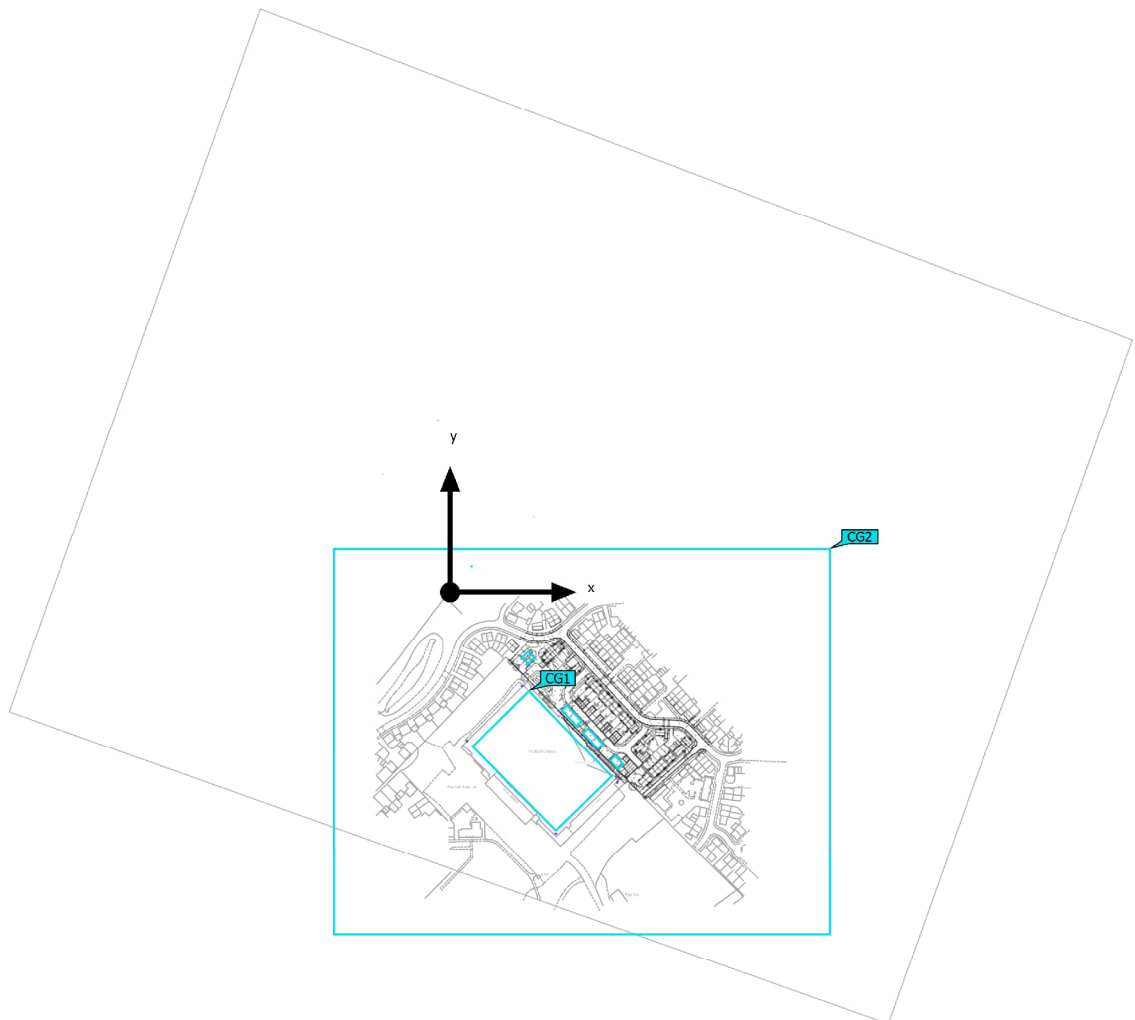
Luminaire list

Φ_{total} 4111952 lm	P_{total} 58436.0 W	Luminous efficacy 70.4 lm/W
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pcs.	Manufacturer	Article No.	Article name	P	Φ	Luminous efficacy
4	Thorn Lighting	96263374 (STD - standard)	ALTIS 2KW R5 HQITS-S CL1 WI	2075.0 W	162620 lm	78.4 lm/W
12	Thorn Lighting	CHAMP2SL A(V1)	Champion 2KW Osram HQI-TS long arc. V1	2089.0 W	140333 lm	67.2 lm/W
12	Thorn Lighting	CHAMP2SL A(V2)	Champion 2KW Osram HQI-TS long arc. V2	2089.0 W	148123 lm	70.9 lm/W

Site 1 (Light scene 1)

Calculation objects



Site 1 (Light scene 1)

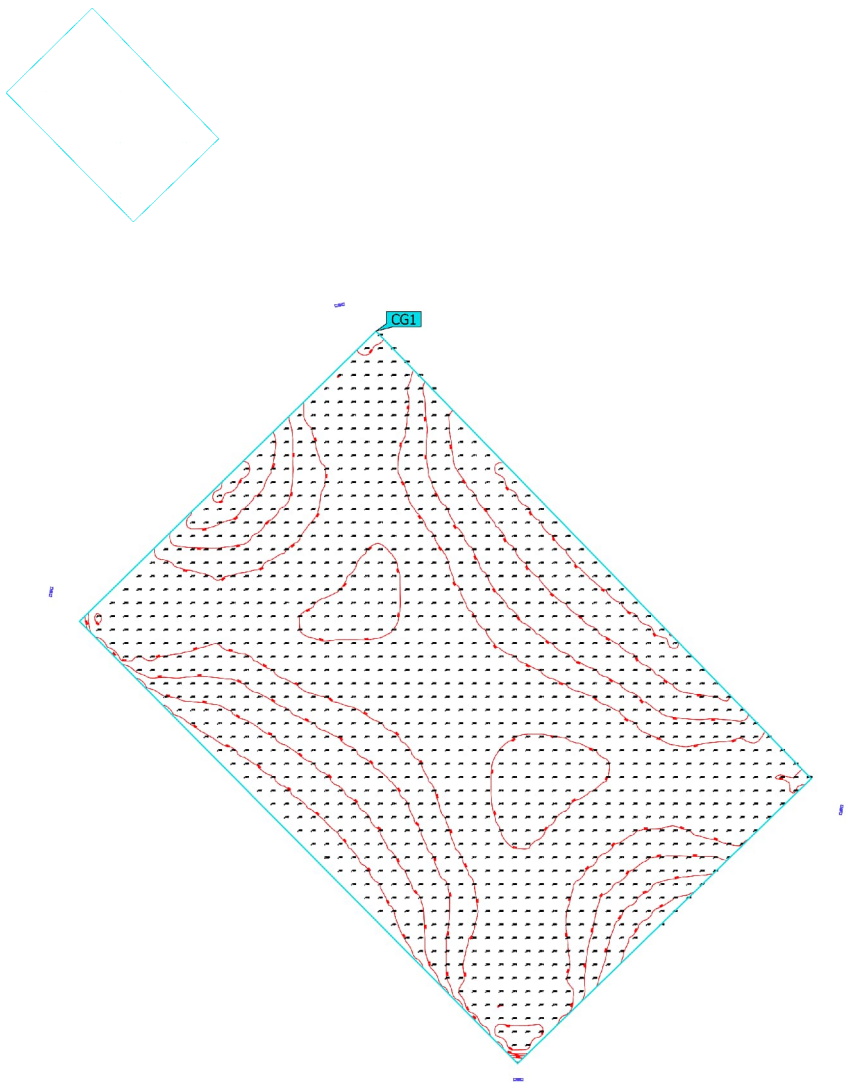
Calculation objects

Calculation surfaces

Properties	$\bar{E}$	E_{min}	E_{max}	$U_o (g_1)$	g_2	Index
Football Pitch Surface Horizontal illuminance Height: 0.000 m	292 lx	106 lx	460 lx	0.36	0.23	CG1
Whole Area Horizontal illuminance Height: 0.000 m	20.3 lx	0.001 lx	430 lx	0.000	0.000	CG2

Utilisation profile: General circulation areas at outdoor workplaces (5.1.3 Regular vehicle traffic (max. 40km/h))

Site 1 (Light scene 1)
Football Pitch Surface

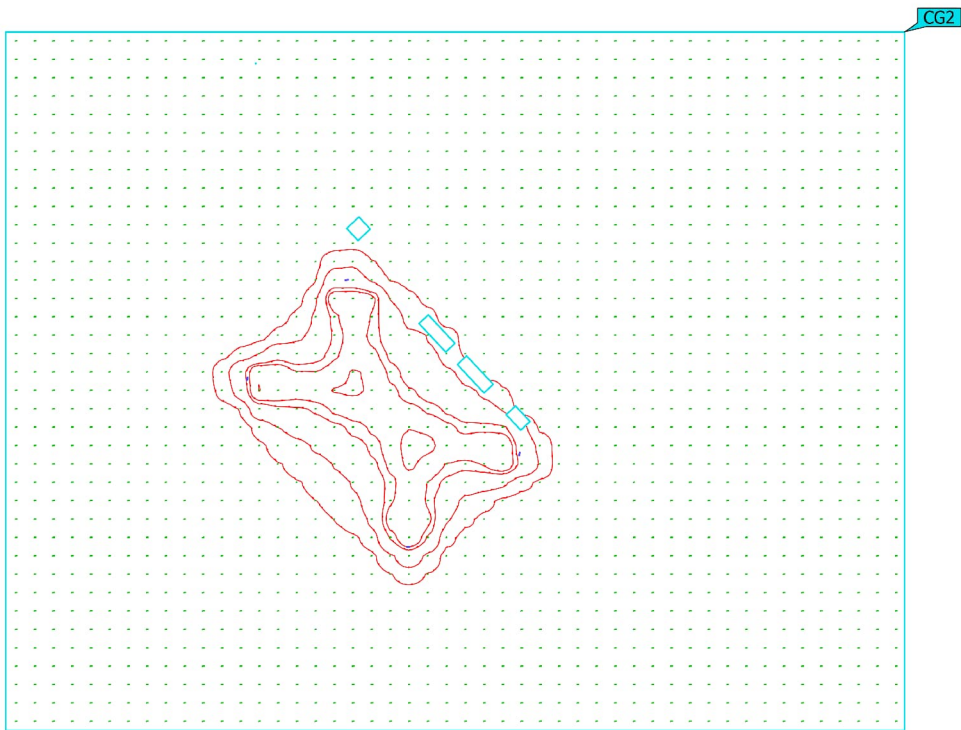
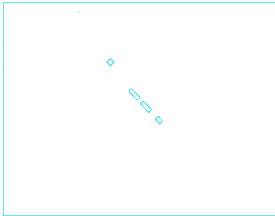


Properties	$\bar{E}$	E_{min}	E_{max}	$U_o (g_1)$	g_2	Index
Football Pitch Surface Horizontal illuminance Height: 0.000 m	292 lx	106 lx	460 lx	0.36	0.23	CG1

Utilisation profile: General circulation areas at outdoor workplaces (5.1.3 Regular vehicle traffic (max. 40km/h))

Site 1 (Light scene 1)

Whole Area



Properties	$\bar{E}$	E_{min}	E_{max}	$U_o (g_1)$	g_2	Index
Whole Area	20.3 lx	0.001 lx	430 lx	0.000	0.000	CG2
Horizontal illuminance						
Height: 0.000 m						

Utilisation profile: General circulation areas at outdoor workplaces (5.1.3 Regular vehicle traffic (max. 40km/h))

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 colour temperature) Body temperature of a thermal radiator which serves to describe its light colour. Unit: Kelvin [K]. The lesser the numerical value the redder; the greater the numerical value the bluer the light colour. The colour temperature of gas-discharge lamps and semi-conductors are termed "correlated colour temperature" in contrast to the colour temperature of thermal radiators. Allocation of the light colours to the colour temperature ranges acc. to EN 12464-1: Light colour - colour 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. colour rendering index) Designation for the colour rendering index of a luminaire or a lamp acc. to DIN 6169: 1976 or CIE 13.3: 1995. The general colour 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 colours (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.
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 .

L

LENI	(Engl. lighting energy numeric indicator) Lighting energy numeric indicator acc. to EN 15193 Unit: $kWh/(m^2 \cdot a)$
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Glossary

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
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

Glossary

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 $RMF \times LMF \times LLMF \times LSF$.

P

P	(Engl. power) Electric power consumption Unit: watt Abbreviation: W
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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.
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 colour 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).

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.
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Glossary

U

UGR (max)	(unified glare rating) Measure for the psychological glare effect in interiors. In addition to luminaire luminance, the UGR 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 UGR values for various indoor workplaces.
UGR observer	Calculation point in the room, for the DIALux the UGR 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).

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.
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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.