08 Feb. 22

Kilcarbery 110 kV Substation

Compound Lighting Design Calculations

H&MV ENGINEERING

High Voltage Specialists

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Compound Lighting Design Calculations

Issue: P01	Date of issue: 08/02/22
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Approved by:	Eamon Sheehan

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1. Revision History

Date	Revision	Comment
08/02/2022	P01	Initial Revision

2. Introduction

The purpose of this study is to calculate the average illuminance within the 220 kV compound. Sufficient illumination shall be provided to allow safe operating and movement within the compound.

3. Design Parameters

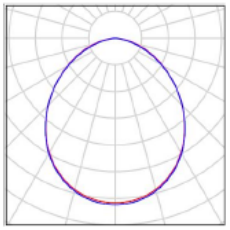
The horizontal illuminance shall exceed 2 lux throughout the HV compound in accordance with Eirgrid specification XDS-GFS-014-001-R2.

4. Conclusion

All the design parameters were satisfied. The worst-case illuminance is E_{min} [lx] 2.06.

5. Luminaire Parts List

20 Pieces LEDVANCE 4058075097704 FLOODLIGHT 135
135 W 4000 K IP65 BK
Article No.: 4058075097704
Luminous flux (Luminaire): 15000 lm
Luminous flux (Lamps): 15000 lm
Luminaire Wattage: 135.0 W
Luminaire classification according to CIE: 100
CIE flux code: 53 84 97 100 100
Fitting: 1 x FLOODLIGHT 135 W 4000 K IP65 BK
(Correction Factor 1.000).

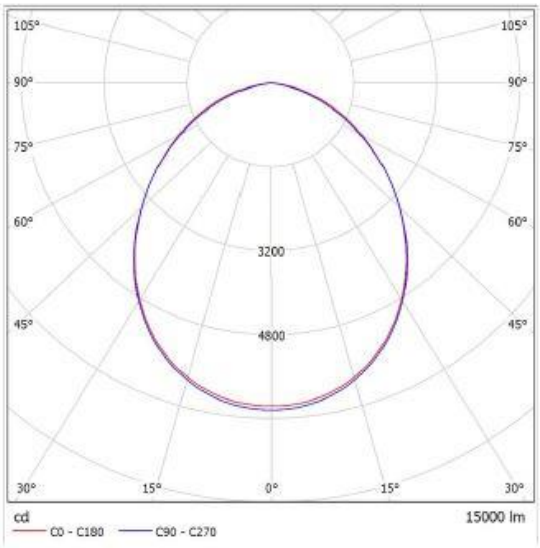


5.1 LEDVANCE GMBH 4058075097704 FLOOD LED SYM 135W/4000K BK IP65 / LUMINAIRE DATA SHEET

Luminaire classification according to CIE: 100
CIE flux code: 53 84 97 100 100

Luminaire with symmetrical light output with 135 W. Product features: Luminaire efficacy: up to 110 lm/W. Symmetrical beam angle: 100° x 100°. Mounting bracket for up to 180° tilting. Type of protection: IP65. Impact resistance: IK08. Ambient temperature in operation: -20…+50 °C. Connection via 1 m cable, wiring required. Product benefits: Energy savings of up to 90 % compared to halogen lamp floodlights. Frosted cover made of tempered glass for uniform illumination. Optimized weight and size due to compact design. 5 years guarantee. Areas of application: Replacement for floodlights with halogen lamps. Garages. Public areas. Building facades. Construction areas. D-sign according to EN 60598-2-24 for fire-nisk commercial unit, f. e. by accumulation of dust.

Luminous emittance 1:



Luminous emittance 1:

Glare Evaluation According to UGR

ρ Ceiling		70	70	50	50	30	70	70	50	50	30
ρ Walls		50	30	50	30	30	50	30	50	30	30
ρ Floor		20	20	20	20	20	20	20	20	20	20
Room Size X	Y	Viewing direction at right angles to lamp axis					Viewing direction parallel to lamp axis				
2H	2H	27.6	28.8	27.9	29.0	29.3	27.6	28.8	27.9	29.1	29.3
	3H	28.9	30.0	29.2	30.3	30.5	28.8	29.9	29.1	30.2	30.5
	4H	29.3	30.4	29.6	30.6	30.9	29.1	30.2	29.5	30.5	30.8
	6H	29.5	30.5	29.9	30.8	31.1	29.3	30.2	29.6	30.5	30.8
	8H	29.5	30.5	29.9	30.8	31.1	29.3	30.2	29.6	30.5	30.8
	12H	29.5	30.4	29.9	30.8	31.1	29.2	30.1	29.6	30.4	30.8
4H	2H	28.0	29.1	28.3	29.3	29.6	28.0	29.1	28.4	29.4	29.7
	3H	29.5	30.4	29.9	30.7	31.1	29.4	30.3	29.8	30.6	31.0
	4H	30.0	30.8	30.4	31.2	31.5	29.8	30.6	30.2	31.0	31.3
	6H	30.3	31.0	30.8	31.4	31.8	30.0	30.7	30.4	31.1	31.5
	8H	30.4	31.0	30.8	31.4	31.8	30.0	30.7	30.5	31.0	31.5
	12H	30.4	31.0	30.8	31.4	31.8	30.0	30.6	30.4	31.0	31.4
8H	4H	30.2	30.8	30.6	31.2	31.6	30.0	30.6	30.4	31.0	31.4
	6H	30.5	31.0	31.0	31.5	31.9	30.2	30.7	30.7	31.2	31.6
	8H	30.6	31.1	31.1	31.5	32.0	30.2	30.7	30.7	31.1	31.6
	12H	30.6	31.0	31.1	31.5	32.0	30.2	30.6	30.7	31.1	31.6
12H	4H	30.2	30.7	30.6	31.1	31.6	30.0	30.5	30.4	31.0	31.4
	6H	30.5	31.0	31.0	31.4	31.9	30.2	30.7	30.7	31.1	31.6
	8H	30.6	31.0	31.1	31.5	32.0	30.2	30.6	30.7	31.1	31.6

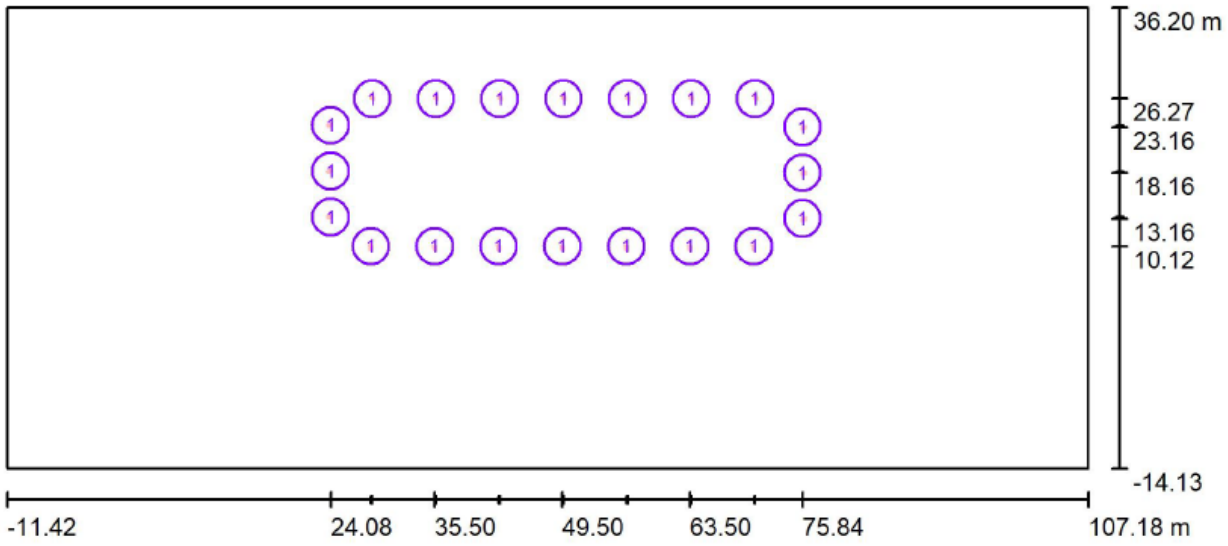
Variation of the observer position for the luminaire distances S

S = 1.0H	+0.2 / -0.2	+0.2 / -0.3
S = 1.5H	+0.3 / -0.6	+0.4 / -0.7
S = 2.0H	+0.7 / -1.2	+0.9 / -1.3
Standard table	BK04	BK03
Correction Summand	4.0	3.3

Corrected Glare Indices referring to 15000lm Total Luminous Flux

6 HV Compound

6.1 HV Compound / Normal Lighting / Summary



Scale 1 : 848

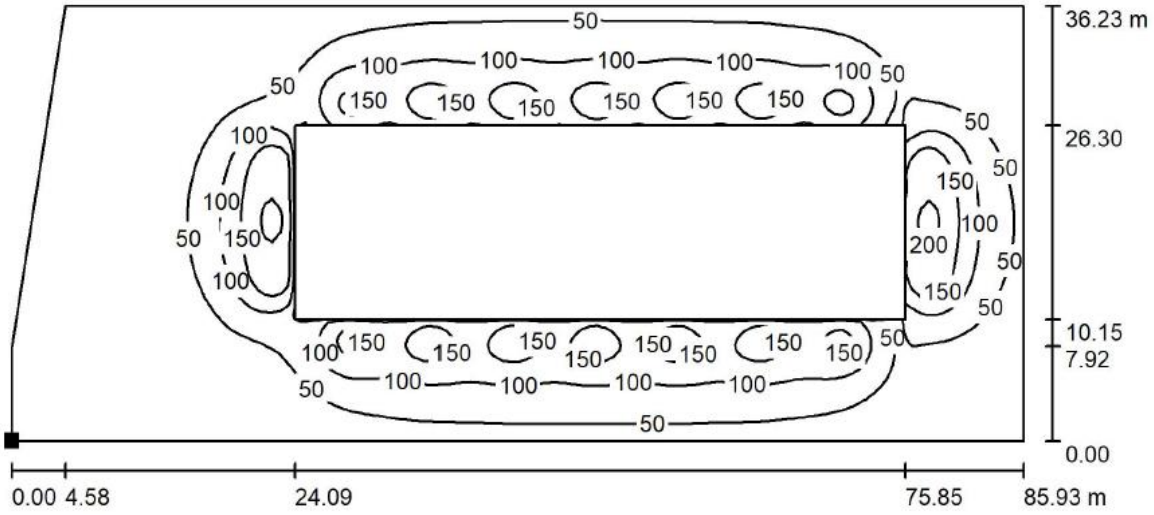
Luminaire Parts List

No.	Pieces	Designation
1	20	LEDVANCE 4058075097704 FLOODLIGHT 135 135 W 4000 K IP65 BK

- Lights have been mounted at a height of 4.9 m above ground level.
- Measurements above are taken from the fence line around the substation building from drawing no. 21_115-CSE-00-XX-DR-C-2105 PROPOSED FENCING LAYOUT PLAN

21_115-CSE-00-XX-D
R-C-2105 PROPOSEI

6.2 HV Compound / Isolines (E)



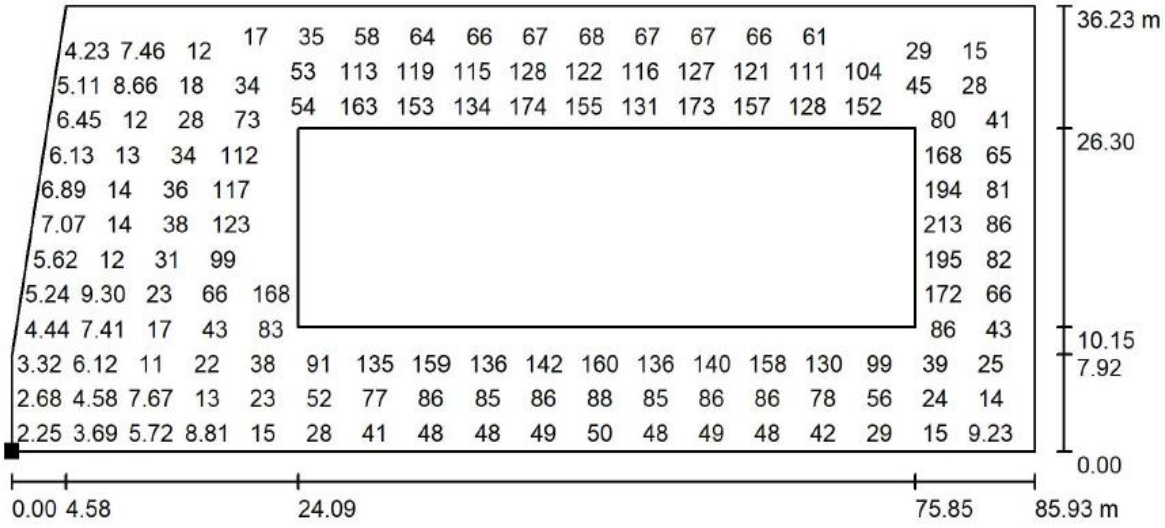
Values in Lux, Scale 1 : 615

Position of surface in external scene:
Marked point:
(-0.013 m, -0.029 m, 0.000 m)

Grid: 128 x 128 Points

E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0	E_{min} / E_{max}
67	2.06	217	0.031	0.010

6.3 HV Compound / Value Chart (E)



Values in Lux, Scale 1 : 615

Not all calculated values could be displayed.

Position of surface in external scene:
Marked point:
(-0.013 m, -0.029 m, 0.000 m)

Grid: 128 x 128 Points

E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0	E_{min} / E_{max}
67	2.06	217	0.031	0.010